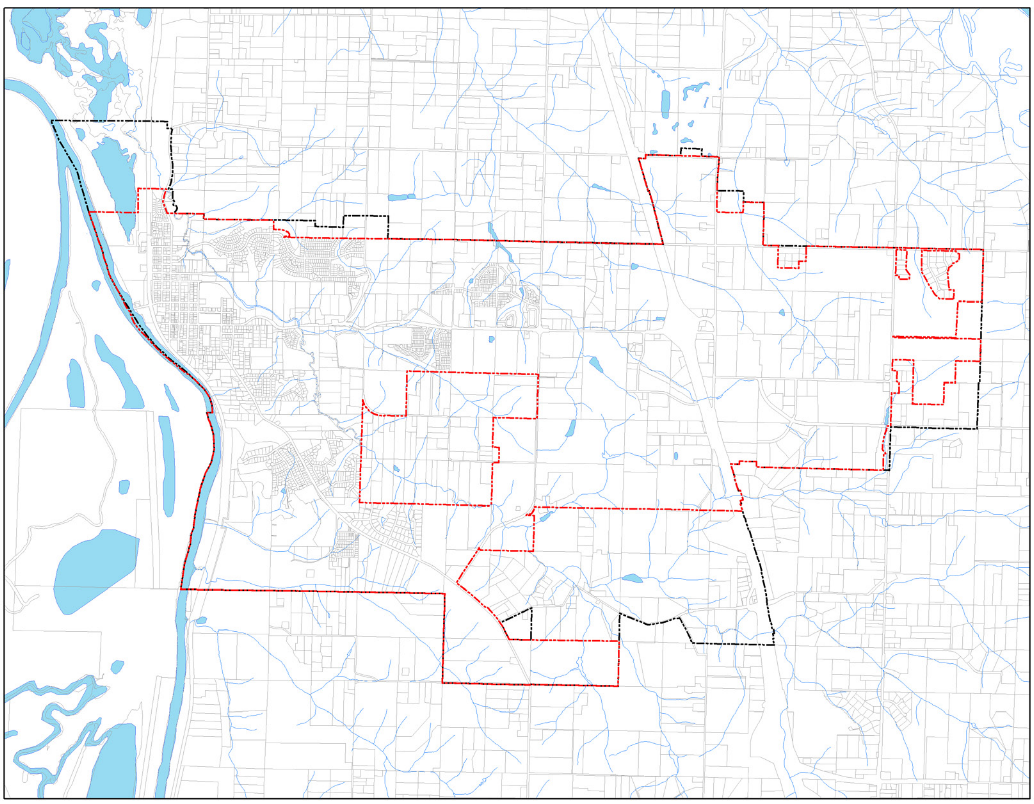
CITY OF RIDGEFIELD
CLARK COUNTY, WASHINGTON

GENERAL SEWER PLAN
VOLUME 2 – APPENDICES



G&O No. 13214
March 2013

Gray & Osborne, Inc.
CONSULTING ENGINEERS

APPENDIX A

NPDES PERMIT, FACT SHEET, AND RELATED CORRESPONDENCE

Issuance Date: June 9, 2011
Effective Date: July 1, 2011
Expiration Date: June 30, 2016

DEPARTMENT OF
ECOLOGY
State of Washington

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT NO. WA0023272

State of Washington
DEPARTMENT OF ECOLOGY
Olympia, Washington 98504-7775

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1251 et seq.

City of Ridgefield

230 Pioneer Street
P.O. Box 608

Ridgefield, WA 98642

Plant Location: West Cook Street	Receiving Water: Lake River
Water Body I.D. No.: Old ID # WA-28-1010, New ID# 1220169456238	Discharge Location: Latitude: 45.82150 Longitude: -122.75402
Plant Type: Activated sludge with secondary clarifier and UV disinfection	

is authorized to discharge in accordance with the special and general conditions that follow.

Steven G. Eberl, P.E.
Acting Southwest Regional Manager
Water Quality Program
Washington State Department of Ecology

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GENERAL CONDITIONS

SUMMARY OF PERMIT REPORT SUBMITTALS

Refer to the Special and General Conditions of this permit for additional submittal requirements.

Permit Section	Submittal	Frequency	First Submittal Date
S1.	Declaration of Completion of Construction	1/permit	When Completed
S3.	Discharge Monitoring Report	Monthly	August 15, 2011
S3.E	Noncompliance Notification	As necessary	
S4.B.	Plans for Maintaining Adequate Capacity	As necessary	
S4.C.	Notification of New or Altered Sources	As necessary	
S4.E.	Infiltration and Inflow Evaluation	Annually	October 15, 2011
S4.F.	Wasteload Assessment	Annually	October 15, 2011
S5.G.	O&M Manual Update/Review Letter	Annually	March 15, 2012
S6.D.	Industrial User Survey	1/permit cycle	June 15, 2015
S8.A.	Acute Toxicity Characterization Data	2/permit (once in summer and once in winter)	September 15, 2014 April 15, 2015
S8.A.	Acute Toxicity Tests Characterization Summary Report	1/permit cycle	September 15, 2015
S8.D	Acute Toxicity: "Causes and Preventative Measures for Transient Events."	As necessary	
S8.D	Acute Toxicity TI/TRE Plan	As necessary	
S9.A	Chronic Toxicity Characterization Data	2/permit (once in summer and once in winter)	September 15, 2014 April 15, 2015
S9.A	Chronic Toxicity Tests Characterization Summary Report	1/permit cycle	September 15, 2015
S9.D	Chronic Toxicity: "Causes and Preventative Measures for Transient Events"	As necessary	
S9.D	Chronic Toxicity TI/TRE Plan	As necessary	
S10.	Outfall Evaluation	1/permit cycle	October 15, 2013
S11.	Schedule for Installing Alkalinity Addition System	As necessary	Within 90 days of effluent pH <6.0 or <70 mg/L Alkalinity
G1.	Notice of Change in Authorization	As necessary	
G4.	Permit Application for Substantive Changes to the Discharge	As necessary	

Permit Section	Submittal	Frequency	First Submittal Date
G5.	Engineering Report for Construction or Modification Activities	As necessary	
G7.	Application for Permit Renewal	1/permit cycle	January 1, 2016
G21	Notice of Planned Changes	As necessary	
G22	Reporting Anticipated Non-compliance	As necessary	

SPECIAL CONDITIONS

S1. DISCHARGE LIMITS

A. Effluent Limits

All discharges and activities authorized by this permit shall be consistent with the terms and conditions of this permit. The discharge of any of the following pollutants more frequently than, or at a level in excess of, that identified and authorized by this permit shall constitute a violation of the terms and conditions of this permit.

Beginning on the effective date of this permit and lasting through the expiration date the Permittee is authorized to discharge municipal wastewater at the permitted location subject to complying with the following limitations:

PHASE 1[e] EFFLUENT LIMITS[a]: OUTFALL # 001		
Parameter	**Average Monthly**	**Average Weekly**
Biochemical Oxygen Demand[b] (5 day)	30 mg/L 175 lbs/day 85 percent removal	45 mg/L 263 lbs/day
Total Suspended Solids[b]	30 mg/L 175 lbs/day 85 percent removal	45 mg/L 263 lbs/day
Fecal Coliform Bacteria	100/100 mL	200/100 mL
pH[c]	Daily minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0.	
Parameter	**Average Monthly**	**Maximum Daily[d]**
Total Ammonia (as N)	1.4 mg/L 8.2 lbs/day	3.14 mg/L
[a] The average monthly and weekly effluent limitations are based on the arithmetic mean of the samples taken with the exception of fecal coliform, which is based on the geometric mean.		
[b] The average monthly effluent concentration for BOD_5 and Total Suspended Solids shall not exceed 30 mg/L or 15 percent of the respective monthly average influent concentrations, whichever is more stringent.		
[c] Indicates the range of permitted values. When pH is continuously monitored, excursions between 5.0 and 6.0, or 9.0 and 10.0 shall not be considered violations provided no single excursion exceeds 60 minutes in length and total excursions do not exceed seven hours and 30 minutes per month. Any excursions below 5.0 and above 10.0 are violations. The instantaneous maximum and minimum pH shall be reported monthly.		

[d] The maximum daily effluent limitation is defined as the highest allowable daily discharge. The daily discharge means the discharge of a pollutant measured during a calendar day. For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For other units of measurement, the daily discharge is the average measurement of the pollutant over the day.
[e] Phase 1 limits apply until the first of the month following receipt of the declaration triggering Phase 2 limits (footnote 'e' in the following table.

PHASE 2[e] EFFLUENT LIMITS[a]: OUTFALL # 001		
Parameter	**Average Monthly**	**Average Weekly**
Biochemical Oxygen Demand[b] (5 day)	30 mg/L 202 lbs/day 85 percent removal	45 mg/L 303 lbs/day
Total Suspended Solids[b]	30 mg/L 202 lbs/day 85 percent removal	45 mg/L 303 lbs/day
Fecal Coliform Bacteria	100/100 mL	200/100 mL
pH[c]	Daily minimum is equal to or greater than 6.0 and the daily maximum is less than or equal to 9.0.	
Parameter	**Average Monthly**	**Maximum Daily[d]**
Total Ammonia (as N)	1.2 mg/L 10 lbs/day	2.9 mg/L
[a] The average monthly and weekly effluent limitations are based on the arithmetic mean of the samples taken with the exception of fecal coliform, which is based on the geometric mean.		
[b] The average monthly effluent concentration for BOD_5 and Total Suspended Solids shall not exceed 30 mg/L or 15 percent of the respective monthly average influent concentrations, whichever is more stringent.		
[c] Indicates the range of permitted values. When pH is continuously monitored, excursions between 5.0 and 6.0, or 9.0 and 10.0 shall not be considered violations provided no single excursion exceeds 60 minutes in length and total excursions do not exceed seven hours and 30 minutes per month. Any excursions below 5.0 and above 10.0 are violations. The instantaneous maximum and minimum pH shall be reported monthly.		
[d] The maximum daily effluent limitation is defined as the highest allowable daily discharge. The daily discharge means the discharge of a pollutant measured during a calendar day. For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For other units of measurement, the daily discharge is the average measurement of the pollutant over the day.		
[e] Phase 2 limits apply on the first day of the month following the receipt by the Department of Ecology of a properly completed Declaration of Completion of Construction of Water Pollution Control Facilities (see Chapter 173-240 WAC for format) for the facilities described in the approved Facility Plan as Phase 2 improvements.		

B. Mixing Zone Descriptions

The mixing zone appears to fit the model of the estuary best because of the tide reversals. The maximum boundaries of the mixing zones are therefore defined as:

Chronic boundary extends 200 feet upstream and 200 feet downstream. The width of Lake River is 240 feet wide and the mixing zone is allowed only 25 percent of the width which is 60 feet.

The Acute boundary is 10 percent of the 200-foot value established above, which is a 20-foot radius from the end of the pipe.

S2. MONITORING REQUIREMENTS

A. Monitoring Schedule

Category	Parameter	Units	Sample Point	Minimum Sampling Frequency	Sample Type
Wastewater Influent	BOD_5	mg/L lbs/day	Influent at Headworks past the screening	2/week	24-hour Composite
Wastewater Influent	TSS	mg/L lbs/day	Influent at Headworks past the screening	2/week	24-hour Composite
Wastewater Influent	Total Ammonia as N	mg/L lbs/day	Influent at Headworks past the screening	2/week	Grab
Wastewater Effluent	Flow	MGD	Effluent past the weir	Continuous[a]	Recording
Wastewater Effluent	BOD_5	mg/L lbs/day	Effluent past the weir	2/week	24-hour Composite
Wastewater Effluent	TSS	mg/L lbs/day	Effluent past the weir	2/week	24-hour Composite
Wastewater Effluent	pH	Standard Units	Effluent past the weir	Daily	Grab
Wastewater Effluent	Fecal Coliform	#/100 ml	Effluent past the weir	2/week	Grab
Wastewater Effluent	Total Ammonia as N	mg/L lbs/day	Effluent past the weir	2/week	Grab
Wastewater Effluent	Alkalinity	mg/L as CaCO3	Effluent past the weir	2/week	24-hour Composite

Category	Parameter	Units	Sample Point	Minimum Sampling Frequency	Sample Type
Wastewater Effluent	Temperature[b]	Deg C	Effluent past the weir	Continuous[a]	Recorded
Wastewater Effluent	Nitrite as N	mg/L	Effluent past the weir	Quarterly[d]	Grab
Wastewater Effluent	Nitrate as N	mg/L	Effluent past the weir	Quarterly[d]	Grab
Wastewater Effluent	TKN	mg/L	Effluent past the weir	Quarterly[d]	Grab
Wastewater Effluent	Ortho-phosphate (PO_4)	mg/L	Effluent past the weir	Quarterly[d]	Grab
Wastewater Effluent	Total Phosphorus	mg/L	Effluent past the weir	Quarterly[d]	Grab
Acute Toxicity Testing	Section S9 for details on monitoring (Test 2/year for one year unless a limit is needed in which case testing shall be 2/year each following year)				
Chronic Toxicity Testing	Section S10 for details on monitoring (Test 2/year for one year unless a limit is needed in which case testing shall be 2/year each following year)				

[a] Continuous means uninterrupted except for brief lengths of time for calibration, for power failure, or for unanticipated equipment repair or maintenance. Sampling shall be taken twice daily when continuous monitoring is not possible.

[b] To determine the daily maximum temperature, recorders may be set for reading every half-hour and choosing highest value during the 24-hour period.

[c] Clean sampling techniques are required for all metals sampling to avoid false positive errors. The Permittee should also follow lab testing that uses EPA method 200.8 that specifies the use of Induced Coupled Plasma with Mass Spectrometry (ICP/MS). Mercury shall be tested using EPA method 1631 Revision C (in 40 CFR Part 136).

[d] Quarterly is defined as: January through March, report with March DMR
April through June, report with June DMR
July through September, report with September DMR
October through December, report with December DMR

B. Sampling and Analytical Procedures

Samples and measurements taken to meet the requirements of this permit shall be representative of the volume and nature of the monitored parameters, including representative sampling of any unusual discharge or discharge condition, including bypasses, upsets, and maintenance-related conditions affecting effluent quality.

Sampling and analytical methods used to meet the monitoring requirements specified in this permit shall conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 Code of Federal Regulations (CFR) Part 136 or to the latest revision of *Standard Methods for the Examination of Water and Wastewater* (APHA), unless otherwise specified in this permit or approved in writing by the Department of Ecology (Ecology).

C. Flow Measurement

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the quantity of monitored flows. The devices shall be installed, calibrated, and maintained to ensure that the accuracy of the measurements are consistent with the accepted industry standard for that type of device. Frequency of calibration shall be in conformance with manufacturer's recommendations and at a minimum frequency of at least one calibration per year. Calibration records shall be maintained for at least three years.

D. Laboratory Accreditation

All monitoring data required by Ecology shall be prepared by a laboratory registered or accredited under the provisions of, *Accreditation of Environmental Laboratories*, Chapter 173-50 Washington Administrative Code (WAC). Flow, temperature, settleable solids, conductivity, pH, and internal process control parameters are exempt from this requirement. Conductivity and pH shall be accredited if the laboratory must otherwise be registered or accredited. Ecology exempts crops, soils, and hazardous waste data from this requirement pending accreditation of laboratories for analysis of these media.

S3. REPORTING AND RECORDKEEPING REQUIREMENTS

The Permittee must monitor and report in accordance with the following conditions. Falsification of information submitted to Ecology is a violation of the terms and conditions of this permit.

A. Reporting

The first monitoring period begins on the effective date of the permit. The Permittee must:

1. Submit monitoring results each month.

2. Summarize, report, and submit monitoring data obtained during each monitoring period on a Discharge Monitoring Report (DMR) form provided, or otherwise approved, by Ecology.

3. Submit DMR forms monthly whether or not the facility was discharging. If the facility did not discharge during a given monitoring period, submit the form as required with the words "NO DISCHARGE" entered in place of the monitoring results.

4. Ensure that DMR forms are postmarked or received by Ecology no later than the 15th day of the month following the completed monitoring period, unless otherwise specified in this permit.

5. Send report(s) to Ecology at:

Water Quality Permit Coordinator
Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

All laboratory reports providing data for organic and metal parameters must include the following information: sampling date, sample location, date of analysis, parameter name, CAS number, analytical method/number, method detection limit (MDL), laboratory practical quantitation limit (PQL), reporting units, and concentration detected. Analytical results from samples sent to a contract laboratory must include information on the chain of custody, the analytical method, QA/QC results, and documentation of accreditation for the parameter.

B. Records Retention

The Permittee must retain records of all monitoring information for a minimum of three years. Such information must include all calibration and maintenance records and all original recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit. The Permittee must extend this period of retention during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by Ecology.

C. Recording of Results

For each measurement or sample taken, the Permittee must record the following information:

1. The date, exact place, method, and time of sampling or measurement.

2. The individual who performed the sampling or measurement.

3. The dates the analyses were performed.

4. The individual who performed the analyses.

5. The analytical techniques or methods used.

6. The results of all analyses.

D. Additional Monitoring by the Permittee

If the Permittee monitors any pollutant more frequently than required by Condition S2 of this permit, then the Permittee must include the results of such monitoring in the calculation and reporting of the data submitted in the Permittee's DMR.

E. Reporting Permit Violations

The Permittee must take the following actions when it violates or is unable to comply with any permit condition:

- Immediately take action to stop, contain, and cleanup unauthorized discharges or otherwise stop the noncompliance and correct the problem.
- If applicable, immediately repeat sampling and analysis. Submit the results of any repeat sampling to Ecology within 30 days of sampling.

1. Immediate Reporting

The Permittee must report any failure of the disinfection system immediately to the Department of Ecology's Regional Office 24-hour number listed below:

Southwest Regional Office 360-407-6300

The Permittee must report any failure of the disinfection system, any collection system overflows, or any plant bypass discharging to a waterbody used as a source of drinking water immediately to the Department of Ecology and the Department of Health, Drinking Water Program at the numbers listed below:

Southwest Regional Office	360-407-6300
Department of Health Drinking Water Program	360-521-0323 (business hours) 360-481-4901 (after business hours)

2. Twenty-Four (24)-Hour Reporting

The Permittee must report the following occurrences of noncompliance by telephone, to Ecology at 360-407-6300, within 24 hours from the time the Permittee becomes aware of any of the following circumstances:

a. Any noncompliance that may endanger health or the environment, unless previously reported under subpart 1, above.

b. Any unanticipated **bypass** that exceeds any effluent limitation in the permit (See Part S4.B., "Bypass Procedures").

c. Any **upset** that exceeds any effluent limitation in the permit (See G.15, "Upset").

d. Any violation of a maximum daily or instantaneous maximum discharge limitation for any of the pollutants in Section S1.A of this permit.

e. Any overflow prior to the treatment works, whether or not such overflow endangers health or the environment or exceeds any effluent limitation in the permit.

3. Report Within Five Days

The Permittee must also provide a written submission within five days of the time that the Permittee becomes aware of any event required to be reported under subparts 1 or 2, above. The written submission must contain:

a. A description of the noncompliance and its cause.

b. The period of noncompliance, including exact dates and times.

c. The estimated time noncompliance is expected to continue if it has not been corrected.

d. Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

e. If the noncompliance involves an overflow prior to the treatment works, an estimate of the quantity (in gallons) of untreated overflow.

4. Waiver of Written Reports

Ecology may waive the written report required in subpart 3, above, on a case-by-case basis upon request if a timely oral report has been received.

5. All Other Permit Violation Reporting

The Permittee must report all permit violations, which do not require immediate or within 24 hours reporting, when it submits monitoring reports for S3.A ("Reporting"). The reports must contain the information listed in paragraph E.3, above. Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply.

6. Report Submittal

The Permittee must submit reports to the address listed in S3.

F. Other Reporting

The Permittee must report a spill of oil or hazardous materials in accordance with the requirements of RCW 90.56.280 and chapter 173-303-145. You can obtain further

instructions at the following website:
http://www.ecy.wa.gov/programs/spills/other/reportaspill.htm.

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to Ecology, it must submit such facts or information promptly.

The Permittee must submit a new application or supplement at least 180 days prior to commencement of discharges, resulting from the activities listed below, which may result in permit violations. These activities include: any facility expansions, production increases, or other planned changes, such as process modifications, in the permitted facility.

G. Maintaining a Copy of This Permit

The Permittee must keep a copy of this permit at the facility and make it available upon request to Ecology inspectors.

S4. FACILITY LOADING

A. Design Criteria

Flows or waste loadings of the following design criteria for the permitted treatment facility shall not be exceeded:

Phase 1:

Average flow for the maximum month:	0.70 MGD
BOD_5 loading for maximum month:	1,240 lbs/day
TSS loading for maximum month:	1,240 lbs/day
Ammonia loading for maximum month:	160 lbs/day

Phase 2: (Applicable after acceptance of the Declaration of Completion of Construction of Water Pollution Control Facilities for Phase 2.)

Average flow for the maximum month:	1.0 MGD
BOD_5 loading for maximum month:	1,348 lbs/day
TSS loading for maximum month:	1,348 lbs/day
Ammonia loading for maximum month:	225 lbs/day

B. Plans for Maintaining Adequate Capacity

The Permittee shall submit to Ecology a plan and a schedule for continuing to maintain capacity when:

1. The actual flow or waste load reaches 85 percent of any one of the design criteria in S4.A for three consecutive months; or

2. When the projected increase would reach design capacity within five years,

Whichever occurs first. If such a plan is required, it shall contain a plan and schedule for continuing to maintain capacity. The capacity as outlined in this plan must be sufficient to achieve the effluent limitations and other conditions of this permit. This plan shall address any of the following actions or any others necessary to meet the objective of maintaining capacity.

a. Analysis of the present design including the introduction of any process modifications that would establish the ability of the existing facility to achieve the effluent limits and other requirements of this permit at specific levels in excess of the existing design criteria specified in paragraph A above.

b. Reduction or elimination of excessive infiltration and inflow of uncontaminated ground and surface water into the sewer system.

c. Limitation on future sewer extensions or connections or additional waste loads.

d. Modification or expansion of facilities necessary to accommodate increased flow or waste load.

e. Reduction of industrial or commercial flows or waste loads to allow for increasing sanitary flow or waste load.

Engineering documents associated with the plan must meet the requirements of WAC 173-240-060, "Engineering Report," and be approved by Ecology prior to any construction. The plan shall specify any contracts, ordinances, methods for financing, or other arrangements necessary to achieve this objective.

C. Duty to Mitigate

The Permittee is required to take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment

D. Notification of New or Altered Sources

The Permittee shall submit written notice to Ecology whenever any new discharge or a substantial change in volume or character of an existing discharge into the Publicly Owned Treatment Works (POTW) is proposed which: (1) would interfere with the operation of, or exceed the design capacity of, any portion of the POTW; (2) is not part of an approved general sewer plan or approved plans and specifications; or (3) would be subject to pretreatment standards under 40 CFR Part 403 and Section 307(b) of the Clean Water Act. This notice shall include an evaluation of the POTW's ability to adequately transport and treat the added flow and/or waste load, the quality and volume of effluent to be discharged to the POTW, and the anticipated impact on the Permit tee's effluent [40 CFR 122.42(b)].

E. Infiltration and Inflow Evaluation

1. The Permittee shall conduct an infiltration and inflow evaluation. Refer to the U.S. EPA publication, *I/I Analysis and Project Certification*, available as Publication No. 97-03 at: Publications Office, Department of Ecology, P.O. Box 47600, Olympia, Washington 98504-7600. Plant monitoring records may be used to assess measurable infiltration and inflow.

2. A report shall be prepared which summarizes any measurable infiltration and inflow for the calendar year. If infiltration and inflow have increased by more than 15 percent from that found in the first report based on equivalent rainfall, the report shall contain a plan and a schedule for: (1) locating the sources of infiltration and inflow; and (2) correcting the problem.

3. The report shall be submitted by **October 15, 2011,** and **annually** thereafter.

F. Wasteload Assessment

The Permittee shall conduct an annual assessment of their flow and waste load for the calendar and submit year a report to Ecology by **October 15, 2011**, and **annually** thereafter. The report shall contain the following: an indication of compliance or noncompliance with the permit effluent limitations; a comparison between the existing and design monthly average dry weather and wet weather flows, peak flows, BOD, and total suspended solids loadings; and (except for the first rèport) the percentage increase in these parameters since the last annual report. The report shall also state the present and design population or population equivalent, projected population growth rate, and the estimated date upon which the design capacity is projected to be reached, according to the most restrictive of the parameters above. The interval for review and reporting may be modified if Ecology determines that a different frequency is sufficient.

S5. OPERATION AND MAINTENANCE

The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems, which are installed by a Permittee only when the operation is necessary to achieve compliance with the conditions of this permit.

A. Certified Operator

An operator certified for at least a Class II plant by the state of Washington shall be in responsible charge of the day-to-day operation of the wastewater treatment plant. An operator certified for at least a Class I plant shall be in charge during all regularly scheduled shifts.

B. O & M Program

The Permittee shall institute an adequate operation and maintenance program for their entire sewage system. Maintenance records shall be maintained on all major electrical and mechanical components of the treatment plant, as well as the sewage system and pumping stations. Such records shall clearly specify the frequency and type of maintenance recommended by the manufacturer and shall show the frequency and type of maintenance performed. These maintenance records shall be available for inspection at all times.

C. Short-term Reduction

If a Permittee contemplates a reduction in the level of treatment that would cause a violation of permit discharge limitations on a short-term basis for any reason, and such reduction cannot be avoided, the Permittee shall give written notification to Ecology, if possible, 30 days prior to such activities, detailing the reasons for, length of time of, and the potential effects of the reduced level of treatment. This notification does not relieve the Permittee of their obligations under this permit.

D. Electrical Power Failure

The Permittee is responsible for maintaining adequate safeguards to prevent the discharge of untreated wastes or wastes not treated in accordance with the requirements of this permit during electrical power failure at the treatment plant and/or sewage lift stations either by means of alternate power sources, standby generator, or retention of inadequately treated wastes.

The Permittee shall maintain Reliability Class II (EPA 430-99-74-001) at the wastewater treatment plant, which requires a backup power source sufficient to operate all vital components and critical lighting and ventilation during peak wastewater flow conditions, except vital components used to support the secondary processes (i.e., mechanical aerators or aeration basin air compressors) need not be operable to full levels of treatment, but shall be sufficient to maintain the biota.

E. Prevent Connection of Inflow

The Permittee shall strictly enforce their sewer ordinances and not allow the connection of inflow (roof drains, foundation drains, etc.) to the sanitary sewer system.

F. Bypass Procedures

Bypass, which is the intentional diversion of waste streams from any portion of a treatment facility, is prohibited, and Ecology may take enforcement action against a Permittee for bypass unless one of the following circumstances (1, 2, or 3) is applicable.

1. Bypass for essential maintenance without the potential to cause violation of permit limits or conditions.

   Bypass is authorized if it is for essential maintenance and does not have the potential to cause violations of limitations or other conditions of this permit, or adversely impact public health as determined by Ecology prior to the bypass. The Permittee shall submit prior notice, if possible at least 10 days before the date of the bypass.

2. Bypass which is unavoidable, unanticipated and results in noncompliance of this permit.

This bypass is permitted only if:

a. Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.

b. There are no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment downtime (but not if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance), or transport of untreated wastes to another treatment facility.

c. Ecology is properly notified of the bypass as required in Condition S3E of this permit.

3. Bypass which is anticipated and has the potential to result in noncompliance of this permit.

The Permittee shall notify Ecology at least 30 days before the planned date of bypass. The notice shall contain: (1) a description of the bypass and its cause; (2) an analysis of all known alternatives which would eliminate, reduce, or mitigate the need for bypassing; (3) a cost-effectiveness analysis of alternatives including comparative resource damage assessment; (4) the minimum and maximum duration of bypass under each alternative; (5) a recommendation as to the preferred alternative for conducting the bypass; (6) the projected date of bypass initiation; (7) a statement of compliance with State Environmental Policy Act (SEPA); (8) a request for modification of water quality standards as provided for in WAC 173-201A-110, if an exceedance of any water quality standard is anticipated; and (9) steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass.

For probable construction bypasses, the need to bypass is to be identified as early in the planning process as possible. The analysis required above shall be considered during preparation of the engineering report or facilities plan and plans and specifications and shall be included to the extent practical. In cases where the probable need to bypass is determined early, continued analysis is necessary up to and including the construction period in an effort to minimize or eliminate the bypass.

Ecology will consider the following prior to issuing an administrative order for this type bypass:

a. If the bypass is necessary to perform construction or maintenance-related activities essential to meet the requirements of this permit.

b. If there are feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment down time, or transport of untreated wastes to another treatment facility.

c. If the bypass is planned and scheduled to minimize adverse effects on the public and the environment.

After consideration of the above and the adverse effects of the proposed bypass and any other relevant factors, Ecology will approve or deny the request. The public shall be notified and given an opportunity to comment on bypass incidents of significant duration, to the extent feasible. Approval of a request to bypass will be by administrative order issued by Ecology under Revised Code of Washington (RCW) 90.48.120.

G. Operations and Maintenance Manual

The approved Operations and Maintenance Manual shall be kept available at the treatment plant and all operators shall follow the instructions and procedures of this manual.

In addition to requirements of WAC 173-240-080 (1) through (5) the O&M Manual shall include:

1. Emergency procedures for plant shutdown and cleanup in event of wastewater system upset or failure.

2. Wastewater system maintenance procedures that contribute to the generation of process wastewater

3. Any directions to maintenance staff when cleaning, or maintaining other equipment or performing other tasks which are necessary to protect the operation of the wastewater system (e.g., defining maximum allowable discharge rate for draining a tank, blocking all floor drains before beginning the overhaul of a stationary engine.)

4. The treatment plant process control monitoring schedule.

The O&M Manual shall be reviewed by the Permittee at least annually and the Permittee shall confirm this review by letter to Ecology by **March 15, 2012**, and **annually** thereafter. Substantial changes or updates to the O&M Manual shall be submitted to Ecology whenever they are incorporated into the manual.

S6. PRETREATMENT

A. General Requirements

The Permittee shall work with Ecology to ensure that all commercial and industrial users of the POTW are in compliance with the pretreatment regulations promulgated in 40 CFR Part 403 and any additional regulations that may be promulgated under Section 307(b) (pretreatment) and 308 (reporting) of the Federal Clean Water Act.

B. Wastewater Discharge Permit Required

The Permittee shall not allow significant industrial users (SIUs) to discharge wastewater to the Permittee's sewerage system until such user has received a wastewater discharge permit from Ecology in accordance with Chapter 90.48 RCW and Chapter 173-216 WAC, as amended.

C. Identification and Reporting of Existing, New, and Proposed Industrial Users

1. The Permittee shall take continuous, routine measures to identify all existing, new, and proposed SIUs and potential significant industrial users (PSIUs) discharging or proposing to discharge to the Permittee's sewerage system (see Appendix B of Fact Sheet for definitions).

2. Within 30 days of becoming aware of an unpermitted existing, new, or proposed industrial user who may be an SIU, the Permittee shall notify such user by registered mail that, if classified as an SIU, they shall be required to apply to Ecology and obtain a State Waste Discharge Permit. A copy of this notification letter shall also be sent to Ecology within this same 30-day period.

3. The Permittee shall also notify all PSIUs, as they are identified, that if their classification should change to an SIU, they shall be required to apply to Ecology for a State Waste Discharge Permit within 30 days of such change.

D. Industrial User Survey

The Permittee shall complete and submit to Ecology an Industrial User Survey listing all SIUs and PSIUs discharging to the POTW. The survey shall be conducted once during the permit and shall be received by Ecology by **June 15, 2015**. At a minimum, the list of SIUs and PSIUs shall be developed by means of a telephone book search, a water utility billing records search, and a physical reconnaissance of the service area. Information on PSIUs shall at least include: the business name, telephone number, address, description of the industrial process(es), and the known wastewater volumes and characteristics. For assistance with the development of the Industrial User Survey, the Permittee shall refer to Ecology's guidance document entitled "Performing an Industrial User Survey."

E. Duty to Enforce Discharge Prohibitions

1. In accordance with 40 CFR 403.5(a), the Permittee shall not authorize or knowingly allow the discharge of any pollutants into its POTW which cause pass through or interference, or which otherwise violates general or specific discharge prohibitions contained in 40 CFR Part 403.5 or WAC-173-216-060.

2. The Permittee shall not authorize or knowingly allow the introduction of any of the following into their treatment works:

    a. Pollutants which create a fire or explosion hazard in the POTW (including, but not limited to waste streams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test methods specified in 40 CFR 261.21).

b. Pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.0, or greater than 11.0 standard units, unless the works are specifically designed to accommodate such discharges.

c. Solid or viscous pollutants in amounts that could cause obstruction to the flow in sewers or otherwise interfere with the operation of the POTW.

d. Any pollutant, including oxygen demanding pollutants, (BOD, etc.) released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the POTW.

e. Petroleum oil, nonbiodegradable cutting oil, or products of mineral origin in amounts that will cause interference or pass through.

f. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity which may cause acute worker health and safety problems.

g. Heat in amounts that will inhibit biological activity in the POTW resulting in interference but in no case heat in such quantities such that the temperature at the POTW headworks exceeds 40°C (104°F) unless Ecology, upon request of the Permittee, approves, in writing, alternate temperature limits.

h. Any trucked or hauled pollutants, except at discharge points designated by the Permittee.

i. Wastewaters prohibited to be discharged to the POTW by the Dangerous Waste Regulations (Chapter 173-303 WAC), unless authorized under the Domestic Sewage Exclusion (WAC 173-303-071).

3. All of the following are prohibited from discharge to the POTW unless approved in writing by Ecology under extraordinary circumstances (such as a lack of direct discharge alternatives due to combined sewer service or the need to augment sewage flows due to septic conditions):

   a. Noncontact cooling water in significant volumes.

   b. Stormwater, and other direct inflow sources.

   c. Wastewaters significantly affecting system hydraulic loading, which do not require treatment, or would not be afforded a significant degree of treatment by the system.

4. The Permittee shall notify Ecology if any industrial user violates the prohibitions listed in this section.

S7. RESIDUAL SOLIDS

Residual solids include screenings, grit, scum, primary sludge, waste activated sludge, and other solid waste. The Permittee shall store and handle all residual solids in such a manner so as to prevent their entry into state ground or surface waters. The Permittee shall not discharge leachate from residual solids to state surface or ground waters.

S8. ACUTE TOXICITY

A. Effluent Characterization

The Permittee shall conduct acute toxicity testing on the final effluent to determine the presence and amount of acute (lethal) toxicity. The two acute toxicity tests listed below shall be conducted on each sample taken for effluent characterization.

Effluent characterization for acute toxicity shall be conducted twice in one year. Acute toxicity testing shall follow protocols, monitoring requirements, and quality assurance/quality control procedures specified in this section. A dilution series consisting of a minimum of five concentrations and a control shall be used to estimate the concentration lethal to 50 percent of the organisms (LC_{50}). The percent survival in 100 percent effluent shall also be reported.

A submittal of the acute toxicity characterization data are due **September 15, 2014,** for the summer sampling and **April 15, 2015,** for the winter sampling. A written report the acute toxicity characterization in the form of a summary report shall be due by **September 15, 2015.**

Acute toxicity tests shall be conducted with the following species and protocols:

1. Fathead minnow, *Pimephales promelas* (96 hour static-renewal test, method: EPA/600/4-90/027F).

2. Daphnid, *Ceriodaphnia dubia*, *Daphnia pulex*, or *Daphnia magna* (48 hour static test, method: EPA/600/4-90/027F). The Permittee shall choose one of the three species and use it consistently throughout effluent characterization.

B. Effluent Limit for Acute Toxicity

The Permittee has an effluent limit for acute toxicity if, after completing one year of effluent characterization, either:

1. The median survival of any species in 100 percent effluent is below 80 percent, or

2. Any one test of any species exhibits less than 65 percent survival in 100 percent effluent.

If an effluent limit for acute toxicity is required by subsection B at the end of one year of effluent characterization, the Permittee shall immediately complete all applicable requirements in subsections C, D, and F.

If no effluent limit is required by subsection B at the end of one year of effluent characterization, then the Permittee shall complete all applicable requirements in subsections E and F.

The effluent limit for acute toxicity is no acute toxicity detected in a test concentration representing the acute critical effluent concentration (ACEC).

In the event of failure to pass the test described in subsection C of this section for compliance with the effluent limit for acute toxicity, the Permittee is considered to be in compliance with all permit requirements for acute whole effluent toxicity as long as the requirements in subsection D are being met to the satisfaction of Ecology.

The ACEC means the maximum concentration of effluent during critical conditions at the boundary of the zone of acute criteria exceedance assigned pursuant to WAC 173-201A-100. The zone of acute criteria exceedance is authorized in Section S1.B of this permit. The ACEC equals 33 percent effluent.

C. Monitoring for Compliance With an Effluent Limit for Acute Toxicity

Monitoring to determine compliance with the effluent limit shall be conducted two times per year for the remainder of the permit term using each of the species listed in subsection A on a rotating basis and performed using at a minimum 100 percent effluent, the ACEC, and a control. The Permittee shall schedule the toxicity tests in the order listed in the permit unless Ecology notifies the Permittee in writing of another species rotation schedule. The percent survival in 100 percent effluent shall be reported for all compliance monitoring.

Compliance with the effluent limit for acute toxicity means no statistically significant difference in survival between the control and the test concentration representing the ACEC. The Permittee shall immediately implement subsection D if any acute toxicity test conducted for compliance monitoring determines a statistically significant difference in survival between the control and the ACEC using hypothesis testing at the 0.05 level of significance (Appendix H, EPA/600/4-89/001). If the difference in survival between the control and the ACEC is less than 10 percent, the hypothesis test shall be conducted at the 0.01 level of significance.

D. Response to Noncompliance With an Effluent Limit for Acute Toxicity

If the Permittee violates the acute toxicity limit in subsection B, the Permittee shall begin additional compliance monitoring within one week from the time of receiving the test results. This additional monitoring shall be conducted weekly for four consecutive weeks using the same test and species as the failed compliance test. Testing shall determine the LC_{50} and effluent limit compliance. The discharger shall return to the original monitoring frequency in subsection C after completion of the additional compliance monitoring.

If the Permittee believes that a test indicating noncompliance will be identified by Ecology as an anomalous test result, the Permittee may notify Ecology that the compliance test result might be anomalous and that the Permittee intends to take only one additional sample for toxicity testing and wait for notification from Ecology before completing the additional monitoring required in this subsection. The notification to

Ecology shall accompany the report of the compliance test result and identify the reason for considering the compliance test result to be anomalous. The Permittee shall complete all of the additional monitoring required in this subsection as soon as possible after notification by Ecology that the compliance test result was not anomalous. If the one additional sample fails to comply with the effluent limit for acute toxicity, then the Permittee shall proceed without delay to complete all of the additional monitoring required in this subsection. The one additional test result shall replace the compliance test result upon determination by Ecology that the compliance test result was anomalous.

If all of the additional compliance monitoring conducted in accordance with this subsection complies with the permit limit, the Permittee shall search all pertinent and recent facility records (operating records, monitoring results, inspection records, spill reports, weather records, production records, raw material purchases, pretreatment records, etc.) and submit a report to Ecology on possible causes and preventive measures for the transient toxicity event which triggered the additional compliance monitoring.

If toxicity occurs in violation of the acute toxicity limit during the additional compliance monitoring, the Permittee shall submit a Toxicity Identification/Reduction Evaluation (TI/RE) plan to Ecology. The TI/RE plan submittal shall be within 60 days after the sample date for the fourth additional compliance monitoring test. If the Permittee decides to forgo the rest of the additional compliance monitoring tests required in this subsection because one of the first three additional compliance monitoring tests failed to meet the acute toxicity limit, then the Permittee shall submit the TI/RE plan within 60 days after the sample date for the first additional monitoring test to violate the acute toxicity limit. The TI/RE plan shall be based on WAC 173-205-100(2) and shall be implemented in accordance with WAC 173-205-100(3).

E. Monitoring When There Is No Permit Limit for Acute Toxicity

The Permittee shall test final effluent once in the last summer and once in the last winter prior to submission of the application for permit renewal. All species used in the initial acute effluent characterization or substitutes approved by Ecology shall be used and results submitted to Ecology as a part of the permit renewal application process.

F. Sampling and Reporting Requirements

1. All reports for effluent characterization or compliance monitoring shall be submitted in accordance with the most recent version of Department of Ecology Publication #WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* in regards to format and content. Reports shall contain bench sheets and reference toxicant results for test methods. If the lab provides the toxicity test data on floppy disk for electronic entry into Ecology's database, then the Permittee shall send the disk to Ecology along with the test report, bench sheets, and reference toxicant results.

2. Testing shall be conducted on 24-hour composite effluent samples or grab samples. Composite samples taken for toxicity testing shall be cooled to 4 degrees Celsius while being collected and shall be sent to the lab immediately upon completion. Grab samples must be shipped on ice to the lab immediately upon collection. If a grab sample is received at the testing lab within one hour after collection, it must have a temperature below 20°C at receipt. If a grab sample is received at the testing lab within 4 hours after collection, it must be below 12°C at receipt. All other samples must be below 8°C at receipt. The lab shall begin the toxicity testing as soon as possible but no later than 36 hours after sampling was ended. The lab shall store all samples at 4°C in the dark from receipt until completion of the test.

3. All samples and test solutions for toxicity testing shall have water quality measurements as specified in Department of Ecology Publication #WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* or most recent version thereof.

4. All toxicity tests shall meet quality assurance criteria and test conditions in the most recent versions of the EPA manual listed in subsection A and the Department of Ecology Publication #WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. If test results are determined to be invalid or anomalous by Ecology, testing shall be repeated with freshly collected effluent.

5. Control water and dilution water shall be laboratory water meeting the requirements of the EPA manual listed in subsection A or pristine natural water of sufficient quality for good control performance.

6. The whole effluent toxicity tests shall be run on an unmodified sample of final effluent.

7. The Permittee may choose to conduct a full dilution series test during compliance monitoring in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control. The series of concentrations must include the ACEC.

8. All whole effluent toxicity tests, effluent screening tests, and rapid screening tests that involve hypothesis testing, and do not comply with the acute statistical power standard of 29 percent as defined in WAC 173-205-020, must be repeated on a fresh sample with an increased number of replicates to increase the power.

S9. CHRONIC TOXICITY

A. Effluent Characterization

The Permittee shall conduct chronic toxicity testing on the final effluent. The two chronic toxicity tests listed below shall be conducted on each sample taken for effluent characterization.

Testing shall be conducted twice in the first year of the permit effective date with one test in the summer and one in the winter. Testing shall be completed and data submitted to Ecology by **September 15, 2014,** for the summer sampling and **April 15, 2015,** for the winter sampling. A summary report of the characterization data is due by **September 15, 2015.**

Effluent testing for chronic toxicity shall be conducted twice in one year. The Permittee shall conduct chronic toxicity testing during effluent characterization on a series of at least five concentrations of effluent in order to determine appropriate point estimates. This series of dilutions shall include the ACEC. The Permittee shall compare the ACEC to the control using hypothesis testing at the 0.05 level of significance as described in Appendix H, EPA/600/4-89/001.

Chronic toxicity tests shall be conducted with the following two species and the most recent version of the following protocols:

Freshwater Chronic Toxicity Test Species		Method
Fathead minnow	*Pimephales promelas*	EPA/600/4-91/002
Water flea	*Ceriodaphnia dubia*	EPA/600/4-91/002

B. Effluent Limit for Chronic Toxicity

After completion of effluent characterization, the Permittee has an effluent limit for chronic toxicity if any test conducted for effluent characterization shows a significant difference between the control and the ACEC at the 0.05 level of significance using hypothesis testing (Appendix H, EPA/600/4-89/001) and shall complete all applicable requirements in subsections C, D, and F.

If no significant difference is shown between the ACEC and the control in any of the chronic toxicity tests, the Permittee has no effluent limit for chronic toxicity and only subsections E and F apply.

The effluent limit for chronic toxicity is no toxicity detected in a test concentration representing the chronic critical effluent concentration (CCEC).

In the event of failure to pass the test described in subsection C, of this section, for compliance with the effluent limit for chronic toxicity, the Permittee is considered to be in compliance with all permit requirements for chronic whole effluent toxicity as long as the requirements in subsection D are being met to the satisfaction of Ecology.

The CCEC means the maximum concentration of effluent allowable at the boundary of the mixing zone assigned in Section S1.B pursuant to WAC 173-201A-100. The CCEC equals 6 percent effluent.

C. Monitoring for Compliance with an Effluent Limit for Chronic Toxicity

Monitoring to determine compliance with the effluent limit shall be conducted twice a year for the remainder of the permit term using each of the species listed in subsection A on a rotating basis and performed using at a minimum the CCEC, the ACEC, and a control. The Permittee shall schedule the toxicity tests in the order listed in the permit unless Ecology notifies the Permittee in writing of another species rotation schedule.

Compliance with the effluent limit for chronic toxicity means no statistically significant difference in response between the control and the test concentration representing the CCEC. The Permittee shall immediately implement subsection D if any chronic toxicity test conducted for compliance monitoring determines a statistically significant difference in response between the control and the CCEC using hypothesis testing at the 0.05 level of significance (Appendix H, EPA/600/4-89/001). If the difference in response between the control and the CCEC is less than 20 percent, the hypothesis test shall be conducted at the 0.01 level of significance.

In order to establish whether the chronic toxicity limit is eligible for removal from future permits, the Permittee shall also conduct this same hypothesis test (Appendix H, EPA/600/4-89/001) to determine if a statistically significant difference in response exists between the ACEC and the control.

D. Response to Noncompliance with an Effluent Limit for Chronic Toxicity

If a toxicity test conducted for compliance monitoring under subsection C determines a statistically significant difference in response between the CCEC and the control, the Permittee shall begin additional compliance monitoring within one week from the time of receiving the test results. This additional monitoring shall be conducted monthly for three consecutive months using the same test and species as the failed compliance test. Testing shall be conducted using a series of at least five effluent concentrations and a control in order to be able to determine appropriate point estimates. One of these effluent concentrations shall equal the CCEC and be compared statistically to the nontoxic control in order to determine compliance with the effluent limit for chronic toxicity as described in subsection C. The discharger shall return to the original monitoring frequency in subsection C after completion of the additional compliance monitoring.

If the Permittee believes that a test indicating noncompliance will be identified by Ecology as an anomalous test result, the Permittee may notify Ecology that the compliance test result might be anomalous and that the Permittee intends to take only one additional sample for toxicity testing and wait for notification from Ecology before completing the additional monitoring required in this subsection. The notification to Ecology shall accompany the report of the compliance test result and identify the reason for considering the compliance test result to be anomalous. The Permittee shall complete all of the additional monitoring required in this subsection as soon as possible after notification by Ecology that the compliance test result was not anomalous. If the one additional sample fails to comply with the effluent limit for chronic toxicity, then the Permittee shall proceed without delay to complete all of the additional monitoring required in this subsection. The one additional test result shall replace the compliance test result upon determination by Ecology that the compliance test result was anomalous.

If all of the additional compliance monitoring conducted in accordance with this subsection complies with the permit limit, the Permittee shall search all pertinent and recent facility records (operating records, monitoring results, inspection records, spill reports, weather records, production records, raw material purchases, pretreatment records, etc.) and submit a report to Ecology on possible causes and preventive measures for the transient toxicity event which triggered the additional compliance monitoring.

If toxicity occurs in violation of the chronic toxicity limit during the additional compliance monitoring, the Permittee shall submit a Toxicity Identification/Reduction Evaluation (TI/RE) plan to Ecology. The TI/RE plan submittal shall be within 60 days after the sample date for the third additional compliance monitoring test. If the Permittee decides to forgo the rest of the additional compliance monitoring tests required in this subsection because one of the first two additional compliance monitoring tests failed to meet the chronic toxicity limit, then the Permittee shall submit the TI/RE plan within 60 days after the sample date for the first additional monitoring test to violate the chronic toxicity limit. The TI/RE plan shall be based on WAC 173-205-100(2) and shall be implemented in accordance with WAC 173-205-100(3).

E. Monitoring When There Is No Permit Limit for Chronic Toxicity

The Permittee shall test final effluent once in the last summer and once in the last winter prior to submission of the application for permit renewal. All species used in the initial chronic effluent characterization or substitutes approved by Ecology shall be used and results submitted to Ecology as a part of the permit renewal application process.

F. Sampling and Reporting Requirements

1. All reports for effluent characterization or compliance monitoring shall be submitted in accordance with the most recent version of Department of Ecology Publication #WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* in regards to format and content. Reports shall contain bench sheets and reference toxicant results for test methods. If the lab provides the toxicity test data on floppy disk for electronic entry into Ecology's database, then the Permittee shall send the disk to Ecology along with the test report, bench sheets, and reference toxicant results.

2. Testing shall be conducted on 24-hour composite effluent samples. Composite samples taken for toxicity testing shall be cooled to 4 degrees Celsius while being collected and shall be sent to the lab immediately upon completion. Grab samples must be shipped on ice to the lab immediately upon collection. If a grab sample is received at the testing lab within one hour after collection, it must have a temperature below 20°C at receipt. If a grab sample is received at the testing lab within 4 hours after collection, it must be below 12°C at receipt. All other samples must be below 8°C at receipt. The lab shall begin the toxicity testing as soon as possible but no later than 36 hours after sampling was ended. The lab shall store all samples at 4°C in the dark from receipt until completion of the test.

3. All samples and test solutions for toxicity testing shall have water quality measurements as specified in Department of Ecology Publication #WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* or most recent version thereof.

4. All toxicity tests shall meet quality assurance criteria and test conditions in the most recent versions of the EPA manual listed in subsection A and the Department of Ecology Publication #WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. If test results are determined to be invalid or anomalous by Ecology, testing shall be repeated with freshly collected effluent.

5. Control water and dilution water shall be laboratory water meeting the requirements of the EPA manual listed in subsection A or pristine natural water of sufficient quality for good control performance.

6. The whole effluent toxicity tests shall be run on an unmodified sample of final effluent.

7. The Permittee may choose to conduct a full dilution series test during compliance monitoring in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control. The series of concentrations must include the ACEC and the CCEC.

8. All whole effluent toxicity tests, effluent screening tests, and rapid screening tests that involve hypothesis testing, and do not comply with the chronic statistical power standard of 39 percent as defined in WAC 173-205-020, must be repeated on a fresh sample with an increased number of replicates to increase the power.

S10. OUTFALL EVALUATION

The Permittee shall inspect, the submerged portion of the outfall line and any future attachments such as a diffuser to document its integrity and continued function. If conditions allow for a photographic verification, it shall be included in the report. By **October 15, 2013**, the inspection report shall be submitted to Ecology.

S11. ALKALINITY ADDITION

Within 90 days of either effluent pH drops below 6.0 or alkalinity falling below 70 mg/L in any two consecutive readings, the Permittee shall provide Ecology with the soonest possible schedule for constructing an alkalinity addition system. This system must be capable of increasing the alkalinity in the aeration basin so that residual alkalinity in the effluent is maintained at or above 100 mg/L and effluent pH is not allowed to drop below 6.0. The Permittee must install and begin using this alkalinity addition system within a year after triggering this requirement.

GENERAL CONDITIONS

G1. SIGNATORY REQUIREMENTS

All applications, reports, or information submitted to Ecology shall be signed and certified.

A. All permit applications shall be signed by either a principal executive officer or a ranking elected official.

B. All reports required by this permit and other information requested by Ecology shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

1. The authorization is made in writing by a person described above and submitted to Ecology.

2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

C. Changes to authorization. If an authorization under paragraph B.2 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph B.2 above must be submitted to Ecology prior to or together with any reports, information, or applications to be signed by an authorized representative.

D. Certification. Any person signing a document under this section shall make the following certification:

> I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

G2. RIGHT OF INSPECTION AND ENTRY

The Permittee shall allow an authorized representative of Ecology, upon the presentation of credentials and such other documents as may be required by law:

A. To enter upon the premises where a discharge is located or where any records must be kept under the terms and conditions of this permit.

B. To have access to and copy - at reasonable times and at reasonable cost - any records required to be kept under the terms and conditions of this permit.

C. To inspect - at reasonable times - any facilities, equipment (including monitoring and control equipment), practices, methods, or operations regulated or required under this permit.

D. To sample or monitor - at reasonable times - any substances or parameters at any location for purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act.

G3. PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated either at the request of any interested person (including the Permittee) or upon Ecology's initiative. However, the permit may only be modified, revoked and reissued, or terminated for the reasons specified in 40 CFR 122.62, 122.64 or WAC 173-220-150 according to the procedures of 40 CFR 124.5.

A. The following are causes for terminating this permit during its term, or for denying a permit renewal application:

1. Violation of any permit term or condition.

2. Obtaining a permit by misrepresentation or failure to disclose all relevant facts.

3. A material change in quantity or type of waste disposal.

4. A determination that the permitted activity endangers human health or the environment, or contributes to water quality standards violations and can only be regulated to acceptable levels by permit modification or termination [40 CFR Part 122.64(3)].

5. A change in any condition that requires either a temporary or permanent reduction, or elimination of any discharge or sludge use or disposal practice controlled by the permit [40 CFR Part 122.64(4)].

6. Nonpayment of fees assessed pursuant to RCW 90.48.465.

7. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090.

B. The following are causes for modification but not revocation and reissuance except when the Permittee requests or agrees:

1. A material change in the condition of the waters of the state.

2. New information not available at the time of permit issuance that would have justified the application of different permit conditions.

3. Material and substantial alterations or additions to the permitted facility or activities which occurred after this permit issuance.

4. Promulgation of new or amended standards or regulations having a direct bearing upon permit conditions, or requiring permit revision.

5. The Permittee has requested a modification based on other rationale meeting the criteria of 40 CFR Part 122.62.

6. Ecology has determined that good cause exists for modification of a compliance schedule, and the modification will not violate statutory deadlines.

7. Incorporation of an approved local pretreatment program into a municipality's permit.

C. The following are causes for modification or alternatively revocation and reissuance:

1. Cause exists for termination for reasons listed in A1 through A7 of this section, and Ecology determines that modification or revocation and reissuance is appropriate.

2. Ecology has received notification of a proposed transfer of the permit. A permit may also be modified to reflect a transfer after the effective date of an automatic transfer (General Condition G8) but will not be revoked and reissued after the effective date of the transfer except upon the request of the new Permittee.

G4. REPORTING PLANNED CHANGES

The Permittee shall, as soon as possible, but no later than sixty (60) days prior to the proposed changes, give notice to Ecology of planned physical alterations or additions to the permitted facility, production increases, or process modification which will result in: 1) the permitted facility being determined to be a new source pursuant to 40 CFR 122.29(b); 2) a significant change in the nature or an increase in quantity of pollutants discharged; or 3) a significant change in the Permittee's sludge use or disposal practices. Following such notice, and the submittal of a new application or supplement to the existing application, along with required engineering plans and reports, this permit may be modified, or revoked and reissued pursuant to 40 CFR 122.62(a) to specify and limit any pollutants not previously limited. Until such modification is effective, any new or increased discharge in excess of permit limits or not specifically authorized by this permit constitutes a violation of the terms and conditions of this permit.

G5. PLAN REVIEW REQUIRED

Prior to constructing or modifying any wastewater control facilities, an engineering report and detailed plans and specifications shall be submitted to Ecology for approval in accordance with Chapter 173-240 WAC. Engineering reports, plans, and specifications shall be submitted at least 180 days prior to the planned start of construction unless a shorter time is approved by Ecology. Facilities shall be constructed and operated in accordance with the approved plans.

G6. COMPLIANCE WITH OTHER LAWS AND STATUTES

Nothing in this permit shall be construed as excusing the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G7. DUTY TO REAPPLY

The Permittee shall apply for permit renewal by **January 1, 2016**.

G8. TRANSFER OF THIS PERMIT

In the event of any change in control or ownership of facilities from which the authorized discharge emanate, the Permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to Ecology.

A. Transfers by Modification

Except as provided in paragraph (B) below, this permit may be transferred by the Permittee to a new owner or operator only if this permit has been modified or revoked and reissued under 40 CFR 122.62(b)(2), or a minor modification made under 40 CFR 122.63(d), to identify the new Permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

B. Automatic Transfers

This permit may be automatically transferred to a new Permittee if:

1. The Permittee notifies Ecology at least 30 days in advance of the proposed transfer date.

2. The notice includes a written agreement between the existing and new Permittees containing a specific date transfer of permit responsibility, coverage, and liability between them.

3. Ecology does not notify the existing Permittee and the proposed new Permittee of its intent to modify or revoke and reissue this permit. A modification under this subparagraph may also be minor modification under 40 CFR 122.63. If this notice is not received, the transfer is effective on the date specified in the written agreement.

G9. REDUCED PRODUCTION FOR COMPLIANCE

The Permittee, in order to maintain compliance with its permit, shall control production and/or all discharges upon reduction, loss, failure, or bypass of the treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails.

G10. REMOVED SUBSTANCES

Collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall not be resuspended or reintroduced to the final effluent stream for discharge to state waters.

G11. DUTY TO PROVIDE INFORMATION

The Permittee shall submit to Ecology, within a reasonable time, all information which Ecology may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee shall also submit to Ecology upon request, copies of records required to be kept by this permit.

G12. OTHER REQUIREMENTS OF 40 CFR

All other requirements of 40 CFR 122.41 and 122.42 are incorporated in this permit by reference.

G13. ADDITIONAL MONITORING

Ecology may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G14. PAYMENT OF FEES

The Permittee shall submit payment of fees associated with this permit as assessed by Ecology.

G15. PENALTIES FOR VIOLATING PERMIT CONDITIONS

Any person who is found guilty of willfully violating the terms and conditions of this permit shall be deemed guilty of a crime, and upon conviction thereof shall be punished by a fine of up to \$10,000 and costs of prosecution, or by imprisonment in the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit shall incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to \$10,000 for every such violation. Each and every such violation shall be a separate and distinct offense, and in case of a continuing violation, every day's continuance shall be deemed to be a separate and distinct violation.

G16. UPSET

Definition – "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of the following paragraph are met.

A Permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that: 1) an upset occurred and that the Permittee can identify the cause(s) of the upset; 2) the permitted facility was being properly operated at the time of the upset; 3) the Permittee submitted notice of the upset as required in Condition S3.E; and 4) the Permittee complied with any remedial measures required under S4.C of this permit.

In any enforcement proceeding the Permittee seeking to establish the occurrence of an upset has the burden of proof.

G17. PROPERTY RIGHTS

This permit does not convey any property rights of any sort, or any exclusive privilege.

G18. DUTY TO COMPLY

The Permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

G19. TOXIC POLLUTANTS

The Permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

G20. PENALTIES FOR TAMPERING

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two years per violation, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this Condition, punishment shall be a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or by both.

G21. REPORTING ANTICIPATED NON-COMPLIANCE

The Permittee shall give advance notice to Ecology by submission of a new application or supplement thereto at least 180 days prior to commencement of such discharges, of any facility expansions, production increases, or other planned changes, such as process modifications, in the permitted facility or activity which may result in noncompliance with permit limits or conditions. Any maintenance of facilities, which might necessitate unavoidable interruption of operation and degradation of effluent quality, shall be scheduled during noncritical water quality periods and carried out in a manner approved by Ecology.

G22. REPORTING OTHER INFORMATION

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to Ecology, it shall promptly submit such facts or information.

G23. COMPLIANCE SCHEDULES

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

APPENDIX A

EFFLUENT CHARACTERIZATION FOR POLLUTANTS
THIS LIST INCLUDES EPA REQUIRED POLLUTANTS (PRIORITY POLLUTANTS) AND SOME ECOLOGY PRIORITY TOXIC CHEMICALS (PBTs)

The following table specifies analytical methods and levels to be used for effluent characterization in NPDES and State waste discharge permits. This appendix specifies effluent characterization requirements of the Department of Ecology unless other methods are specified in the body of this permit.

This permit specifies the compounds and groups of compounds to be analyzed. Ecology may require additional pollutants to be analyzed within a group. The objective of this appendix is to reduce the number of analytical "non-detects" in permit-required monitoring and to measure effluent concentrations near or below criteria values where possible at a reasonable cost. If a Permittee knows that an alternate, less sensitive method (higher DL and QL) from 40 CFR Part 136 is sufficient to produce measurable results in their effluent, that method may be used for analysis.

Pollutant & CAS No. *(if available)*	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL)[2] *µg/L unless specified***
CONVENTIONALS			
Biochemical Oxygen Demand	SM5210-B		2 mg/L
Chemical Oxygen Demand	SM5220-D		10 mg/L
Total Organic Carbon	SM5310-B/C/D		1 mg/L
Total Suspended Solids	SM2540-D		5 mg/L
Total Ammonia (as N)	SM4500-NH3-GH		0.3 mg/L
Flow	Calibrated device		
Dissolved oxygen	4500-OC/OG		0.2 mg/L
Temperature (max. 7-day avg.)	Analog recorder or Use micro-recording devices known as thermistors		0.2° C
pH	SM4500-H^+ B	N/A	N/A
NONCONVENTIONALS			
Total Alkalinity	SM2320-B		5 mg/L as CaCo3
Chlorine, Total Residual	4500 Cl G		50.0
Color	SM2120 B/C/E		10 color unit
Fecal Coliform	SM 9221D/E,9222	N/A	N/A
Fluoride (16984-48-8)	SM4500-F E	25	100
Nitrate-Nitrite (as N)	4500-NO3-E/F/H		100
Nitrogen, Total Kjeldahl (as N)	4500-NH3-C/E/FG		300

Pollutant & CAS No. *(if available)*	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
Ortho-Phosphate (PO_4 as P)	4500- PE/PF	3	10
Phosphorus, Total (as P)	4500-PE/PF	3	10
Oil and Grease (HEM)	1664A	1,400	5,000
Salinity	SM2520-B		3 PSS
Settleable Solids	SM2540 -F		100
Sulfate (as mg/L SO_4)	SM4110-B		200
Sulfide (as mg/L S)	4500-S^2F/D/E/G		200
Sulfite (as mg/L SO_3)	SM4500-SO3B		2000
Total dissolved solids	SM2540 C		20 mg/L
Total Hardness	2340B		200 as CaCO3
Aluminum, Total (7429-90-5)	200.8	2.0	10
Barium Total (7440-39-3)	200.8	0.5	2.0
Boron Total (7440-42-8)	200.8	2.0	10.0
Cobalt, Total (7440-48-4)	200.8	0.05	0.25
Iron, Total (7439-89-6)	200.7	12.5	50
Magnesium, Total (7439-95-4)	200.7	10	50
Molybdenum, Total (7439-98-7)	200.8	0.1	0.5
Manganese, Total (7439-96-5)	200.8	0.1	0.5
Tin, Total (7440-31-5)	200.8	0.3	1.5
METALS, CYANIDE & TOTAL PHENOLS			
Antimony, Total (7440-36-0)	200.8	0.3	1.0
Arsenic, Total (7440-38-2)	200.8	0.1	0.5
Beryllium, Total (7440-41-7)	200.8	0.1	0.5
Cadmium, Total (7440-43-9)	200.8	0.05	0.25
Chromium (hex) dissolved (18540-29-9)	SM3500-Cr EC	0.3	1.2
Chromium, Total (7440-47-3)	200.8	0.2	1.0
Copper, Total (7440-50-8)	200.8	0.4	2.0
Lead, Total (7439-92-1)	200.8	0.1	0.5
Mercury, Total (7439-97-6)	1631E	0.0002	0.0005
Nickel, Total (7440-02-0)	200.8	0.1	0.5
Selenium, Total (7782-49-2)	200.8	1.0	1.0
Silver, Total (7440-22-4)	200.8	0.04	0.2
Thallium, Total (7440-28-0)	200.8	0.09	0.36
Zinc, Total (7440-66-6)	200.8	0.5	2.5
Cyanide, Total (57-12-5)	335.4	2	10
Cyanide, Weak Acid Dissociable	SM4500-CN I	2	10
Phenols, Total	EPA 420.1		50
DIOXIN			
2,3,7,8-Tetra-Chlorodibenzo-P-Dioxin (176-40-16)	1613B	1.3 pg/L	5 pg/L

Pollutant & CAS No. *(if available)*	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL)[2] *µg/L unless specified***
VOLATILE COMPOUNDS			
Acrolein (107-02-8)	624	5	10
Acrylonitrile (107-13-1)	624	1.0	2.0
Benzene (71-43-2)	624	1.0	2.0
Bromoform (75-25-2)	624	1.0	2.0
Carbon tetrachloride (56-23-5)	624/601 or SM6230B	1.0	2.0
Chlorobenzene (108-90-7)	624	1.0	2.0
Chloroethane (75-00-3)	624/601	1.0	2.0
2-Chloroethylvinyl Ether (110-75-8)	624	1.0	2.0
Chloroform (67-66-3)	624 or SM6210B	1.0	2.0
Dibromochloromethane (124-48-1)	624	1.0	2.0
1,2-Dichlorobenzene (95-50-1)	624	1.9	7.6
1,3-Dichlorobenzene (541-73-1)	624	1.9	7.6
1,4-Dichlorobenzene (106-46-7)	624	4.4	17.6
Dichlorobromomethane (75-27-4)	624	1.0	2.0
1,1-Dichloroethane (75-34-3)	624	1.0	2.0
1,2-Dichloroethane (107-06-2)	624	1.0	2.0
1,1-Dichloroethylene (75-35-4)	624	1.0	2.0
1,2-Dichloropropane (78-87-5)	624	1.0	2.0
1,3-dichloropropylene (mixed isomers) (542-75-6)	624	1.0	2.0
Ethylbenzene (100-41-4)	624	1.0	2.0
Methyl bromide (74-83-9) (Bromomethane)	624/601	5.0	10.0
Methyl chloride (74-87-3) (Chloromethane)	624	1.0	2.0
Methylene chloride (75-09-2)	624	5.0	10.0
1,1,2,2-Tetrachloroethane (79-34-5)	624	1.9	2.0
Tetrachloroethylene (127-18-4)	624	1.0	2.0
Toulene (108-88-3)	624	1.0	2.0
1,2-Trans-Dichloroethylene (156-60-5) (Ethylene dichloride)	624	1.0	2.0
1,1,1-Trichloroethane (71-55-6)	624	1.0	2.0
1,1,2-Trichloroethane (79-00-5)	624	1.0	2.0
Trichloroethylene (79-01-6)	624	1.0	2.0
Vinyl chloride (75-01-4)	624/SM6200B	1.0	2.0

Pollutant & CAS No. *(if available)*	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL)[2] *µg/L unless specified***
ACID COMPOUNDS			
2-Chlorophenol (95-57-8)	625	1.0	2.0
2,4-Dichlorophenol (120-83-2)	625	0.5	1.0
2,4-Dimethylphenol (105-67-9)	625	0.5	1.0
4,6-dinitro-o-cresol (534-52-1) (2-methyl-4,6,-dinitrophenol)	625/1625B	1.0	2.0
2,4 dinitrophenol (51-28-5)	625	1.0	2.0
2-Nitrophenol (88-75-5)	625	0.5	1.0
4-nitrophenol (100-02-7)	625	0.5	1.0
Parachlorometa cresol (59-50-7) (4-chloro-3-methylphenol)	625	1.0	2.0
Pentachlorophenol (87-86-5)	625	0.5	1.0
Phenol (108-95-2)	625	2.0	4.0
2,4,6-Trichlorophenol (88-06-2)	625	2.0	4.0
BASE/NEUTRAL COMPOUNDS (compounds in bold are Ecology PBTs)			
Acenaphthene (83-32-9)	625	0.2	0.4
Acenaphthylene (208-96-8)	625	0.3	0.6
Anthracene (120-12-7)	625	0.3	0.6
Benzidine (92-87-5)	625	12	24
Benzyl butyl phthalate (85-68-7)	625	0.3	0.6
Benzo(*a*)anthracene (56-55-3)	625	0.3	0.6
Benzo(j)fluoranthene (205-82-3)	625	0.5	1.0
Benzo(r,s,t)pentaphene (189-55-9)	625	0.5	1.0
Benzo(*a*)pyrene (50-32-8)	610/625	0.5	1.0
3,4-benzofluoranthene (Benzo(b)fluoranthene) (205-99-2)	610/625	0.8	1.6
11,12-benzofluoranthene (Benzo(k)fluoranthene) (207-08-9)	610/625	0.8	1.6
Benzo(*ghi*)Perylene (191-24-2)	610/625	0.5	1.0
Bis(*2-chloroethoxy)*methane (111-91-1)	625	5.3	21.2
Bis(*2-chloroethyl*)ether (111-44-4)	611/625	0.3	1.0
Bis(*2-chloroisopropyl*)ether (39638-32-9)	625	0.3	0.6
Bis(*2-ethylhexyl*)phthalate (117-81-7)	625	0.1	0.5
4-Bromophenyl phenyl ether	625	0.2	0.4

Pollutant & CAS No. *(if available)*	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
(101-55-3)			
2-Chloronaphthalene (91-58-7)	625	0.3	0.6
4-Chlorophenyl phenyl ether (7005-72-3)	625	0.3	0.5
Chrysene (218-01-9)	610/625	0.3	0.6
Dibenzo (a,j)acridine (224-42-0)	610M/625M	2.5	10.0
Dibenzo (a,h)acridine (226-36-8)	610M/625M	2.5	10.0
Dibenzo(a-*h*)anthracene (53-70-3)(1,2,5,6-dibenzanthracene)	625	0.8	1.6
Dibenzo(a,e)pyrene (192-65-4)	610M/625M	2.5	10.0
Dibenzo(a,h)pyrene (189-64-0)	625M	2.5	10.0
3,3-Dichlorobenzidine (91-94-1)	605/625	0.5	1.0
Diethyl phthalate (84-66-2)	625	1.9	7.6
Dimethyl phthalate (131-11-3)	625	1.6	6.4
Di-n-butyl phthalate (84-74-2)	625	0.5	1.0
2,4-dinitrotoluene (121-14-2)	609/625	0.2	0.4
2,6-dinitrotoluene (606-20-2)	609/625	0.2	0.4
Di-n-octyl phthalate (117-84-0)	625	0.3	0.6
1,2-Diphenylhydrazine (*as Azobenzene*) (122-66-7)	1625B	5.0	20
Fluoranthene (206-44-0)	625	0.3	0.6
Fluorene (86-73-7)	625	0.3	0.6
Hexachlorobenzene (118-74-1)	612/625	0.3	0.6
Hexachlorobutadiene (87-68-3)	625	0.5	1.0
Hexachlorocyclopentadiene (77-47-4)	1625B/625	0.5	1.0
Hexachloroethane (67-72-1)	625	0.5	1.0
Indeno(*1,2,3-cd*)Pyrene (193-39-5)	610/625	0.5	1.0
Isophorone (78-59-1)	625	0.5	1.0
3-Methyl cholanthrene (56-49-5)	625	2.0	8.0
Naphthalene (91-20-3)	625	0.3	0.6
Nitrobenzene (98-95-3)	625	0.5	1.0
N-Nitrosodimethylamine (62-75-9)	607/625	2.0	4.0
N-Nitrosodi-n-propylamine (621-64-7)	607/625	0.5	1.0
N-Nitrosodiphenylamine (86-30-6)	625	0.5	1.0

Pollutant & CAS No. ***(if available)***	**Recommended Analytical Protocol**	**Detection (DL)[1]** ***µg/L unless specified***	**Quantitation Level (QL)[2]** ***µg/L unless specified***
Perylene (198-55-0)	625	1.9	7.6
Phenanthrene (85-01-8)	625	0.3	0.6
Pyrene (129-00-0)	625	0.3	0.6
1,2,4-Trichlorobenzene (120-82-1)	625	0.3	0.6
PESTICIDES/PCBs			
Aldrin (309-00-2)	608	0.025	0.05
alpha-BHC (319-84-6)	608	0.025	0.05
beta-BHC (319-85-7)	608	0.025	0.05
gamma-BHC (58-89-9)	608	0.025	0.05
delta-BHC (319-86-8)	608	0.025	0.05
Chlordane (57-74-9)	608	0.025	0.05
4,4'-DDT (50-29-3)	608	0.025	0.05
4,4'-DDE (72-55-9)	608	0.025	0.05[10]
4,4' DDD (72-54-8)	608	0.025	0.05
Dieldrin (60-57-1)	608	0.025	0.05
alpha-Endosulfan (959-98-8)	608	0.025	0.05
beta-Endosulfan (33213-65-9)	608	0.025	0.05
Endosulfan Sulfate (1031-07-8)	608	0.025	0.05
Endrin (72-20-8)	608	0.025	0.05
Endrin Aldehyde (7421-93-4)	608	0.025	0.05
Heptachlor (76-44-8)	608	0.025	0.05
Heptachlor Epoxide (1024-57-3)	608	0.025	0.05
PCB-1242 (53469-21-9)	608	0.25	0.5
PCB-1254 (11097-69-1)	608	0.25	0.5
PCB-1221 (11104-28-2)	608	0.25	0.5
PCB-1232 (11141-16-5)	608	0.25	0.5
PCB-1248 (12672-29-6)	608	0.25	0.5
PCB-1260 (11096-82-5)	608	0.13	0.5
PCB-1016 (12674-11-2)	608	0.13	0.5
Toxaphene (8001-35-2)	608	0.24	0.5

1. Detection level (DL) or detection limit means the minimum concentration of an analyte (substance) that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero as determined by the procedure given in 40 CFR part 136, Appendix B.
2. Quantitation Level (QL) is equivalent to EPA's Minimum Level (ML) which is defined in 40 CFR Part 136 as the minimum level at which the entire GC/MS system must give recognizable mass spectra (background corrected) and acceptable calibration points. These levels were published as proposed in the Federal Register on March 28, 1997.

FACT SHEET FOR NPDES PERMIT WA0023272
CITY OF RIDGEFIELD

12/15/2003

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INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System (NPDES) of permits, which is administered by the Environmental Protection Agency (EPA). The EPA has authorized the state of Washington to administer the NPDES permit program. Chapter 90.48 Revised Code of Washington (RCW) defines the Department of Ecology's (Department) authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the state include procedures for issuing permits [Chapter 173-220 Washington Administrative Code (WAC)], technical criteria for discharges from municipal wastewater treatment facilities (Chapter 173-221 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least 30 days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit are available for review (see Appendix A--Public Involvement of the fact sheet for more detail on the Public Notice procedures).

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in this review have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Comments and the resultant changes to the permit will be summarized in Appendix D--Response to Comments.

GENERAL INFORMATION	
Applicant	City of Ridgefield
Facility Name and Address	Ridgefield Wastewater Treatment Plant West Cook Street Ridgefield, Washington
Type of Treatment:	Activated Sludge
Discharge Location	Lake River Latitude: 45° 49' 18" N Longitude: 122° 45' 09" W.
Water Body ID Number	Old ID # WA-28-1010, New ID # 1220169456238

BACKGROUND INFORMATION

DESCRIPTION OF THE FACILITY

HISTORY

The Ridgefield sewage treatment system was originally constructed in 1959 and has undergone several upgrades since then. The latest upgrade began in 2000. The facility operation had difficulty prior to 2001 when it was discovered by the Department that some staff at the Ridgefield facility were falsifying discharge monitoring records. In the last two years staff have been replaced and the facility appears to be running smoothly.

COLLECTION SYSTEM STATUS

Most of the sewer collection system was installed in 1959 and consists mostly of 8-inch and 6-inch diameter sewer lines with a ten-inch trunk line that delivers wastewater to the treatment plant. There is approximately 26,000 feet of sewer lines in the city. Most of the sewers are constructed of concrete or asbestos cement pipe with rubber o-ring gaskets. The side sewers are constructed of concrete pipe with cold-packed bitumastic joints.

There are two collection system pump stations that serve low elevations adjacent to Lake River and another lift station located in Abrams Park. These lift stations are small serving less than 20 homes. The rest of the system is gravity flow with a lift station located at the treatment plant to provide gravity flow through the plant.

There is a separate collection system for the high school and an adjacent subdivision. These separate systems are not owned and maintained by the city, which can present problems when routine maintenance and solving inflow and infiltration problems. This separate system includes two pump stations in series. The upper pump station serves the high school and is owned by the Ridgefield School District. This separate collection system is connected to the City of Ridgefield's system by 12,000 feet of force main. The school collection system was built in 1977 and the subdivision collection system was constructed in 1992.

The Port of Ridgefield industrial park has an 8-inch gravity sewer that flows to a pump station and 12,000 feet of force main to the City system. This same pump station serves the golf course facilities and a Washington State Department of Transportation (WSDOT) weigh station.

TREATMENT PROCESSES

The City of Ridgefield uses an activated sludge system followed by secondary clarification and UV-disinfection. A schematic may be found in Appendix C. In more detail, the effluent is first screened at the head works with a centrifugal grit removal system followed by both a HYCOR rotating screen and a floating grease/particle separator. Solids removed with these processes are sent to a dumpster. There is a Parshall flume with an ultrasonic flow meter in this area of the plant along with a 24-hour refrigerated sampling station. Flow enters a selection chamber before entering one of two activated sludge tanks. The selection chamber can have aeration on or off for part of the tank with the aim of increasing food to mass ratio in the selector. The activated sludge tanks are used one at a time for a period of approximately one year while the other tank serves as a backup aeration tank. The flow then enters the one main secondary clarifier. An old clarifier attached to the aeration tanks serves as an emergency back-up. Flow enters a

UV-disinfection channel. There are three banks of UV lights, but only one bank is needed under normal flow. There is another Parshall flume with an ultrasonic flow meter in this area of the plant along with a 24-hour refrigerated sampling station.

There are no industrial users of the system. There are some commercial users at the Port, however, they discharge only domestic sewage from toilets to Ridgefield's system. The town has three restaurants that discharge to the treatment plant. All of the restaurants have grease traps.

The facility is classified as a level II plant which requires an operator of at least level II certification to be in charge of daily operations and operators of level I to operate the plant. There are two operators with level II certification, and one operator with level I certification. The facility is staffed 7:30 a.m. -4:00 p.m., Monday through Friday, with staff on call 24 hours per day and on the weekends.

At this time the State Revolving Fund Loans has been closed out and no other loans or grants are pending.

DISCHARGE OUTFALL

Secondary treated and disinfected effluent is discharged from the facility via a ten-inch outfall into Lake River which is a tributary to the Columbia River. There is no diffuser on the outfall.

RESIDUAL SOLIDS

The treatment facilities remove solids during the treatment of the wastewater at the headworks (grit and screenings), and at the secondary clarifiers, in addition to incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment. Grit, rags, scum, and screenings are drained and disposed of as solid waste at the local transfer station. Solids removed from the clarifier (including biosolids) are treated in aerobic digesters for thickening and then are trucked to the Salmon Creek WWTP. The Salmon Creek facility land applies biosolids after further treatment.

PERMIT STATUS

The previous permit for this facility was issued on August 12, 1998. The previous permit placed effluent limitations on five-day Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS), pH, Fecal Coliform bacteria, total residual chlorine, and ammonia.

There were several requirements in the previous permit that were never completed. These requirements included conducting a receiving water study, and securing an outfall corridor to the Columbia River. The Permittee has had difficulty in getting permission to cross the wildlife refuge in order to reach the Columbia River as required under the 1998 permit. Because the previous permit anticipated an outfall to the Columbia, a receiving water study in Lake River was not required.

An application for permit renewal was submitted to the Department on February 5, 2003, and accepted by the Department.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

The facility received its last compliance inspection on April 29, 2003. No samples were taken at that time, however, the facility operations and paper work were thoroughly examined. The facility was in good operating condition. A few minor changes were recommended by the inspector.

WASTEWATER CHARACTERIZATION

During the history of the previous permit, the Permittee has not remained in compliance, based on Discharge Monitoring Reports (DMRs) submitted to the Department and inspections conducted by the Department. However, during the last 17 months with upgrades to the plant, new operation and management, the facility has been mostly operating within limits. Therefore, the characterization table shown below only includes data for the 17 month period from November 2001 to March 2003.

Table 1: Effluent Characterization

Parameter	**Averages, 95th Percentiles or Maximum/Minimums**	**Effluent Limits from 1998 Permit**
Flow	0.297 mgd (avg of monthly maximums)	0.5 mgd maximum monthly design flow
pH	6.4 min, 7.5 max	6.0-9.0 limits
Fecal coliform	4/100 ml (95th percentile of monthly geomean) 39/100 ml (95th percentile of weekly geomean) 66/100ml (maximum)	200/100ml monthly 400/100ml weekly
BOD	5 mg/L avg of monthly maximums	30 mg/L avg monthly 45 mg/L avg weekly
TSS	6 mg/L avg of monthly maximums	30 mg/L avg monthly 45 mg/L avg weekly
Ammonia	0.586 mg/L 95th percentile of all summer months in 2000	Optimize plant operation for nitrification and monitor

The flow has been kept below the maximum monthly design flow of 0.5 mgd. An average of the monthly maximum flows was 0.297 mgd. The minimum and maximum pH never violated limits. The fecal coliform was kept well within limits with the use of the new Ultra-Violet (UV) disinfection system. BOD and TSS concentrations were both kept very low. The average of the monthly maximums was 5 mg/L for BOD and 6 mg/L for TSS, whereas the monthly and weekly limits were 30 mg/L and 45 mg/L respectively. The Ammonia was kept below 0.586 mg/L 95 percent of the time. Because the limit for ammonia was narrative, the determination of whether ammonia was a problem will be covered later in this fact sheet. Ammonia will be compared to background in the reasonable potential analysis.

No other toxics were noted in the effluent. No metals have been examined in the past but may be required in the future.

PROPOSED PERMIT LIMITATIONS

Federal and state regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations for municipal discharges are set by regulation (40 CFR 133, and Chapters 173-220 and 173-221 WAC). Water quality-based limitations are based upon compliance with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), Sediment Quality Standards (Chapter 173-204 WAC) or the

National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992.) The most stringent of these types of limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

The limits in this permit are based in part on information received in the application. The effluent constituents in the application were evaluated on a technology- and water quality-basis. The limits necessary to meet the rules and regulations of the state of Washington were determined and included in this permit. The Department does not develop effluent limits for all pollutants that may be reported on the application as present in the effluent. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation. Effluent limits are not always developed for pollutants that may be in the discharge but not reported as present in the application. In those circumstances the permit does not authorize discharge of the non-reported pollutants. Effluent discharge conditions may change from the conditions reported in the permit application. If significant changes occur in any constituent, as described in 40 Code of Federal Regulations (CFR) 122.42(a), the Permittee is required to notify the Department. The Permittee may be in violation of the permit until the permit is modified to reflect additional discharge of pollutants.

DESIGN CRITERIA

In accordance with WAC 173-220-150 (1)(g), flows or waste loadings shall not exceed approved design criteria.

The design criteria for this treatment facility are taken from 1997 Facility Plan for the facility by Wallis Engineering and are as follows:

Table 2: Design Standards for the Ridgefield WWTP.

Parameter	Design Quantity
Monthly average flow (max. month)	0.5 MGD
Monthly average dry weather flow	Not Available
Instantaneous peak flow	1.50 MGD
BOD_5 influent loading (max. month)	1,083 lbs/day
TSS influent loading (max. month)	1,083 lbs/day
Design population equivalent	4,167

The 1997 facility plan discusses different phases of plant upgrade and applied the phases to the design criteria. The design criteria shown in table 2 were for the "Phase one interim upgrade." A second half of phase-one would boost the maximum monthly flow to 0.75 mgd. However, the facility plan states that this expansion would not take place until the outfall was extended to the Columbia River. The assumption is that Lake River would not be able to take the additional ammonia loading from Ridgefield even with the best operations and equipment at this time. The present population listed on DMRs as 2,170 plus schools and industries.

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

Municipal wastewater treatment plants are a category of discharger for which technology-based effluent limits have been promulgated by federal and state regulations. These effluent limitations are given in 40 CFR Part 133 (federal) and in Chapter 173-221 WAC (state). These regulations are performance standards that constitute all known available and reasonable methods of prevention, control, and treatment for municipal wastewater.

The following technology-based limits for pH, fecal coliform, BOD_5, and TSS are taken from Chapter 173-221 WAC are:

Table 3: Technology-based Limits.

Parameter	Limit
pH:	shall be within the range of 6 to 9 standard units.
Fecal Coliform Bacteria	Monthly Geometric Mean = 200 organisms/100 ml Weekly Geometric Mean = 400 organisms/100 ml
BOD_5 (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L
TSS (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L

The 1998 permit had a limit for chlorine, but since the disinfection system was replaced with UV. The chlorine limits have been eliminated.

The following technology-based mass limits are based on WAC 173-220-130(3)(b) and 173-221-030(11)(b).

Monthly effluent mass loadings (lbs/day) were calculated as the maximum monthly design flow (0.5 MGD) x Concentration limit (30 mg/L) x 8.34 (conversion factor) = mass limit 125 lbs/day.

The weekly average effluent mass loading is calculated as 1.5 x monthly loading = 188 lbs/day.

SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state. Water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin-wide total maximum daily loading study (TMDL).

NUMERICAL CRITERIA FOR THE PROTECTION OF AQUATIC LIFE

"Numerical" water quality criteria are numerical values set forth in the state of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

NUMERICAL CRITERIA FOR THE PROTECTION OF HUMAN HEALTH

The state was issued 91 numeric water quality criteria for the protection of human health by the U.S. EPA (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

NARRATIVE CRITERIA

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the state of Washington.

ANTIDEGRADATION

The state of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when receiving waters are of higher quality than the criteria assigned, the existing water quality shall be protected. More information on the state Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

The Department has reviewed existing records and is unable to determine if ambient water quality is either higher or lower than the designated classification criteria given in Chapter 173-201A WAC; therefore, the Department will use the designated classification criteria for this water body in the proposed permit. The discharges authorized by this proposed permit should not cause a loss of beneficial uses.

CRITICAL CONDITIONS

Surface water quality-based limits are derived for the waterbody's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses.

MIXING ZONES

The Water Quality Standards allow the Department to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment near the point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention, control and treatment (AKART) and in accordance with other mixing zone requirements of WAC 173-201A-100.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria.

DESCRIPTION OF THE RECEIVING WATER

The facility discharges to Lake River which is designated as a Class A receiving water in the vicinity of the outfall. There do not appear to be any nearby point source outfalls within a mile of the Ridgefield outfall. Nearby non-point sources of pollutants may include livestock operations on tributaries that feed Lake River. There are no such operations within one mile of the Ridgefield outfall. Vancouver Lake receives a fair about of urban runoff which may contribute to problems in Lake River. To the west of Lake River in the vicinity of the outfall and to several miles up and down the river is a national wildlife refuge.

Characteristic uses of Class A fresh water include the following: water supply (domestic, industrial, agricultural); stock watering; fish migration; fish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.

Water quality of this class shall meet or exceed the requirements for all or substantially all uses.

SURFACE WATER QUALITY CRITERIA

Applicable criteria are defined in Chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA 1992). Criteria for this discharge are summarized below:

Fecal Coliforms	100 organisms/100 ml maximum geometric mean
Dissolved Oxygen	8 mg/L minimum
Temperature	18 degrees Celsius maximum or incremental increases above background
pH	6.5 to 8.5 standard units
Turbidity	less than 5 NTUs above background
Toxics	No toxics in toxic amounts (see Appendix C for numeric criteria for toxics of concern for this discharge)

There are currently no TMDL studies that have been conducted for Lake River. However, the water in Lake River has serious limitations as pointed out in the Department's Environmental Assessment Program data base listing for Lake River. There has been very limited sampling of Lake River near Ridgefield (results are shown in Appendix C). There was sampling conducted from October 1991 through September 1992 for conventional parameters and metals. The Permittee conducted limited sampling for temperature and pH from 1998 through 2001, and fecal coliform, ammonia, and BOD_5 in 2002 and 2003. The Lake River summer pH had a 90^{th} percentile of 8.43 standard units, the summer temperature had a 90^{th} percentile of 20.53°C, and the fecal coliform had a 90^{th} percentile of 116 org./100 ml. The Permittee will be required to conduct a water quality study and do a Priority Pollutant Scan for metals during the next permit.

CONSIDERATION OF SURFACE WATER QUALITY-BASED LIMITS FOR NUMERIC CRITERIA

Pollutant concentrations in the proposed discharge exceed water quality criteria with technology-based controls which the Department has determined to be AKART. A mixing zone is authorized in accordance with the geometric configuration, flow restriction, and other restrictions for mixing zones in Chapter 173-201A WAC and are defined as follows:

> The dilution factors of effluent to receiving water that occur within these zones have been determined from the analysis shown in the 1997 Facility Plan, Appendix I. A more thorough mixing zone/dilution analysis will need to be conducted using dye tracers to confirm the presence of an eddy, quantify dilution and set a basis for computer modeling, e.g., PLUMES dilution model.

The dilution factors determined in the Facility plan used the best information available at the time. However, the permit requirements to do another mixing study reflects our findings that there is a lot of uncertainty in the flow conditions of Lake River with the current reversals from back flooding from the Columbia River.:

	Acute	Chronic
Aquatic Life	3.0:1	17.0:1

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants--their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as BOD is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

The derivation of water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water.

The critical condition for Lake River was discussed in the 1997 Facility Plan. Because the Lake River Channel is influenced by the flows on the Columbia River, a 7Q10 low flow is not realistic. Lake River had an average flow rate of 357 cfs and a cross section of approximately 2,000 SF at low river stage. This low stage is an attempt to estimate the minimum flow. The ambient background data used for this permit includes the following (from Wallis Engineering, 1997):

Parameter	Value used
low stage flow	267 cfs (357 cfs avg high)
Velocity	0.28 – 2.0 ft/sec (flow reversals possible)
Cross section	2000 square feet
Width	240 feet
Temperature	20.53 ° C (90th percentile)
pH (high)	8.43 (90th percentile)
Dissolved Oxygen	8.6 mg/L (min from 1992 data)
Total Ammonia-N	0.13 mg/L (highest value used from winter data)
Fecal Coliform	15/100 ml geometric mean
	116/100 ml 90th percentile (from 11/02-1/03)
All Metals	0.0 (No samples. Assumed to be below detection)

BOD_5--Under critical conditions there is no predicted violation of the Water Quality Standards for Surface Waters. Therefore, the technology-based effluent limitation for BOD_5 was placed in the permit.

The impact of BOD on the receiving water was modeled using The Streeter Phelps DOsag model at critical condition and with the technology-based effluent limitation for BOD_5 described under "Technology-Based Effluent Limitations" above (30mg/l BOD). The calculations used to determine dissolved oxygen impacts are shown in Appendix C. The model showed a final dissolved oxygen value of 8.43 which is drop of 0.17 mg/L using the most conservative estimates and based on the best information of ambient conditions at the present time. The final dissolved oxygen value is well above the water quality criteria of 8.0 mg/L.

Temperature and pH--The impact of the discharge on the temperature of the receiving water was modeled by simple mixing analysis at critical condition. The receiving water temperature at the critical condition is 20.53°C and the effluent temperature is 19.44°C. The effluent temperature is based on two years of summer data from 1998 and 1999. Effluent temperature has not been measured since 1999. The predicted resultant temperature at the boundary of the chronic mixing zone is 20.47°C. The calculations may be found in Appendix C, PHMIX.

Because the effluent temperature was above the water quality criteria of 18°C in both the effluent and the receiving water, there is concern of a possible water quality standards violation. It is not clear if the increased background temperature is a natural occurrence or caused by human actions. Until a TMDL is conducted, it will be assumed that the ambient temperature is higher than the natural condition. If this higher ambient temperature is a natural condition, then a 0.3°C increase above background may be allowed. We assume that if the background temperature is above the water quality criteria then the effluent needs to meet the water quality criteria at the end of the pipe. Because the temperature information is old and the facility has undergone changes, the effluent temperature may be different now. It is likely, however, that the new clarifier and UV disinfection heat up the effluent rather than cool it down. There is also the possibility that the 1000-foot long pipe from the tail of the facility to Lake River will cool the effluent slightly over this distance.

The permit will recommend more frequent and accurate temperature measurements over the life of the next permit. Continuous temperature monitors (commonly known as tidbits) should be placed in Lake River upstream of the outfall and in the effluent as close as possible to the end of the outfall. The temperature should be monitored from May through October and maximum daily temperatures reported.

The impact of pH was modeled using the calculations from EPA, 1988. The input variables were dilution factor 17, upstream temperature 20.53°C, upstream pH 8.43, upstream alkalinity 53 (as mg $CaCO_3$/L taken from Columbia River data), effluent temperature 19.44°C, effluent pH of 7.5 and effluent alkalinity 150 (as mg $CaCO_3$/L estimate based on similar facilities).

Under critical conditions there is no predicted violation of the Water Quality Standards for pH. Therefore, the technology-based effluent limitations for pH was placed in the permit.

Fecal coliform—The maximum fecal coliform value in the effluent for the last three years was 66 org./100 ml. Because the background fecal coliform is higher than the water quality standard of 100 org./100 ml, the Permittee will receive a water quality limit for fecal coliform of 100 org./100 ml for the monthly limit and 200 org./100ml for the weekly limit. This should be fairly equivalent to the water quality standards criteria for Class A waters which is a geometric mean of 100 org/100ml and not more than 10% of samples above 200 org./100 ml. Because the facility has not exceeded 66 org./100 ml in three years of operation, it does not appear that the facility will have difficulty meeting the water quality limit.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the Water Quality Standards for Surface Waters or from having surface water quality-based effluent limits.

A reasonable potential analysis for ammonia (See Appendix C) was conducted to determine whether or not effluent limitations would be required in this permit and found no potential. The determination of the reasonable potential for ammonia to exceed the water quality criteria was evaluated with procedures given in EPA, 1991 (Appendix C) at the critical condition. The critical condition in this case occurs during the summer months. The parameters used in the critical condition modeling are as follows: acute dilution factor 3, chronic dilution factor 17, receiving water temperature 20.5°C, and receiving water pH of 8.43. No other background pollutants have been measured.

No metals have been tested in the effluent. The Department policy is to conduct a priority pollutant scan on facilities with activated sludge systems that are the size of Ridgefield's. However, instead of a full priority pollutant scan which would examine the influent, effluent, and sludge, we are recommending a scan of heavy metals in the effluent and the receiving water. The scan for metals should be conducted once in the winter and once in the summer before the end of the permit cycle. To make sure that metals are sampled using the best "clean methods" and avoid false positives, the Permittee should follow EPA method 200.8 for sampling metals that specifies the use of Induced Coupled Plasma with Mass Spectrometry (ICP/MS). The permit will require testing of the metals listed in 40 CFR Part 122, Table III, which includes the following:

Metals and other toxic pollutants specified in 40 CFR Part 122, Appendix D, Table III

Antimony	Total
Arsenic	Total
Beryllium	Total
Cadmium	Total
Chromium	Total
Copper	Total
Lead	Total
Mercury	Total
Nickel	Total
Selenium	Total
Thallium	Total
Zinc	Total
Cyanide	Total
Phenols	Total

Mercury should be tested using EPA method 1631 Revision C which may be found in 40 CFR Part 136. This method for mercury has a minimum detection level of 0.5 ppt.

No valid ambient background data was available for any other pollutant. A determination of reasonable potential using zero for background should result in no reasonable potential. The Permittee is required in section S2 of the proposed permit to collect background concentrations of the metals listed above near the point of discharge. This information may result in a permit modification or limits in the next renewal.

Water quality criteria for metals in Chapter 173-201A WAC are based on the dissolved fraction of the metal.

The Permittee may provide data clearly demonstrating the seasonal partitioning of the dissolved metal in the ambient water in relation to an effluent discharge. Metals criteria may be adjusted on a site-specific basis when data is available clearly demonstrating the seasonal partitioning in the ambient water in relation to an effluent discharge.

Metals criteria may also be adjusted using the water effects ratio approach established by USEPA, as generally guided by the procedures in USEPA Water Quality Standards Handbook, December 1983, as supplemented or replaced.

WHOLE EFFLUENT TOXICITY

The Water Quality Standards for Surface Waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

Acute toxicity tests measure mortality as the significant response to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests are providing an indication of the potential lethal effect of the effluent to organisms in the receiving environment.

Chronic toxicity tests measure various sublethal toxic responses such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test of an organism with an extremely short life cycle or a partial life cycle test on a critical stage of one of a test organism's life cycles. Organism survival is also measured in some chronic toxicity tests.

In accordance with WAC 173-205-040, the Permittee's effluent has been determined to have the potential to contain toxic chemicals. The proposed permit contains requirements for whole effluent toxicity testing as authorized by RCW 90.48.520 and 40 CFR 122.44 and in accordance with procedures in Chapter 173-205 WAC. The proposed permit requires the Permittee to conduct toxicity testing for one year in order to characterize both the acute and chronic toxicity of the effluent.

If acute or chronic toxicity is measured during effluent characterization at levels that, in accordance with WAC 173-205-050(2)(a), have a reasonable potential to cause receiving water toxicity, then the proposed permit will set a limit on the acute or chronic toxicity. The proposed permit will then require the Permittee to conduct WET testing in order to monitor for compliance with either an acute toxicity limit, a chronic toxicity limit, or both an acute and a chronic toxicity limit. The proposed permit also specifies the procedures the Permittee must use to come back into compliance if the limits are exceeded.

Accredited WET testing laboratories have the proper WET testing protocols, data requirements, and reporting format. Accredited laboratories are knowledgeable about WET testing and capable of calculating an NOEC, LC_{50}, EC_{50}, IC_{25}, etc. All accredited labs have been provided the most recent version of the Department of Ecology Publication # WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* which is referenced in the permit. Any Permittee interested in receiving a copy of this publication may call the Department Publications Distribution Center (360)

407-7472 for a copy. The Department recommends that Permittees send a copy of the acute or chronic toxicity sections(s) of their permits to their laboratory of choice.

When the WET tests during effluent characterization indicate that no reasonable potential exists to cause receiving water toxicity, the Permittee will not be given WET limits but will be required to use rapid screening tests to assure toxicity doesn't appear. If a rapid screening test indicates that toxicity has appeared, the Permittee will investigate immediately and take appropriate action.

If the Permittee makes process or material changes which, in the Department's opinion, results in an increased potential for effluent toxicity, then the Department may require additional effluent characterization in a regulatory order, by permit modification, or in the permit renewal. Toxicity is assumed to have increased if WET testing conducted in response to rapid screening tests fails to meet the performance standards in WAC 173-205-020 "whole effluent toxicity performance standard."

HUMAN HEALTH

Washington's water quality standards now include 91 numeric health-based criteria that must be considered in NPDES permits. These criteria were promulgated for the state by the U.S. EPA in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

The Department has determined that the applicant's discharge is unlikely to contain chemicals regulated for human health based on existing data or knowledge. The discharge will be re-evaluated for impacts to human health at the next permit reissuance.

A determination of the discharge's potential to cause an exceedance of the water quality standards was conducted as required by 40 CFR 122.44(d). The reasonable potential determination was evaluated with procedures given in the Technical Support Document for Water Quality-Based Toxics Control (EPA/505/2-90-001) and the Department's Permit Writer's Manual (Ecology Publication 92-109, July, 1994). The determination indicated that the discharge has no reasonable potential to cause a violation of water quality standards, thus an effluent limit is not warranted.

COMPARISON OF EFFLUENT LIMITS WITH THE EXISTING PERMIT ISSUED AUGUST 12, 1998

Parameter	**Existing Limits**		**Proposed Limits**	
	Monthly Limits	**Weekly Limits**	**Monthly Limits**	**Weekly Limits**
BOD, and TSS	30 mg/L 88 lbs/day (interim) 125 lbs/day (final) and 85% removal	45 mg/L 132 lbs/day (interim) 188 lbs/day (final)	30 mg/L 125 lbs/day and 85% removal	45 mg/L 188 lbs/day
Fecal Coliform Bacteria	200/100 ml	400/100 ml	100/100 ml (geomean)	200/100ml (geomean)
pH	Shall not be outside the range 6.0 to 9.0		Shall not be outside the range 6.0 to 9.0	
Total Residual	Minimized (interim)		Not applicable	

Chlorine	Not applicable (final)	
Ammonia (NH3-N)	Optimize plant operation for nitrification and monitor	No limit

The final limits shown above in the 1998 permit were to become final after the submittal of the Declaration of Construction of Water Pollution Control Facilities and lasting through the expiration date of the permit.

MONITORING REQUIREMENTS

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

Monitoring for oil and grease and metals is being required to further characterize the effluent. Metals that need to be examined are those listed in 40 CFR Part 122, appendix D, table III. These metals are listed above under the discussion of Toxic Pollutants. These pollutants could have a significant impact on the quality of the surface water.

Monitoring of sludge quantity and quality is necessary to determine the appropriate uses of the sludge. Sludge monitoring is required by the current state and local solid waste management program and also by EPA under 40 CFR 503.

The monitoring schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of the Department's *Permit Writer's Manual* (July 1994) for an activated sludge facility that is less than 2.0 MGD average design flow.

LAB ACCREDITATION

With the exception of certain parameters the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories*. The laboratory at this facility is accredited for general chemistry which includes BOD/COD, total residual chlorine, dissolved oxygen, pH, and solids, total suspended. Ammonia and fecal coliform must be tested in a different laboratory and are currently being tested at the Salmon Creek laboratory.

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The conditions of S3 are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-220-210).

PREVENTION OF FACILITY OVERLOADING

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-220-150 require the Permittee to take the actions detailed in proposed permit requirement S.4 to plan expansions or modifications before existing capacity is reached and to report and correct conditions that could result in new or increased discharges of pollutants. Condition S.4 restricts the amount of flow.

OPERATION AND MAINTENANCE (O&M)

The proposed permit contains Condition S.5 as authorized under RCW 90.48.110, WAC 173-220-150, Chapter 173-230 WAC, and WAC 173-240-080. It is included to ensure proper operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

RESIDUAL SOLIDS HANDLING

To prevent water quality problems the Permittee is required in permit Condition S7 to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and State Water Quality Standards.

The final use and disposal of sewage sludge (biosolids) from this facility is regulated by U.S. EPA under 40 CFR 503, and by the Department under Chapter 70.95J RCW and Chapter 173-308 WAC. The WWTP as a biosolids generator, is required to obtain coverage under the General Statewide Permit for Biosolids Management. The disposal of other solid waste is under the jurisdiction of the Clark County Health Department.

PRETREATMENT

Federal and State Pretreatment Program Requirements

Under the terms of the addendum to the "Memorandum of Understanding between Washington Department of Ecology and the United States Environmental Protection Agency, Region 10" (1986), the Department has been delegated authority to administer the Pretreatment Program [i.e., act as the Approval Authority for oversight of delegated Publicly Owned Treatment Works (POTWs)]. Under this delegation of authority, the Department has exercised the option of issuing wastewater discharge permits for significant industrial users discharging to POTWs which have not been delegated authority to issue wastewater discharge permits.

There are a number of functions required by the Pretreatment Program which the Department is delegating to such POTWs because they are in a better position to implement the requirements (e.g. tracking the number and general nature of industrial dischargers to the sewerage system). The requirements for a Pretreatment Program are contained in Title 40, part 403 of the Code of Federal Regulations. Under the requirements of the Pretreatment Program [40 CFR 403.8(f)(1)(iii)], the Department is required to approve, condition, or deny new discharges or a significant increase in the discharge for existing significant industrial users (SIUs) [40 CFR 403.8 (f)(1)(i)].

The Department is responsible for issuing State Waste Discharge Permits to SIUs and other industrial users of the Permittee's sewer system. Industrial dischargers must obtain these permits from the Department prior to the Permittee accepting the discharge [WAC 173-216-110(5)] (Industries discharging wastewater that is similar in character to domestic wastewater are not required to obtain a permit. Such dischargers should contact the Department to determine if a permit is required.). Industrial dischargers need to apply for a State Waste Discharge Permit 60 days prior to commencing discharge. The conditions contained in the permits will include any applicable conditions for categorical discharges, loading limitations included in contracts with the POTW, and other conditions necessary to assure compliance with State water quality standards and biosolids standards.

The Department requires this POTW to fulfill some of the functions required for the Pretreatment Program in the NPDES permit (e.g., tracking the number and general nature of industrial dischargers to the sewage system). The POTW's NPDES permit will require that all SIUs currently discharging to the POTW be identified and notified of the requirement to apply for a wastewater discharge permit from the Department. None of the obligations imposed on the POTW relieve an industrial or commercial discharger of its primary responsibility for obtaining a wastewater discharge permit (if required), including submittal of engineering reports prior to construction or modification of facilities [40 CFR 403.12(j) and WAC 173-216-070 and WAC 173-240-110, et seq.].

Wastewater Permit Required

RCW 90.48 and WAC 173-216-040 require SIUs to obtain a permit prior to discharge of industrial waste to the Permittee's sewerage system. This provision prohibits the POTW from accepting industrial wastewater from any such dischargers without authorization from the Department.

Requirements for Routine Identification and Reporting of Industrial Users

The NPDES permit requires non-delegated POTWs to " take continuous, routine measures to identify all existing, new, and proposed SIUs and potential significant industrial users (PSIUs) discharging to the Permittee's sewerage system." Examples of such routine measures include regular review of business tax licenses for existing businesses and review of water billing records and existing connection authorization records. System maintenance personnel can also be diligent during performance of their jobs in identifying and reporting as-yet unidentified industrial dischargers. Local newspapers, telephone directories, and word-of-mouth can also be important sources of information regarding new or existing discharges. The POTW is required to notify an industrial discharger, in writing, of their responsibilities regarding application for a state waste discharge permit and to send a copy of the written notification to the Department. The Department will then take steps to solicit a State waste discharge permit application.

Submittal of List of Industrial Users

This provision requires the POTW to submit once per permit cycle a list of existing and proposed SIUs and PSIUs. This requirement is intended to update the Department on the status of industrial users in the POTW's service area, without requiring the POTW to go through the process of performing a formal Industrial User Survey. This provision is normally applied to POTWs not serving industrial or commercial users. Although this permit does not require performance of an Industrial User Survey, the Permittee is nevertheless required under the previous section, to take adequate continuous routine measures to identify existing and new industrial discharges.

Duty to Enforce Discharge Prohibitions

This provision prohibits the POTW from authorizing or permitting an industrial discharger to discharge certain types of waste into the sanitary sewer. The first portion of the provision prohibits acceptance of pollutants which cause pass-through or interference. The definitions of pass through and interference are in Appendix B of the fact sheet..

The second portion of this provision prohibits the POTW from accepting certain specific types of wastes, namely those which are explosive, flammable, excessively acidic, basic, otherwise corrosive, or obstructive to the system. In addition wastes with excessive BOD, petroleum based oils, or which result in toxic gases are prohibited to be discharged. The regulatory basis for these prohibitions is 40 CFR Part 403, with the exception of the pH provisions which are based on WAC 173-216-060.

The third portion of this provision prohibits certain types of discharges unless the POTW receives prior authorization from the Department. The discharges include cooling water in significant volumes, stormwater and other direct inflow sources, and wastewaters significantly affecting system hydraulic loading, which do not require treatment.

Support by the Department for Developing Partial Pretreatment Program by POTW

The Department has committed to providing technical and legal assistance to the Permittee in fulfilling these joint obligations, in particular assistance with developing an adequate sewer use ordinance, notification procedures, enforcement guidelines, and developing local limits and inspection procedures.

EFFLUENT MIXING STUDY

The Department has estimated the amount of mixing of the discharge within the authorized mixing zone to determine the potential for violations of the Water Quality Standards for Surface Waters (Chapter 173-201A WAC). Condition S8 of this permit requires the Permittee to more accurately determine the mixing characteristics of the discharge. Mixing will be measured or modeled under conditions specified in the permit to assess whether assumptions made about dilution will protect the receiving water quality outside the allotted dilution zone boundary. As noted earlier in this fact sheet, the dilution is based on assumptions about Lake River that should be confirmed or disproved through an actual mixing study. Very little is known about tide reversals, and low flow conditions in Lake River and likely cannot be shown without dye studies. The dilution ratios determined for this fact sheet were fairly small.

The modeling should be re-run with the assumption of a diffuser at the end of the now 10" pipe. The modeling should be done after the on-site dilution mixing study has been conducted. A previous dilution modeling showed that adding a six-inch constriction to the outfall should improve the dilution. A tide-flex diffuser or multi-port diffuser should be modeled with the new assumptions gained from the dye study. If the modeling shows the diffuser improves dilution, recommendations should be made for installing a diffuser.

A review of study plans by the Department will be required prior the Permittee's consultants conducting a study.

OUTFALL EVALUATION

Proposed permit Condition S12 requires the Permittee to conduct an outfall inspection and submit a report detailing the findings of that inspection once during the permit. The purpose of the inspection is to determine the condition of the discharge pipe and diffusers (if added) and to determine if sediment is accumulating in the vicinity of the outfall.

GENERAL CONDITIONS

General Conditions are based directly on state and federal law and regulations and have been standardized for all individual municipal NPDES permits issued by the Department.

PERMIT ISSUANCE PROCEDURES

PERMIT MODIFICATIONS

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards, Sediment Quality Standards, or Ground Water Standards, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended state or federal regulations.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to protect human health, aquatic life, and the beneficial uses of waters of the state of Washington. The Department proposes that this permit be issued for five years.

REFERENCES FOR TEXT AND APPENDICES

Environmental Protection Agency (EPA)

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.

1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington, D.C.

1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

1983. Water Quality Standards Handbook. USEPA Office of Water, Washington, D.C.

Metcalf and Eddy.

1991. Wastewater Engineering, Treatment, Disposal, and Reuse. Third Edition.

Tsivoglou, E.C., and J.R. Wallace.

1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Wallis Engineering.

1997. Facility Plan for the City of Ridgefield, Washington. Final. WE660D

Washington State Department of Ecology.

Laws and Regulations(http://www.ecy.wa.gov/laws-rules/index.html)

Permit and Wastewater Related Information
(http://www.ecy.wa.gov/programs/wq/wastewater/index.html

Washington State Department of Ecology.

1994. Permit Writer's Manual. Publication Number 92-109

Water Pollution Control Federation.

1976. Chlorination of Wastewater.

Wright, R.M., and A.J. McDonnell.

1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(EE2). (Cited in EPA 1985 op.cit.)

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on July 14, 2002, and July 21, 2002, in the *Columbian* to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

The Department will publish a Public Notice of Draft (PNOD) on October 29, 2003, in the *Columbian* to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Administrator
Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775.

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the 30-day comment period to the address above. The request for a hearing shall indicate the interest of the party and the reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least 30 days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within 30 days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, (360) 407-6554, or by writing to the address listed above.

This permit and fact sheet were written by Eric Schlorff.

APPENDIX B--GLOSSARY

Acute Toxicity--The lethal effect of a pollutant on an organism that occurs within a short period of time, usually 48 to 96 hours.

AKART-- An acronym for "all known, available, and reasonable methods of prevention, control, and treatment".

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Average Monthly Discharge Limitation --The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month (except in the case of fecal coliform). The daily discharge is calculated as the average measurement of the pollutant over the day.

Average Weekly Discharge Limitation -- The highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week. The daily discharge is calculated as the average measurement of the pollutant over the day.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of a treatment facility.

CBOD5 – The quantity of oxygen utilized by a mixed population of microorganisms acting on the nutrients in the sample in an aerobic oxidation for five days at a controlled temperature of 20 degrees Celsius, with an inhibitory agent added to prevent the oxidation of nitrogen compounds. The method for determining CBOD5 is given in 40 CFR Part 136.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity--The effect of a pollutant on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Combined Sewer Overflow (CSO)--The event during which excess combined sewage flow caused by inflow is discharged from a combined sewer, rather than conveyed to the sewage treatment plant because either the capacity of the treatment plant or the combined sewer is exceeded.

Compliance Inspection - Without Sampling--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the percent removal requirement. Additional sampling may be conducted.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing a minimum of four discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots.

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Continuous Monitoring –Uninterrupted, unless otherwise noted in the permit.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Dilution Factor--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the effluent fraction e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Engineering Report--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

Industrial User-- A discharger of wastewater to the sanitary sewer which is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Infiltration and Inflow (I/I)--"Infiltration" means the addition of ground water into a sewer through joints, the sewer pipe material, cracks, and other defects. "Inflow" means the addition of precipitation-caused drainage from roof drains, yard drains, basement drains, street catch basins, etc., into a sewer.

Interference -- A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal and;

Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Major Facility--A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum Daily Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Method Detection Level (MDL)--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

Minor Facility--A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing Zone--A volume that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in State regulations (Chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

Pass through -- A discharge which exits the POTW into waters of the–State in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of State water quality standards.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Potential Significant Industrial User--A potential significant industrial user is defined as an Industrial User which does not meet the criteria for a Significant Industrial User, but which discharges wastewater meeting one or more of the following criteria:

a. Exceeds 0.5 % of treatment plant design capacity criteria and discharges <25,000 gallons per day or;

b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).

The Department may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

Quantitation Level (QL)-- A calculated value five times the MDL (method detection level).

Significant Industrial User (SIU)--

1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N and;

2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

Upon finding that the industrial user meeting the criteria in paragraph 2, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

*The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, wetlands, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)--Total suspended solids are the particulate materials in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit--A limit on the concentration or mass of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

APPENDIX C--TECHNICAL CALCULATIONS

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on the Department's homepage at (http://www.ecy.wa.gov/programs/wq/wastewater/index.html

This spreadsheet calculates the reasonable potential to exceed state water quality standards for a small number of samples. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-based Toxics Control, U.S. EPA, March, 1991 (EPA/505/2-90-001) on page 56. User input columns are shown with red headings. Corrected formulas in col G and H on 5/98 (GB)

				State Water Quality Standard		Max concentration at edge of... mixing zone		
Parameter	Metal Criteria Translator as decimal	Metal Criteria Translator as decimal	Ambient Concentration (metals as dissolved)	Acute	Chronic	**Acute Mixing Zone**	**Chronic Mixing Zone**	**LIMIT REQ'D?**
	Acute	Chronic	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	
Ammonia	1.00	1.00	130.0000	2100.0000	340.0000	300.25	160.04	NO

CALCULATIONS

Effluent percentile value		Max effluent conc. measured (metals as total recoverable)	Coeff Variation		# of samples	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor	
	Pn	*ug/L*	*CV*	*s*	*n*				COMMENTS
0.95	0.933	590.00	0.60	0.55	43	1.09	3	17	

Calculation Of Ammonia Concentration and Criteria for fresh water.

Based on EPA Quality Criteria for Water (EPA 400/5-86-001) and WAC 173-201A. Revised 1-5-94 (corrected total ammonia criterion). Revised 3/10/95 to calculate chronic criteria in accordance with EPA Memorandum from Heber to WQ Stds Coordinators dated July 30, 1992.

INPUT	
1. Ambient Temperature (deg C; 0<T<30)	20.5
2. Ambient pH (6.5<pH<9.0)	8.43
3. Acute TCAP (Salmonids present- 20; absent- 25)	20
4. Chronic TCAP (Salmonids present- 15; absent- 20)	15

OUTPUT	
1. Intermediate Calculations:	
Acute FT	1.00
Chronic FT	1.41
FPH	1.00
RATIO	14
pKa	9.38
Fraction Of Total Ammonia Present As Un-ionized	10.0018%
2. Un-ionized Ammonia Criteria	
Acute (1-hour) Un-ionized Ammonia Criterion (ug NH3/L)	260.0
Chronic (4-day) Un-ionized Ammonia Criterion (ug NH3/L)	42.0
3. Total Ammonia Criteria:	
Acute Total Ammonia Criterion (mg NH3+ NH4/L)	2.6
Chronic Total Ammonia Criterion (mg NH3+ NH4/L)	0.4
4. Total Ammonia Criteria expressed as Nitrogen:	
Acute Ammonia Criterion as mg N	2.1
Chronic Ammonia Criterion as N	0.34

Lake River Ambient Conditions from City of Ridgefield

DATE	FECAL COLIFORM	NH3-N	BOD
10/1/02			3.3
11/5/2002	10	0.06	1
11/7/2002	16	0.04	1
11/12/2002	1		1.1
11/14/2002	44	0.107	1
11/19/2002	43	0.017	1
11/21/2002	1	0.001	1.2
11/26/2002	23	0.001	
12/3/2002	27	0.06	
12/5/2002	48	0.001	0.51
12/10/2002	33	0.001	1.02
12/12/2002	35	0.02	2.1
12/17/2002		0.04	2.2

12/19/2002	108	0.03	0
12/25/2002		0.001	0.8
12/26/2002	74	0.13	
12/27/2002	92		1.4
1/2/2003	1	0.06	1.4
1/3/2003	1	0.06	
1/7/2003	120	0.09	1
1/9/2003	66	0.07	1
1/14/2003	366	0.09	1
1/16/2003	136	0.08	1.3
1/21/2003	2.3	0.04	1
1/23/2003	1	0.04	1
1/28/2003	3	0.03	1
1/31/2003	1	0.05	1.1
	geomean	max value	
	15.13415	0.13	
	90th percentile	90th percentile	90th percentile
	116.4	0.09	1.89

Streeter-Phelps analysis of critical dissolved oxygen sag.

Based on Lotus File DOSAG2.WK1 Revised 19-Oct-93

INPUT

1. EFFLUENT CHARACTERISTICS	
Discharge (cfs): (0.5 mgd):	0.77
CBOD5 (mg/L):	30
NBOD (mg/L):	13
Dissolved Oxygen (mg/L):	2
Temperature (deg C):	18
2. RECEIVING WATER CHARACTERISTICS	
Upstream Discharge (cfs):	267
Upstream CBOD5 (mg/L):	1.9
Upstream NBOD (mg/L):	0.81
Upstream Dissolved Oxygen (mg/L):	8.6
Upstream Temperature (deg C):	20.53
Elevation (ft NGVD):	25
Downstream Average Channel Slope (ft/ft):	0.00088
Downstream Average Channel Depth (ft):	8.3

Downstream Average Channel Velocity (fps):	1.05

3. REAERATION RATE (Base e) AT 20 deg C (day^-1): 3.57

Reference	Applic. Vel (fps)	Applic. Dep (ft)	Suggested Values
Churchill	1.5 - 6	2 - 50	0.35
O'Connor and Dobbins	.1 - 1.5	2 - 50	0.56
Owens	.1 - 6	1 - 2	0.44
Tsivoglou-Wallace	.1 - 6	.1 - 2	3.83

4. BOD DECAY RATE (Base e) AT 20 deg C (day^-1): 0.67

Reference	Suggested Value
Wright and McDonnell, 1979	0.67

OUTPUT

1. INITIAL MIXED RIVER CONDITION

CBOD5 (mg/L):	2.0
NBOD (mg/L):	0.8
Dissolved Oxygen (mg/L):	8.6
Temperature (deg C):	20.5

2. TEMPERATURE ADJUSTED RATE CONSTANTS (Base e)

Reaeration (day^-1):	3.61
BOD Decay (day^-1):	0.69

3. CALCULATED INITIAL ULTIMATE CBODU AND TOTAL BODU

Initial Mixed CBODU (mg/L):	2.9
Initial Mixed Total BODU (CBODU + NBOD, mg/L):	3.7

4. INITIAL DISSOLVED OXYGEN DEFICIT

Saturation Dissolved Oxygen (mg/L):	8.991
Initial Deficit (mg/L):	0.41

5. TRAVEL TIME TO CRITICAL DO CONCENTRATION (days): 0.35

6. DISTANCE TO CRITICAL DO CONCENTRATION (miles): 6.05

7. CRITICAL DO DEFICIT (mg/L): 0.56

8. CRITICAL DO CONCENTRATION (mg/L):	8.43

Calculation of pH of a mixture of two flows. Based on the procedure in EPA's DESCON program (EPA, 1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington D.C.)

Based on Lotus File PHMIX2.WK1 Revised 19-Oct-93

INPUT

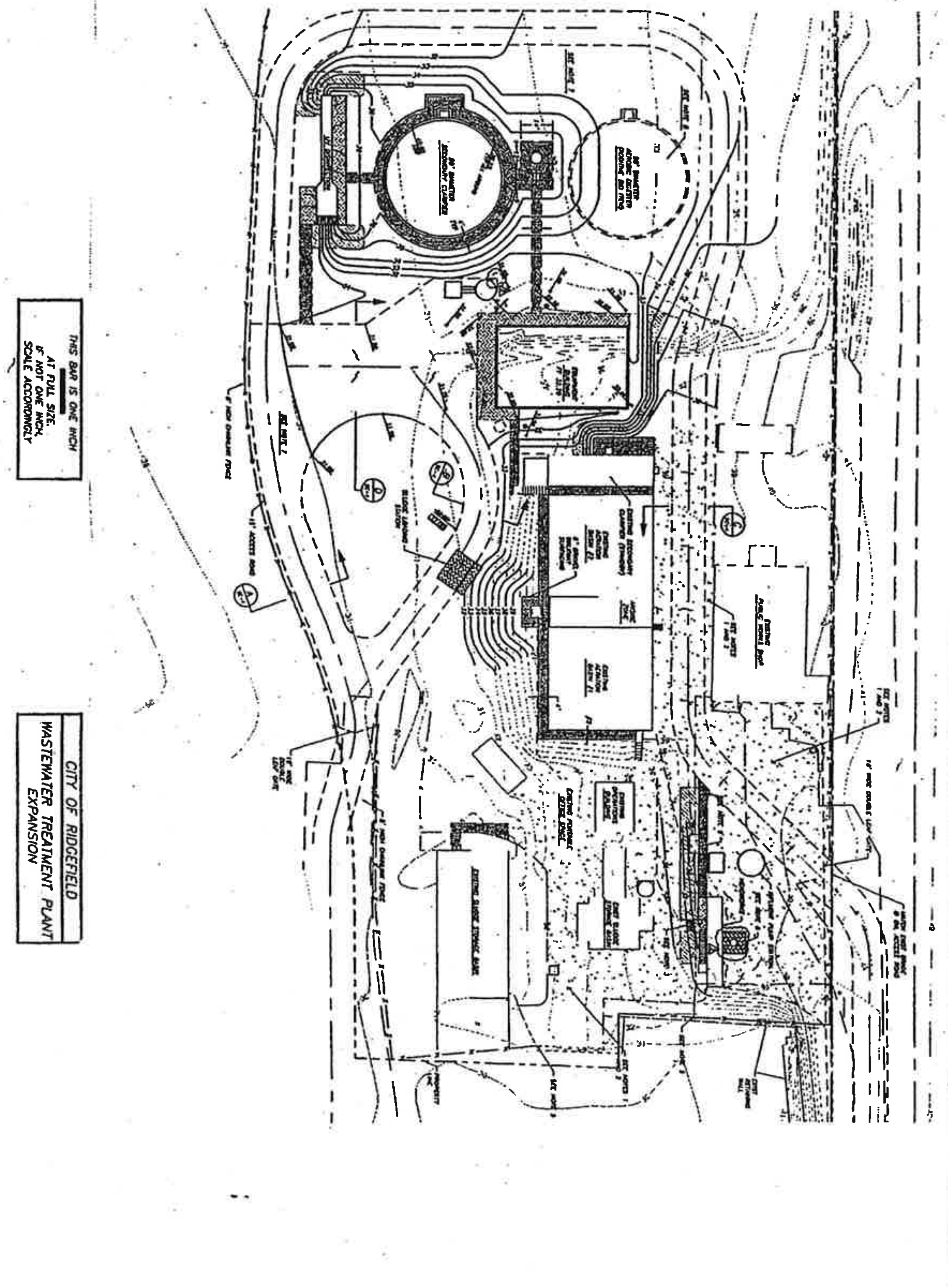
1. DILUTION FACTOR AT MIXING ZONE BOUNDARY	17.000
1. UPSTREAM/BACKGROUND CHARACTERISTICS	
Temperature (deg C):	20.53
pH:	8.43
Alkalinity (mg CaCO3/L):	53.00
2. EFFLUENT CHARACTERISTICS	
Temperature (deg C):	19.44
pH:	7.50
Alkalinity (mg CaCO3/L):	150.00

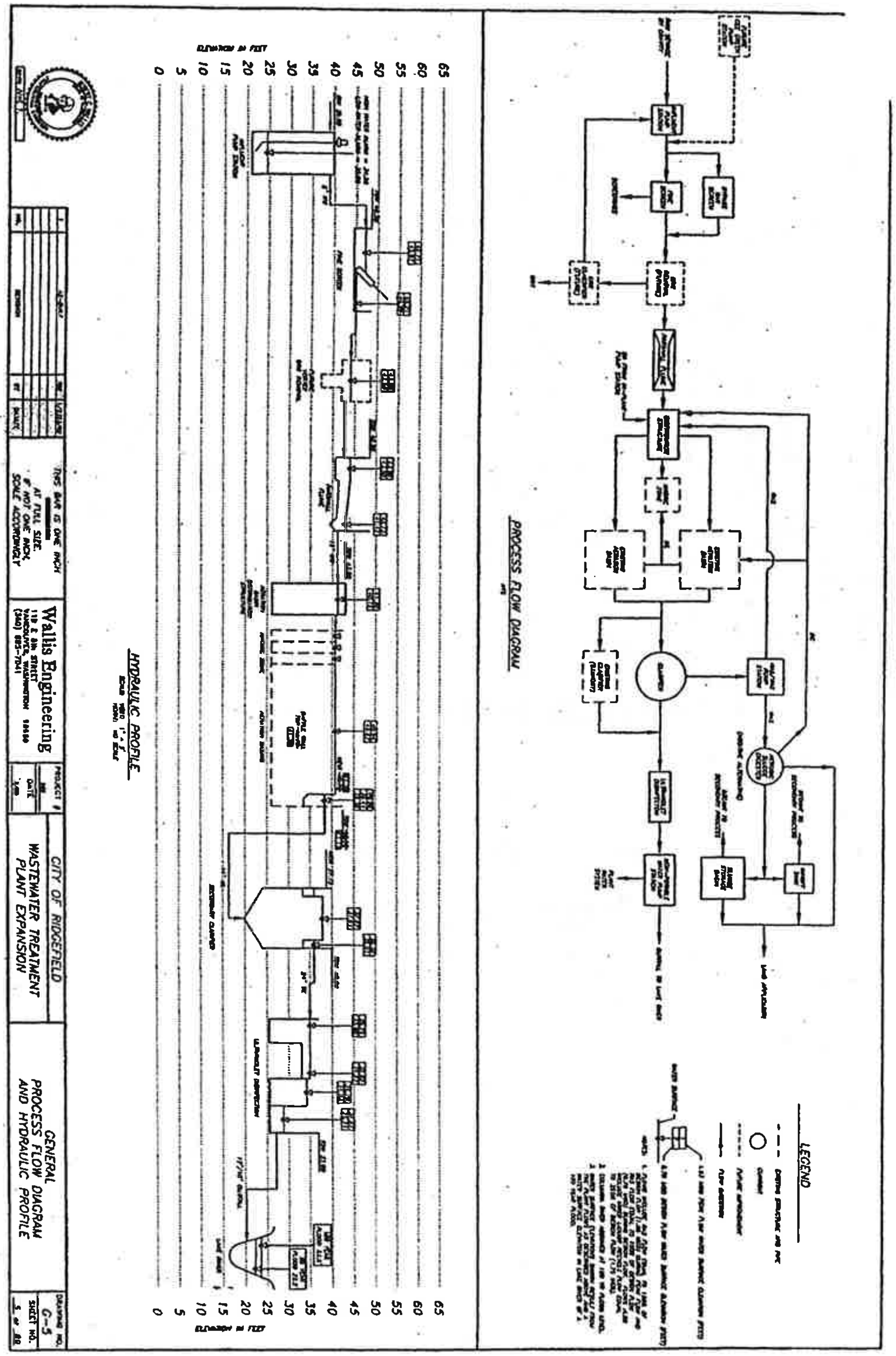
OUTPUT

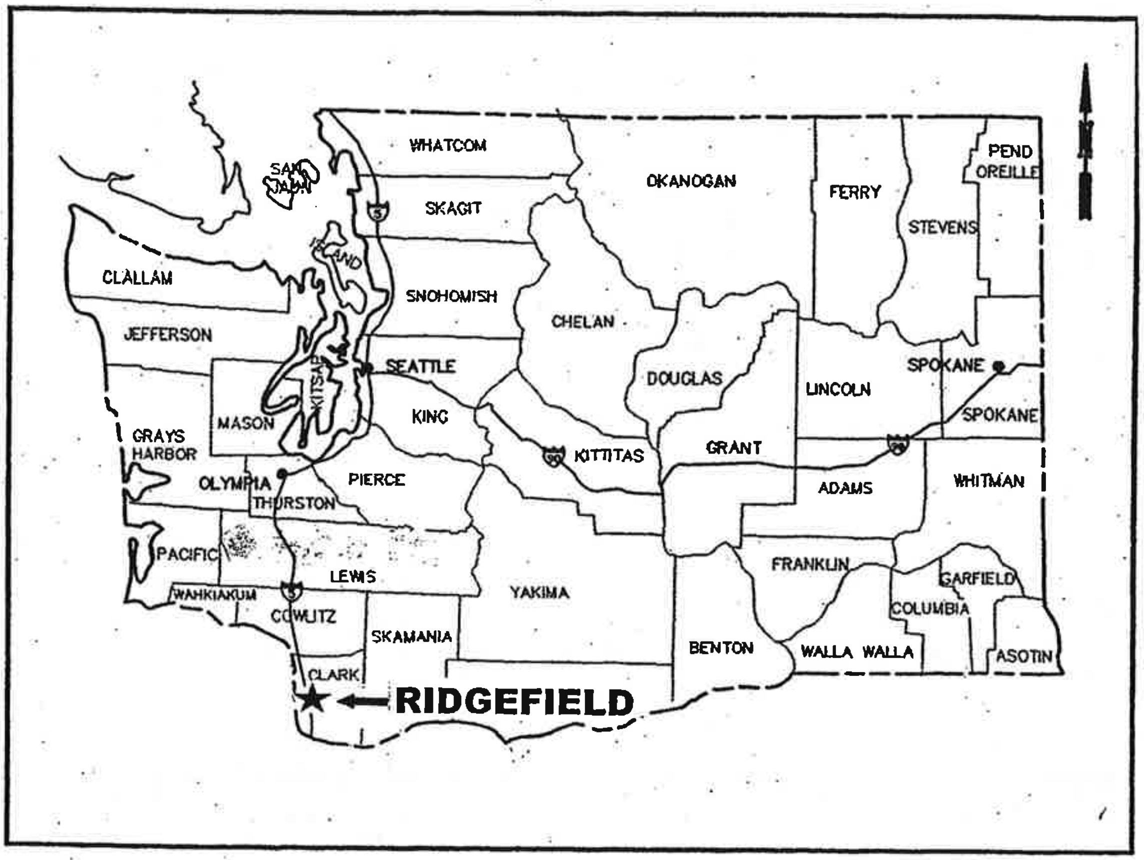
1. IONIZATION CONSTANTS	
Upstream/Background pKa:	6.38
Effluent pKa:	6.39
2. IONIZATION FRACTIONS	
Upstream/Background Ionization Fraction:	0.99
Effluent Ionization Fraction:	0.93
3. TOTAL INORGANIC CARBON	
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	53.47
Effluent Total Inorganic Carbon (mg CaCO3/L):	161.54

4. CONDITIONS AT MIXING ZONE BOUNDARY

Temperature (deg C):	20.47
Alkalinity (mg CaCO3/L):	58.71
Total Inorganic Carbon (mg CaCO3/L):	59.83
pKa:	6.38
pH at Mixing Zone Boundary:	8.10


THIS BAR IS ONE INCH
AT FULL SIZE.
IF NOT ONE INCH,
SCALE ACCORDINGLY
CITY OF RIDGEFIELD
WASTEWATER TREATMENT PLANT
EXPANSION


PROCESS FLOW DIAGRAM
LEGEND
HYDRAULIC PROFILE
Wallis Engineering
CITY OF RIDGEFIELD
WASTEWATER TREATMENT PLANT EXPANSION
GENERAL PROCESS FLOW DIAGRAM AND HYDRAULIC PROFILE
G-5



VICINITY MAP
NOT TO SCALE

APPENDIX D--RESPONSE TO COMMENTS

Comments from the City of Ridgefield, November 20, 2003, with responses from the Department

Comment 1:

Special Conditions S1 and S4 list limit for BOD, TSS, and flow based upon information from the 1997 Facility Plan rather than the actual expanded plant design criteria. During the final design process, a lot of effort was made to size new facilities to optimize future expansion possibilities. This resulted in changes from the criteria outlined in the facility plan. An entire series of Design Memoranda (24 total) were prepared during the design, which were shared with DOE and which summarized the construction plans that were approved by DOE. A reduced-size copy of construction plans sheet G-4 is enclosed for reference.

Response 1:

Plans and Specifications are reviewed for conformity with an approved Facility Plan. This review is intended to evaluate whether the plans describe a facility sufficient to meet the minimum criteria for sizing and reliability in the facility plan. Slight increases to component sizes in the Plans and Specifications are not sufficient, by themselves, to increase the facility plan's rated capacity. Figure 11 of the approved Final Facilities Plan approved February 27, 1997, shows the "Proposed 0.5 MGD interim expansion" designed for a maximum monthly flow of 0.5 MGD. The facility does not include a discharge to the Columbia River. This discharge to the Columbia River is necessary for the facility to exceed 0.5 MGD. Figure 11A of the same Facilities Plan shows the same facility with the outfall and pump station necessary for discharge to the Columbia River and a capacity of 0.75 MGD for the maximum monthly average flow. There are no additional treatment components. Page 9-7 of the plan explains why: "To reduce the debt requirements, an interim upgrade is proposed which would correct the serious deficiencies that exist at the plant, and provide nitrification so that the current outfall to Lake River could be utilized for several more years." This upgrade is for 0.5 MGD as shown on Figure 11 but does not meet the Department requirement of discharging to the Columbia River, which is needed to increase the discharge to 0.7 MGD.

NOTE: Why the plan shows 0.7 MGD, not 0.75 MGD once they discharge to the Columbia -- Both of these plans were to include the 55-foot diameter clarifier of Figures 10 and 10A. The Referenced sheet G-4 shows a clarifier of only 50-foot in diameter was installed. A 55-foot diameter clarifier has a 21 percent larger surface area than a 50-foot clarifier. Since clarifiers are sized on surface area, this may explain why sheet G-4 shows only a 0.7 MGD capacity instead of a 0.75 MGD capacity. While the Department may accept the 0.7 MGD capacity (a seven percent decrease in capacity from the 0.75 MGD capacity planned for phase I) this highlights the need for Ridgefield to revise their Facility Plans more frequently when such changes are made. Further, Page 8-6 of the approved Facility Plan expresses the intention to use the other existing clarifier, clarifier #2 as a redundant clarifier to satisfy reliability requirements during the first phase. A recent Department inspection found that this reliability does not currently exist. One clarifier was converted to sludge digestion and the other was retrofitted and is in use, rather than being kept in standby condition. This change created the need to construct an additional clarifier to meet redundancy requirements at the same time as the discharge to the Columbia.

It should also be noted that other alternatives for final effluent disposition exist—including water reuse. However, such a change in plans would require an amendment of the existing General Sewer Plan/Facility Plan and review and approval by the Departments of Ecology and Health to ensure that the requirement of the state's reclaimed water standards are met.

Comment 2:

The City requests that the new permit be based on these criteria that reflect the actual treatment plant rather than the outdated Facility Plan data. The BOD and TSS limits should be 175 lbs/day and 263 lbs/day average monthly and weekly, respectively, and the average flow for the maximum month should be 0.70 mgd.

Response 2:

The City has only constructed the interim upgrade portion of the phase I facility, a phase noted to achieve a 0.5 MGD capacity. The City has yet to accomplish the construction of the outfall to the Columbia River necessary to realize full phase I capacity. Because of that lack of outfall to the Columbia, the City continues to discharge to a point that requires a higher degree of treatment. This correspondingly reduces the POTWs capacity to 0.5 MGD (MMA). While sheet G-4 is inconsistent with the Facility Plan in that it recognizes a 0.7 MGD flow at the end of construction, it is not unusual for plans and specifications to report the hydraulic capacity of components that will be accomplished when other actions are also completed. In this case, the Facility Plan clarifies that the 0.7 MGD flow capacity will be achieved when the outfall to the Columbia River is constructed. It is, however, important that the plans reflect that this was a downgrade from 0.75 MGD previously anticipated at the completion of phase I. If the new criteria showed a 0.75 MGD capacity when the outfall line to the Columbia is completed, this should be lowered to 0.70 MGD based on this comment and the evidence provided.

Comment 3:

The City asks that the mixing zone analysis Plan of Study required in S8.A be submitted for review a month later (March 15, 2004, instead of February 15, 2004).

Response 3:

The due date will be changed to May 15, 2004, to allow adequate time after permit issuance.

Comment 4:

The City asks that the Effluent Mixing Report required in S8.B be submitted for review two months later (January 15, 2005, instead of November 15, 2004).

Response 4:

This change in date is acceptable and will be made.

Comment 5:

The City asks the Design Criteria on page 5 of the Fact Sheet be updated to meet with their understanding of the design criteria.

Response 5:

The only appropriate change is to downgrade full phase I capacity from 0.75 MGD to 0.70 MGD, if the discharge is to the Columbia. Until discharge is removed from Lake River, the capacity must be held at 0.5 MGD. The rationale for not changing the capacity of the facility at its current discharge point is included in the response to items 1 and 2 above. Furthermore the lack of clarifier redundancy would also be critical to this decision and is further necessary to realize full phase I capacity.

Comment 6:

The Description of the Receiving Water section on page 7 of the Fact Sheet should also describe the conditions occurring upstream in the Whipple Creek, Salmon Creek, and Burnt Bridge Creek basins, and Vancouver Lake with its flushing channel from the Columbia River. It should be noted that these upstream conditions have a major and substantial impact on the quality of Lake River before it reaches the City's outfall. A realistic assessment should be made of these conditions as they relate to the potential impact from the City's treatment plant effluent as the required treatment levels are established. To establish standardized requirements at considerable public expense based on a general assumption of some beneficial result when such is improbable is not in the public's interest. Further study may be conducted in the future through a TMDL. However, no TMDL is scheduled for these waters at this time and may not reveal anything new or different for the Ridgefield discharge.

Response 6:

The permit fact sheet includes information important to permit decisions. It is not intended to capture all the data that may be relevant to a water cleanup plan or other more involved study of the ambient environment. While such information as the City describes may be important to such a plan it is not relevant to the development of an NPDES permit–only the receiving water conditions and the effluent quality needed to prevent further degradation of the ambient environment are evaluated.

CITY OF RIDGEFIELD

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230 Pioneer St.
PO Box 608
Ridgefield, WA 98642
(360) 887-3557
(360) 887-0861 fax

Police Department
116 N Main Ave.
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(360) 887-3556
(360) 887-0930 fax

Community Development
127 N Main Ave.
PO Box 608
Ridgefield, WA 98642
(360) 887-3908
(360) 887-2507 fax

Public Works
127 N Main Ave.
PO Box 608
Ridgefield, WA 98642
(360) 887-8251
(360) 887-2507 fax

January 14, 2005

Mr. Kelly Susewind, P.E.
Washington State Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

Subject: City of Ridgefield Outfall Study

Dear Mr. Susewind:

In fulfillment of condition S-8.B of the City of Ridgefield NPDES permit, we are submitting the enclosed outfall mixing zone study. This report only addresses the existing discharge. Mixing zone evaluations for future alternatives will be presented in upcoming facility planning reports.

We have previously discussed aspects of this study with your staff. Because this issue of outfall placement and dilution zone sizing is critical to the City's comprehensive planning, we feel it is imperative to quickly develop an understanding with the Department of Ecology on the classification of the current receiving water for Ridgefield's treatment plant. Although our previous conversations with Ecology have been valuable in framing the issues, there appears to be a significant policy component concerning the classification of Lake River that will require your further consideration.

We have been proceeding under the assumption that Lake River is most properly classified as an estuary for our dilution zone study. This assumption derives from both the existing classification of Lake River within the City's NPDES permit as well as the legal precedents we are familiar with.

The City will need to expand our treatment plant capacity in the near future. This plant expansion will facilitate the City's obligation to provide environmentally supportive housing and economic growth opportunities as required under the Clark County growth management plan. The cost and schedule of the treatment plant expansion will be affected by the requirements for discharge to the receiving water.. The name Lake River not withstanding, our understanding is that this water body is a tidally-reversing element of the Lower Columbia River estuary. If recognized as such, we believe it is capable of serving as a receiving water body for the highly treated effluent that we would discharge from the expanded wastewater treatment plant required to meet our growth needs.

Ecology has previously indicated that mixing zone criteria for rivers should be applied to Lake River. If this opinion prevails, the City will need to undertake a multi-year effort to cross the Ridgefield National Wildlife Refuge with a pressurized outfall line to the mainstem Columbia River. Both the time and the costs required to complete the studies, permits, funding and construction of this outfall will be significant to the City. In addition, modifications to the existing outfall line may negatively affect the work currently underway at the Pacific Wood Treatment MTCA cleanup site.

The City of Ridgefield has struggled with meeting its environmental obligations in the past. These problems have resulted in the establishment of a new administration that is determined to meet these requirements in the future. We sincerely appreciate the quantity of time that Ecology has invested in our community to date and we would like to have an opportunity to meet with you and your staff here in Ridgefield to review these outstanding issues.

I appreciate your attention to this critical matter. The resolution of this issue will affect the development of our wastewater facilities plan alternatives. Therefore, we would appreciate Ecology's written response to our submittal within two weeks. Meanwhile, please call me at (360) 887-8251 to set up a meeting so that we can review the issues before us.

Sincerely,
The City of Ridgefield

Justin L. Clary, P.E.
Public Works Director

JLC:dj

Enc: Wastewater Treatment Facility Effluent Mixing Zone Report, City of Ridgefield

cc: David Knight, P.E., Washington State Department of Ecology
Public Works Department Files

Pioneer Street
Box 608
[illegible]efield, WA 98642

City of Ridgefield

phone (360) 887-3557
fax (360) 887-0861
cityofridgefield@qwest.net

October 15, 2004

Mr. David Knight, P.E.
Washington State Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, Washington 98504-7775

Subject: Temporary Revision to Monitoring Requirements for NPDES Permit No. WA0023272

Dear Mr. Knight:

The City of Ridgefield's wastewater treatment facility is currently operated under National Pollutant Discharge Elimination System Permit (NPDES) Waste Discharge Permit No. WA0023272. As has recently been relayed to you by the City's consultant engineer, David Jansen of Gray & Osborne, Inc., the City has identified a discrepancy between the influent and effluent flow data at the wastewater treatment facility. Comparison of the influent and effluent data and evaluation of that data with the City's water use indicates that the influent flow meter readings are likely the more accurate of the two data sets. The City believes the effluent readings have not been as accurate due to the over sizing of the flowmeter during the upgrade to the disinfection system (the system and flowmeter were oversized to allow for future system capacity). As a result, when facility flowrates drop to minimum flow conditions (i.e., in the late night and early morning), the data recorder "zeroes out" rather than recording and totalizing the actual low flow.

The City intends to install an effluent flowmeter that is more appropriately sized for the range of current system flows. Until the flowmeter is installed and properly calibrated, the City will calculate and report loadings based on the flow readings recorded at the facility's influent flowmeter. We will also report the effluent flow data, but will not use that data for calculating loadings.

If you have any questions or concerns, please feel free to contact me at (360) 887-3557.

Sincerely,
The City of Ridgefield

Justin L. Clary, P.E.
Public Works Director

JLC:jlc

cc: David Jansen, P.E., Gray & Osborne, Inc.
Frederick Crippen, City of Ridgefield
Public Works Department Files

Subject: Ridgefield Mixing Zone study
From: "Bill Fox" <BFox@cosmogrp.com>
Date: Mon, 21 Mar 2005 18:11:57 -0800
To: "David Knight \(E-mail\)" <dakn461@ecy.wa.gov>, "Anise Ahmed \(E-mail\)" <aahm461@ecy.wa.gov>
CC: "Dave Jansen \(E-mail\)" <djansen@g-o.com>

Anise and David - I have started the phase II portion of the Ridgefield mixing zone study, that being for future WWTP flows and outfall alternatives. We will be basically looking at four outfall alternatives: Extend existing outfall into Lake river with a single nozzle, extend into Lake River with a diffuser, new outfall to Columbia River single nozzle, and new Columbia River diffuser.

We are at an impasse regarding the use of the freshwater mixing zone criteria based on 7Q10 for Ridgefield, and I want to explore a possible resolution to this impasse. As you know, we estimated 7Q10 of upstream creeks at 22.6 cfs. The data used for this projection is pretty sparse, so we don't have a lot of certainty, but it almost does not matter how precise it is because it is a very small number. Any dilution factor we would calculate from that number would be very low. As I have stated fairly consistently since the dye studies, the circulation (both instantaneous currents and net ambient flow) are driven more by the tides and proximity to the Columbia River mainstem.

So (I don't want to call this a proposal, but just a topic of discussion): would Ecology consider the <u>residual circulation</u> described in section 4.5.3 of the Part I report as included in the 7Q10 for this outfall? The net (or residual) flow of ambient water past the outfall is clearly not limited to the <u>upstream</u> 7Q10. We measured the residual circulation at about 400 cfs, so the upstream component of net flow is only 5 to 10 percent of the actual ambient flow at that site (again, reinforcing that the Columbia mainstem is the dominant source of dilution water at the outfall). So it seems to me that if we agree to mixing zone criteria based on percentages of the critical ambient flow, the residual discharge of 400 cfs is the appropriate value for that calculation.

Please consider this soon if you are able. I would like to complete the mixing zone study soon, and this would affect it considerably. If you support the measured residual circulation as the critical ambient flow, I would recommend to my client proceeding on that basis (*i.e.* acute limited by 2.5 percent of critical ambient flow, chronic by 25 percent of critical ambient flow).

Bill Fox
Cosmopolitan Engineering Group
117 S 8th Street
Tacoma, WA 98402
(253) 265-2958
(253) 265-6041 fax
bfox@cosmogrp.com

Subject: Re: Ridgefield Plans
From: David Jansen <djansen@g-o.com>
Date: Mon, 18 Oct 2004 12:01:42 -0700
To: "Knight, David J. (SWRO)" <dakn461@ECY.WA.GOV>
CC: "Justin.Clary" <Justin.Clary@ci.ridgefield.wa.us>
BCC: jwilson <jwilson@g-o.com>, mike johnson <mjohnson@g-o.com>, enutting <enutting@g-o.com>

Hello Dave:

I can explain why BOD and flow have not gone up. Per our conversations, the effluent flow meter has been used for reporting purposes. It has not been giving logical values when compared to literature values, water use, or the influent flow meter. Since loading derives from the flow, the DMR loading figures are also not reflecting recent growth. I now have more accurate data and it does show the impacts of growth. Your October DMR from Ridgefield will use influent flow for calculating loadings. You will see a big jump. Justin has drafted a letter to you on this. Also, the trend projections that you identified in your response did not come through on the reply.

The growth rate projections derive from the platting and building permit activity. And you are right, it is skyrocketing. I think last year they issued 15 building permits; this year they are at 230. That's why we must get moving on the capacity solutions.

The issue of the additional secondary clarifier was discussed when we spoke to the slide that identified the lack of secondary clarifier redundancy. (about the third slide). The display board that we used to supplement the powerpoint called out the digester for conversion to a clarifier.

Justin and I are meeting tomorrow with the folks from the Salmon Creek WWTP to see if we can formalize the existing arrangement for continuing the partnered biosolids disposal. That will probably impact the timing of when we add sludge dewatering or if we stick with liquid sludge processing and let Salmon Creek dewater the sludge. But, we did identify that as an issue as well. We'll let you know how it goes.

Thanks for the help and we'll be in touch!

Knight, David J. (SWRO) wrote:

> Thanks Dave,
>
> The presentation looks good. I am sorry I could not make the City Council meeting last week. I am glad to see you are exploring all the options. I didn't really understand the bullet about the outfall leak, but I presume that alludes to the neighboring industrial cleanup site. The reuse options are intriguing, and I have great confidence in your abilities to negotiate a path to a solution that won't slow down the planned growth of the City. I have only one question and it's about the growth rate projections which are pretty high. Are they in harmony with the City's (County approved) comprehensive plan?

While TSS is showing an upward curve, the current BOD loading and flow trends are not increasing yet, so I take it there must be a lot of big development coming soon.

Also, I did not notice this in your briefing, so I wanted to take a moment to reiterate that I believe the upgrade to 0.7 MGD will require another secondary clarifier (in addition to the one present and the small backup clarifier). There was, at one point, the thought that the waste activated sludge holding tank, which is sized similar to the secondary clarifier, might be converted into another secondary clarifier. The solids processing would be done with a belt filter press to reduce the volume and a much smaller holding tank would then suffice, and present storage areas would then also be adequate for longer.

Below is my understanding of the recent trends with respect to BOD, TSS and Flow (through last month). Despite increases in the number of customer hookups approved, BOD loadings and flows haven't shown the effects yet.

Yours, DJK

<<...OLE_Obj...>>

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-----Original Message-----
From: David Jansen [mailto:djansen@g-o.com]
Sent: Friday, October 15, 2004 12:12 PM
To: Knight, David J. (SWRO)
Cc: Justin.Clary
Subject: Ridgefield Sewer Plan

Dave, we wanted to send you a little update on the Sewer Plan. We did a presentation for the City Council, the Port Commission and the public at two meetings this week. The power point and the one page handout for the meetings is attached for your information. I also met this week with the new (started this week) manager of the Ridgefield Nature Preserve. Tim Bodeen is his name. I briefed him on the possibility of crossing the preserve with an outfall. He took some maps that we have put together and said he would get back to me in November about Fish and Wildlife policies concerning such matters. He was not closed to the idea, but he did warn me that it would likely be more difficult than it would have been in the mid 1990's.

Anyway, we're just trying to keep you in the loop as the work proceeds. Let me know if you have any questions!

--

David Jansen, P.E.
Project Manager
Gray & Osborne, Inc.
Olympia Office
2401 Bristol Court SW
Olympia, WA 98502
(360) 754-4266 Phone
(360) 754-2135 Fax

--

David Jansen, P.E.
Project Manager
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Client: __________________ G-O # ________

Electronic File Transfer-

Gray & Osborne, Inc.
CONSULTING ENGINEERS

August 26, 2004

Mr. David Knight, P.E.
Washington State Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, Washington 98504-7775

SUBJECT: RIDGEFIELD COMPREHENSIVE GENERAL, SEWER/WASTEWATER FACILITIES PLAN
CITY OF RIDGEFIELD, CLARK COUNTY, WASHINGTON
G&O #04326

Dear Mr. Knight:

We are providing this letter as a follow up to our meeting that was held on August 9, 2004. On that day, Justin Clary, David Jansen, and Eric Nutting, representing the City of Ridgefield met with David Knight, Kathy Cupps and Pat Baily at the Department of Ecology Southwest Regional Office to discuss plans for the City's General Sewer/Facility Plan.

The City began the meeting by explaining its reason for moving forward with wastewater planning at this time. The City had previously sent a letter to the Department of Ecology explaining that, within the current permit cycle, it is anticipated that the City will need to complete planning and begin another expansion of the City" wastewater treatment capacity. The additional constraints of receiving water limitations and the City's desire to ensure that the Sewer Plan is written using the same basis as the City's Water System Plan and Comprehensive Plan were also provided as reasons for moving forward at this time.

The City explained that it is currently looking at a two-tier approach to meeting needs for additional capacity. The first tier will be upgrading the existing Lake River Wastewater Treatment Plant to a maximum month flow of 0.7 MGD. The following steps will be undertaken to complete this interim upgrade. First, a capacity analysis on the existing equipment will be performed to ensure that the equipment will adequately meet 0.7 MGD treatment requirements. It is anticipated that the existing aerobic digester will be converted in to a secondary clarifier and additional solids handling capacity will be added to compensate for the loss of the digester. A diffuser on the outfall line was also identified as a possible requirement, pending the results of the upcoming outfall mixing study.

At Ecology's suggestion, a bank diffuser located parallel to the river flow will also be considered. The Department of Ecology indicated that the upgraded 0.7 MGD facility should be designed for complete nitrification. Ecology stressed concern associated with ammonia toxicity and indicated that a possible nitrification limit, depending on the receiving water analysis currently being conducted, could be 1 milligram per liter (mg/L).

2401 Bristol Court SW, Building A Olympia, Washington 98502 (360) 754-4266 Fax (360) 754-4240

The Department of Ecology noted that an upgrade might require a higher-level operator certification as well. Ecology also requested that solids disposal capacity be addressed, including the option of continuing solids disposal at the Salmon Creek Wastewater Treatment Plant.

The City indicated that the target date for construction for this 0.7 MGD upgrade is summer 2006. Subject to results of the outfall analysis and the improvements identified above, Ecology did not identify any other significant issues pertaining to expansion and discharge of 0.7 MGD to Lake River.

The meeting discussion then switched to the second tier of upgrades needed to provide for long term needs for the City's urban growth area (UGA). The City indicated initial estimates require 2-3 MGD of wastewater treatment capacity. The City indicated that it is considering the following options in the plan and asked Ecology to evaluate whether any of these options are either preferred or unsupportable.

The options include:

1. Providing additional treatment (e.g., nutrient removal) with increased discharge to Lake River.

2. Constructing a new outfall to the main stem of the Columbia River.

3. Generating reclaimed water with use in the Junction area (satellite plant).

4. Reclaimed water with seasonal discharge to Lake River.

5. Some combination of the above.

In discussing these issues, Ecology expressed some concern that the new outfall to the main stem Columbia River option had never been fully explored to the extent that Ecology anticipated based on prior City wastewater plans. The City indicated they would try and reconstruct the history on efforts to date. However, the City is concerned that permitting issues for this option will be significantly more difficult than anticipated when the relocated outfall was originally proposed two decades ago.

Ecology indicated that all of the identified options were feasible subject to environmental concerns about receiving water capacity for discharge, infiltration rate of the soils for reclaimed water use, temperature concerns if tributary streams are used for seasonal discharges, etc. One specific concern for Ecology was finding out what the 7Q10 flow in Lake River was during months when seasonal discharges might be taking place.

During the reclaimed water discussion, much of the conversation focused on the possible use of the water for industrial/commercial purposes as well as for potential environmental amenities, such as constructed wetlands. There was some discussion about the feasibility of using the reclaimed water for maintaining plants in wetlands and buffers year round, but the City was also reminded about not using natural or compensatory wetlands for wastewater treatment.

Based on this meeting the City intends to proceed with evaluating these options and will continue to apprise Ecology as additional information is obtained concerning the feasibility of these opportunities.

The City also asked about the rational behind the toxicity testing of the effluent. Ecology explained that this was a routine requirement imposed on new wastewater treatment plants and was due to the fact that the treatment plant had just recently been rebuilt. Ecology is not planning a TMDL on Lake River in the next year. Ecology would prefer to use the model "Visual Plumes" in evaluating the outfall, however, CORMIX may also be applicable based on interpretation of the field data.

For the placement of interceptors in the City wastewater collection system, if the locations and service areas differ significantly from the existing approved General Sewer Plan, then an amendment to the General Sewer Plan would be necessary. Public involvement components would need to be included.

I hope this letter provides an accurate representation of the meeting. I have attached a copy of the agenda for your records as well. Please call me or email me at djansen@g-o.com if you have any corrections or additions.

Very truly yours,

GRAY & OSBORNE, INC.

David B. Jansen, P.E.

DBJ/sn
Encl.

cc: Mr. Justin Clary, P.E., City of Ridgefield

Agenda for 8/9/2004
City of Ridgefield & Department of Ecology
Scoping of General Sewer/Wastewater Facility Plan

1. Introductions

2. Basis of City decision to move forward with planning at this time

    a. Growth and Capacity concerns
    b. Receiving Water Constraints
    c. Melding with other utility planning and Comprehensive Plan

3. Options for meeting capacity needs

    a. Interim (upgrade to 0.7 MGD)
        i. Capacity analysis will be performed
        ii. Add second clarifier
        iii. Add solids processing
        iv. Add a diffuser on the outfall
        v. Other needs?
            1. Nitrification?
            2. Filtration?
            3. Nutrient removal?
        vi. Target Date; construction in Summer 2006

    b. Long term (2-3 MGD)
        i. Additional treatment (e.g. nutrient removal) with continued discharge to Lake River
        ii. New outfall to the main stem Columbia River
        iii. Reclaimed water with use in the Junction Area (satellite plant)
        iv. Reclaimed water with seasonal discharge to Lake River
        v. Some combination of the above
        vi. Other options?
        vii. Are any of these options preferred and why?
        viii. Are any of these options dead on arrival and why?

4. Other Issues

    a. Toxicity testing of the effluent
        i. Wastewater is not unusual
    b. Is Ecology planning a TMDL in the next year?
    c. Preferred outfall model—CORMIX?
    d. Other topics of concern
        i. Issues deriving from the PWT cleanup
    e. Sewer line placement--Does Ecology want to review?

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

Your address is in the **Lewis** watershed

February 3, 2005

CERTIFIED MAIL

Mr. Justin L. Clary, P.E.
Public Works Director
City of Ridgefield
127 N. Main Ave, PO Box 608
Ridgefield, WA 98642

Re: City of Ridgefield Outfall Study

Dear Mr. Clary:

The Department of Ecology is in receipt of your letter dated January 14, 2005, in which you request a response regarding the appropriate classification of Lake River for the purpose of defining Ridgefield's allowable mixing zone.

Washington's Water Quality Standards, Chapter 173-201A WAC, establish the maximum size and flow allowance for mixing zones. In particular, section 100 of this chapter defines the maximum allowable mixing zone configurations as well as listing water bodies in the state that are considered to be estuaries.

Due to tidal reversal, Ecology has agreed to support the use of a 200-foot radius for the purposes of defining the mixing zone boundary and dilution ratios. However, while Lake River is subject to tidal reversal at Ridgefield, it retains a riverine character and beneficial uses. Ecology believes application of the flow limitations in WAC 173-201A-100(7)(a) is appropriate to protect Lake River's beneficial uses (such as safe fish passage to the creeks that feed Lake River).

I should note that the limitations posed by the Lake River discharge are not new to the City. In fact, the City of Ridgefield's current sewer plan identifies the Columbia outfall to which your letter refers as the preferred option for the City's long-term discharge. This planning effort contemplated the limited assimilative capacity in Lake River and chose the Columbia outfall as the most cost-effective option.

I look forward to meeting with you to discuss this matter. If you have any questions prior to our meeting, I can be reached at (360) 407-6271. You may also contact Dave Knight at (360) 407-6277.

Sincerely,

Kelly Susewind

Kelly Susewind, P.E., P.G.
Southwest Region Manager
Water Quality Program

KS:GS:jr

Randy Jones

RECEIVED

JUN 13 2003

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

P.O. Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

June 10, 2003

Your address is in the **Lewis** watershed

Mr. Randy Bombardier, City Manager
City of Ridgefield
P.O. Box 608
Ridgefield, WA 98642-3557

Dear Mr. Bombardier:

This letter is in regards to our inspection of the City of Ridgefield's Wastewater Treatment Plant on April 29, 2003.

Our inspection confirmed that there have been vast improvements in the wastewater treatment plant's ability to reliably treat wastewater to the standards required to protect the public over the past three years. In all, the plant is being operated very well and we are quite pleased to see the City's progress. The operators are doing a commendable job and are a significant reason for the recent upgrade's success. Please refer to the enclosed inspection form for the specific findings of this inspection, which we hope can help focus future efforts.

Two potentially problematic issues remain. The first, discussed at our May 5th meeting, is the City's desire to reconsider current plans to move their outfall from Lake River to the Columbia River. The Department of Ecology (Ecology) agreed that slower growth provides an opportunity to reassess this option. However, it was clarified that Ecology did not explore requirements for continued discharge to Lake River due to the City's prior decision to discontinue discharge to this river with its lower assimilative capacity. The City will need to anticipate requirements for continued discharge, project life-cycle costs of both options, and amend the facility plan to reflect any changes in the conclusion of the most cost effective solution. While it is unclear whether continued discharge to Lake River is the best option, Ecology must shortly reissue a permit to the City. Ecology will therefore include in this permit, requirements to collect data that will allow us to determine appropriate conditions for continued discharge to Lake River. This includes a detailed mixing analysis, ambient monitoring, and metals monitoring.

The second issue is the planned conversion of the tank presently used for aerobic sludge digestion to a secondary clarifier. This will likely necessitate the City first devising an alternative solids processing capability at the POTW. Current approved plans recognize these actions happening when capacity is increased from 0.5 MGD to 1.5 MGD. However, our inspection noted the older backup secondary clarifier is proving less capable than prior hopeful estimates, therefore, this upgrade is also important to provide adequate secondary clarifier redundancy. We are asking the City to increase the priority of efforts to accomplish this task.

If you have any questions about these matters, please contact me at (360) 407-6277.

Sincerely,

David J. Knight, P.E.
Environmental Engineer
Water Quality Program
Southwest Regional Office

Soh

DK:le(06/wq)
Enclosure EPA Inspection form
cc: Chuck Meyer, Ecology
Dan Alexanian, Ecology

United States Environmental Protection Agency
Washington D.C. 20460

EPA

Water Compliance Inspection Report

Form Approved.
OMB No. 2040-0057
Approval expires 10-31-95

Section A: National Data System Coding (i.e., PCS)

Transaction Code	NPDES	yr/mo/dy	Inspection Type	Inspector	Facility Type
1 N 2 5	3 WA0023272 11	12 030429 17	18 C	19 S	20 1

Remarks
21 MINOR MUNI ANNUAL 66

Inspection Work Days	Facility Self-Monitoring Evaluation Rating	B1	QA	Reserved	
67 02 69	70 5	71 N	72 N	73 74	75 80

Section B: Facility Data

Name and Location of Facility Inspected *(For industrial users discharging to POTW, also include POTW name and NPDES permit number)*	Entry Time/Date	Permit Effective Date
City of Ridgefield Wastewater Treatment Plant West Cook Street Ridgefield, WA 98642	9:30 AM 4/29/03	October 1, 1998
	Exit Time/Date 1:30 PM 4/29/03	Permit Expiration Date June 30, 2003
Name(s) of On-Site Representative(s)/Title(s)/Phone and Fax Number Fred Crippen, John Duback, Jim Strickland	Other Facility Data	
Name, Address of Responsible Official/Title/Phone and Fax Number Randy Bombardier Ph (360) 887-8251 City of Ridgefield, PO Box 608 (360) 887-0740 Ridgefield, WA 98642-0608 Contacted ☒ Yes ☐ No		

Section C: Areas Evaluated During Inspection *(Check only those areas evaluated)*

☒	Permit	☒	Flow Measurement	☒	Operations & Maintenance	☒	CSO/SSO (Sewer Overflow)
☒	Records/Reports	☒	Self-Monitoring Program	☒	Sludge Handling/Disposal	☒	Pollution Prevention
☒	Facility Site Review	☒	Compliance Schedules	☒	Pretreatment	☐	Multimedia
☒	Effluent/Receiving Waters	☒	Laboratory	☒	Stormwater	☐	Other:

Section D: Summary of Findings/Comments *(Attach additional sheets of narrative and checklists as necessary)*

(Permit condition to secure outfall corridor to be addressed separately) OVERALL: Staff are operating this POTW very well.
SITE: As a result to recent upgrades, the POTW still has a good deal of landscaping to do to prevent stormwater runoff. Need to first improve site drainage in order to prevent stormwater intrusion into electrical vaults and then revegetate.
Operations and Maintenance: Permittee would benefit from better spare parts storage and inventory system. Especially a process for periodically ensuring inventory matches basic load of required items for services and common repairs per the O&M manual.
POTW also needs to exercise process for ammending the O&M Manual, especially adding notes to maintenance tasks.
Maintenance tasks were forecast in a fairly primitive manner, monthly tasks recorded on a sheet, daily work in the log book. POTW would would benefit if it can find an automated system for forecasting, scheduling, and recording maintenance performed.
Capabilities that would benefit this POTW also include the ability to confirm whether a maintenance task was performed and simplify spare parts ordering.
Sampling, analysis: Lab area is small and poorly configured for a return to doing BOD, TSS, analysis. Should be calibrating pH meter at pH of 10 as 3-point calibration required (correction agreed to). Composite samples should be flow proportionate when possible.
Effluent: quality visibly quite good. Slight floating grease in the secondary clarifier alludes to potential need for further emphasizing the grease trap program, but collection system has not experienced grease blockages, and grease is not passing through.
A thorough IU Survey would benefit the POTW by establishing the presence or absence of industrial users.
Disinfection: The UV system appeared to be operating quite reliably with good safeguards and proper attention.
Treatment: One of two aeration basins was operating, other on standby. Oxygen delivery was good using one blower w/VFD at lower range of RPMs. Design included good air delivery capability 50HP*3(AB) +100HP*1(AD). Aeration basins appeared adequately sized for the rated capacity. Only one secondary clarifier was in use. The backup secondary clarifier was quite small, and it's utility is quite limited. Design of the backup secondary clarifier was antiquated (rectangular w/travelling rakes) and its small surface area limits capacity to flow rates on a low flow summer day. Algae buildup in backup clarifier is a potential problem for the UV system.
FUTURE: POTW should establish a schedule for solids handling improvements for the next 3-4 years. Sludge digestor was designed to be converted to a second secondary clarifier at that time. The current backup secondary clarifier is substandard and antiquated. Solids can be processed by modern technology without the digestor. Recommend adding solids dewatering (e.g. belt filter) and pathogen reduction (e.g. lime treatment) systems at/near sludge bays by 2007, then convert sludge digestor to a secondary clarifier.

Name(s) and Signature(s) of Inspector(s)	Agency/Office/Hone and Fax Numbers	Date
David J. Knight P.E.	Ecology/SWRO (360) 407-6277	5/1/03
Signature of Management Q A Reviewer Garin Schrieve, P.E.	Agency/Office/Phone and Fax numbers Ecology/SWRO (360) 407-6272	Date 5/1/03

Subject: RE: Ridgefield
From: "Knight, David J. (SWRO)" <dakn461@ECY.WA.GOV>
Date: Thu, 2 Dec 2004 11:55:19 -0800
To: 'David Jansen' <djansen@g-o.com>

David Jansen [djansen@g-o.com]

-----Original Message-----
From: Knight, David J. (SWRO)
Sent: Thursday, December 02, 2004 11:49 AM
To: Ahmed, Anise
Cc: 'mailto:djansen@g-o.com'; 'BFox@cosmogrp.com'
Subject: FW: Ridgefield

Anise: Would you be available to discuss the Ridgefield MZ analysis? Possible meeting dates for G-O, Cosmo, and City staff include 12/9, 12/13, 12/14 (PM), and 12/16. On the 14th I'm only available until 3:00 PM, but I can make the other dates work.

Also; I was also wondering if you believe it necessary to ask for the study data, results of analysis, and conclusions to date so that we can more readily make decisions at this meeting. Without seeing anything in advance, it may be difficult to evaluate the information this study was to collect in the span of a single meeting to a great enough extent that it allows asking the important clarifying questions and reaching conclusions. I see the intent being for Ecology to be able to concur with the selected model and calibration regime at this meeting (if possible). Without seeing anything in advance of the meeting, I fear we will need to have more than one meeting, which I would like to avoid. Let me know what you think and whether you can free up time on these dates for that purpose.

Yours, DJK.

David J. Knight P.E.
Environmental Engineer
Southwest Regional Office
Water Quality Program
PO Box 47775, Olympia WA 98504-7775
Phone (360) 407-6277

-----Original Message-----
From: David Jansen [mailto:djansen@g-o.com]
Sent: Thursday, December 02, 2004 10:59 AM
To: BFox@cosmogrp.com
Cc: Knight, David J. (SWRO); Ahmed, Anise
Subject: Re: Ridgefield

I just got an updated calendar from the City. Please drop 12/17 from
the list of possible dates. Sorry about that.

Bill Fox wrote:

>Hello David
>
>We are at an intermediate point in our mixing zone study for Ridgefield
>where it might be useful to have some dialogue with Ecology. We have
>completed the field work, data reduction and presentation. I have also
>completed some of the mass balance, QA/QC, model selection and model
>calibration tasks. The next steps are to develop outfall/diffuser
>alternatives and run the models with appropriate planning flows.
>
>If you and Anise are available, I think it would be useful for me to make a
>brief presentation to you on these intermediate results. I would like to
>obtain your concurrence, if possible, regarding the choice of appropriate
>models, calculation of reflux, and interpretation of the dye study results,
>before we proceed into the actual modeling. It will be pretty technical, so
>I think Anise's involvement is key, since he will be reviewing it in the
>end.
>
>Please let me know your thoughts. Possible meeting dates on our end include
>12/9, 12/13, 12/14 (PM), 12/16 and 12/17.
>
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>
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>

--
David Jansen, P.E.
Project Manager
Gray & Osborne, Inc.
Olympia Office
2401 Bristol Court SW
Olympia, WA 98502
(360) 754-4266 Phone
(360) 754-2135 Fax

Client: _________________ G-O # ________

Electronic File Transfer-

Subject: RE: Ridgefield
From: "Knight, David J. (SWRO)" <dakn461@ECY.WA.GOV>
Date: Mon, 6 Dec 2004 09:08:13 -0800
To: "'BFox@cosmogrp.com'" <BFox@cosmogrp.com>, "Ahmed, Anise" <AAHM461@ECY.WA.GOV>
CC: "Dave Jansen (E-mail)" <djansen@g-o.com>, "Justin. Clary (E-mail)" <Justin.Clary@ci.ridgefield.wa.us>

The 9th will work. I have booked the below conference room from 10:00 to 12:30. To make this meeting most productive, it would be helpful if you could provide, (or point out where it occurs in the data provided, the following information:

Instantaneous current velocities and directions during the dye study,
Ambient and effluent water temperatures during the study,
Average current velocity over each tidal cycle,
Effluent dye concentrations over the period of the study,
Effluent flow rates over the period of the dye study
The basis for adjusting the measured dye concentrations (as appears in the spreadsheets),
Columbia River flow rates during the study versus 7Q10 flow rates
Approximation of the critical (7Q10) flow rate in Lake River and comparison to the Lake River flows of this study.

Also, the QAPP discussed that the data would be entered into the most frequently used models (UM3, DKHW, Cormix), has this been done and is this data we can review any of this prior to the meeting?

The data provided was of limited utility to me since I could not find the data needed to translate dye concentration to an effluent concentration, and the location of each of the points where the data was taken (and other data as mentioned above). I understand you will be unavailable for a while and I will try to get ahold of you on your cell phone (253) 677-4134 to confirm the meeting today.

Sincerely, Dave

David J. Knight P.E.
Environmental Engineer
Southwest Regional Office
Water Quality Program
PO Box 47775, Olympia WA 98504-7775
Phone (360) 407-6277

Date	Start	End	Room	Building	Status
12/09/2004	10:00 AM	12:30 PM	R1B-21 Hoh River Room (15 people)	Southwest Regional Office	Web Confirmed

-----Original Message-----
From: Bill Fox [mailto:BFox@cosmogrp.com]
Sent: Thursday, December 02, 2004 3:21 PM
To: Ahmed, Anise; Knight, David J. (SWRO)
Cc: Dave Jansen (E-mail); Justin. Clary (E-mail)
Subject: RE: Ridgefield

It sounds like next Thursday 12/9 will work. How about 10 AM. David, would you confirm this and can you get a room at Ecology?

Attached are the key excel files I am working from. They are a bit unwieldy, but I'll explain them more in the meeting. Or you can call me if you have specific questions. Here is your interim guide to the spreadsheets:

Ridgefield ISCO data.xls has all the data from the ISCO samplers plotted. As you can see, effluent does not stay long in Lake River compared to some of the other dye studies we have performed (Willapa, Snohomish). We determine the reflux concentration for the second release to be (from principal of superposition) to be 2.2 ppb. For an effluent discharge of 700,000 gpd this would translate to a reflux concentration of 0.5%

Ridgefield Fluoro Data.xls has all of the in-situ transect and profile data from the Turner datalogger. With the exception of the first two tabs and the one labeled ISCO, all of these data are at the chronic mixing zone boundary (upstream or downstream depending on tide) on September 3. Each transect and profile plot are labeled with the time and corresponding tidal condition. Notice on each transect I have included calibrated model in dashed red lines. This is linked from the spreadsheet discussed below.

Ridgefield Rivplum.xls is the model I have calibrated to the transects for each tide phase. I will describe these in more detail when we meet. The model has the same basis as RIVPLUM5, except it is a more rigourous solution and strictly mass-based (as opposed to the flow-based equations in RIVPLUM5). These sheets include not just the centerline concentration but also the lateral distribution of the plume. Anise, you probably have the Fischer text "Mixing in Inland and Coastal Waters" (if you don't you should). RIVPLUM5 is based on the flow and concentration based equations 5.8 and 5.9. Since we were discharging a straight tracer with neglibible flow volume (i.e. mass only) I used equation 5.7 for my calibration spreadsheets. Equation 5.7 is the basis for 5.8 and 5.9.

-----Original Message-----
From: Ahmed, Anise [mailto:AAHM461@ECY.WA.GOV]
Sent: Thursday, December 02, 2004 2:32 PM
To: Knight, David J. (SWRO); 'mailto:djansen@g-o.com'; 'BFox@cosmogrp.com'
Subject: RE: Ridgefield

I can meet on Dec 9th or any of the other dates. However, if we have to review something and it is involved, we may want to shoot for the following week, i.e. the week of Dec 13th.

I agree with David, that it would be worthwhile for all parties, if Ecology could have the discussion materials ahead of time, particularly, when concurrence is being sought on choice of appropriate model, calculation of reflux, and interpretation of the dye study results.

Thanks

Anise Ahmed, P.E.
Environmental Assessment Program
Department of Ecology
300 Desmond Drive/PO Box 47710
Olympia, WA 98504-7710
ph. (360) 407-6767

-----Original Message-----
From: Knight, David J. (SWRO)
Sent: Thursday, December 02, 2004 11:49 AM
To: Ahmed, Anise
Cc: 'mailto:djansen@g-o.com'; 'BFox@cosmogrp.com'
Subject: FW: Ridgefield

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Yours, DJK.

David J. Knight P.E.
Environmental Engineer
Southwest Regional Office
Water Quality Program
PO Box 47775, Olympia WA 98504-7775
Phone (360) 407-6277

-----Original Message-----
From: David Jansen [mailto:djansen@g-o.com]
Sent: Thursday, December 02, 2004 10:59 AM
To: BFox@cosmogrp.com

Cc: Knight, David J. (SWRO); Ahmed, Anise
Subject: Re: Ridgefield

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Bill Fox wrote:

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>

--
David Jansen, P.E.
Project Manager
Gray & Osborne, Inc.
Olympia Office
2401 Bristol Court SW
Olympia, WA 98502
(360) 754-4266 Phone
(360) 754-2135 Fax

Client: ________________ G-O # ________

Electronic File Transfer-

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Subject: RE: Ridgefield update
From: "Knight, David J. (SWRO)" <dakn461@ECY.WA.GOV>
Date: Thu, 20 Jan 2005 14:32:09 -0800
To: "'BFox@cosmogrp.com'" <BFox@cosmogrp.com>, "Ahmed, Anise" <AAHM461@ECY.WA.GOV>
CC: "Dave Jansen (E-mail)" <djansen@g-o.com>

Bill. Thanks for the update. I had a couple questions spurred by your E-mail

1. I haven't had the chance to review the referenced submittal yet, but I have previously clarified that it was my researched opinion, and the consensus of those whose positions require they interpret related regulations and policies, that the maximum allowable volumes of river water that can be used for mixing by a discharge to a River (regardless of whether it reverses) is established in Chapter 173-201A as a proportion of the 7Q10 low flow. This could possibly be further clarified by Mr. Susewind in answering the questions posed by Mr. Clary in his letter of January 14th, 2005. Your E-mail says that all the outfall options that you are modeling involve an outfall extension. Given your impressions of the very low 7Q10 in Lake River, I expect at least one of these outfall extensions would be to the Columbia River. Because this is the proposed course of action in the City's current approved General Sewer Plan / Facility Plan, it merits inclusion in any analysis of options.

2. Based on your E-mail, I also had a quick question about the dispersion coefficient. You state that using a UM3 dispersion coefficient of .003m^2/3/sec matches "reasonably well". While you describe trying dispersion coefficients of .0003, .001, and .003, these are quite disparate numbers with only one significant figure. I was hoping the model could be calibrated more closely. Can you please determine what dispersion coefficient (to two significant figures) makes UM3's output match most closely the dilution at the chronic boundary when the conditions of the dye study are input into the model? That would be my opinion of the most defensible approach here. Even though, in Lake River, your general observations about the river's flows would lead me to expect it likely that future mixing is far more limited by the maximum percentage of river flow allowed by rule, until 7Q10 flows are conclusively determined, it is appropriate to do this portion of the analysis as accurately as possible.

Yours, Dave

David J. Knight P.E.
Environmental Engineer
Southwest Regional Office
Water Quality Program
PO Box 47775, Olympia WA 98504-7775
Phone (360) 407-6277

-----Original Message-----
From: Bill Fox [mailto:BFox@cosmogrp.com]
Sent: Thursday, January 20, 2005 11:14 AM
To: Knight, David J. (SWRO); Ahmed, Anise
Cc: Dave Jansen (E-mail)
Subject: Ridgefield update

By now you should have received the mixing zone study for the existing outfall. I just want to update you on the status of the mixing zone study we are performing for the facilities plan. All of the alternatives we will be considering in the plan will include an outfall extension so that the discharge is always submerged.

I have completed a calibration and comparison of UM3, DKHW and RIVPLUM5 to the dye study. UM3 is the most conservative of the three, and given your apprehension regarding RIVPLUM5, I have decided to proceed with UM3 as the selected model.

I tested the Brooks' dispersion coefficient at 0.0003, 0.0010 and 0.0030 m^2/3/sec. 0.0003 is far too conservative, and 0.0030 fits the dye study reasonably well, and we will use this value in our modeling for future alternatives. I calibrated to a similar value from a dye study in the Snohomish Estuary for the City of Everett and can show you that data some time. If you would like to get together to discuss this calibration of the Brooks' model to the dye study, let me know and we can set up another meeting.

Anise, do you expect Walter Fricke to be on the west coast any time soon? I now have several dye studies in tidal rivers that show the default dispersion in VP to be far too low, by a factor of about 10. The default value of 0.0003 m^2/3/sec was estalbished from the Honolulu Sand Island outfall, which is an enormous discharge to the ocean. I would like to compare notes with Walter some day to find out if he has any opinion or data regarding appropriate coefficients for relatively shallow situations like Washington's tidal river estuaries.

Subject: RE: February 15 submittal per S-9 of the permitl
From: "Knight, David J. (SWRO)" <dakn461@ECY.WA.GOV>
Date: Fri, 11 Feb 2005 11:17:15 -0800
To: 'David Jansen' <djansen@g-o.com>
CC: "Schrieve, Garin" <gasc461@ECY.WA.GOV>

Dear Mr. Jansen; In response to your E-mail, please allow me to provide this clarification about the subject submittal due 2/15/05:

I do remember the collaboration on the draft plan for ambient monitoring. Bill Fox had rolled this pan up with mixing zone study plan which he sent me together in draft form on April 21, 2004. I liked the ambient monitoring plan he had devised, thought it fulfilled the requirements of the permit, and had only a couple comments which I sent him on June 1, 2004. I pointed out the reasonable potential analysis, while useful for the City was not an Ecology requirement for that particular submittal (FYI it's a required component in General Sewer Plans and Facility Plans to anticipate limits and whether the proposed treatment can meet them, but that is not part of what we required under S9. Rather, the required analysis of the GSP would use the data collected under S9).

Secondly, I pointed out that the two submittals for mixing zone and receiving water were intended to be separate, and the mixing zone study was required first to provide unbiased data on mixing ratios that could not be colored by an analysis of what mixing is required to continue discharging to Lake River based on ambient and effluent water quality. He had evidently gotten the impression during our meeting in early April 2004 that I concurred that these should be rolled up into one effort. While I tried to be clear that I did not concur with that strategy then, I was thankful for the opportunity to clarify my position in the follow-up E-mail. The GSP/FP would logically put these studies together after each was independently performed.

This submittal of 4/21/04 was titled "draft", so I took it as a coordination draft and I believe it served that purpose well (for both plans). As a required submittal under the permit, however, I was still anticipating the sampling plan required under S9 would be submitted under signature of the authorized representative of the City by February 15th, 2005. If this has happened already, I apologize for the oversight. It is quite possible it could have been sent directly to our files without my seeing it, or that it happened so long ago it was not properly credited with fulfilling this permit requirement. I just didn't recall seeing it as of our meeting yesterday and thought the reminder may be timely. I have no way to confirm on our end if we received it before Monday. I will check with our tracking system then to see we have a record of it being submitted.

Thank you again for arranging a productive meeting. We did receive the mixing zone study (part 1/2), before it was due (1/15/05) and are accepting it as fulfilling the requirements of S8.B of the City's permit. You may wish to include additional modeling analyses and conclusions associated with this effort as a chapter in the General Sewer Plan / Facility Plan rather than submitting them as "part 2" of the mixing zone study as doing so might serve to make the prior submittal appear incomplete.

(I've attached the draft plan I received on 4/21/04 in case you didn't get a copy)

Yours, Dave

David J. Knight P.E.
Environmental Engineer
Southwest Regional Office
Water Quality Program
PO Box 47775, Olympia WA 98504-7775
Phone (360) 407-6277

****

(In response to this E-mail from Dave Jansen sent 2/11/05)

Dave:

We have a little confusion at our end. At the meeting yesterday, Garin mentioned to us that a receiving water sampling plan was due to the department in February. According to some material that Bill Fox sent us, a plan was submitted to you to satisfy the SAP requirements of both sections S-8 and S-9 in April 2004 and was approved by you in an e mail dated June 1, 2004. Can you let us know if we still need to submit anything else?

Thanks for the help.

--

David Jansen, P.E.
Project Manager
Gray & Osborne, Inc.
Olympia Office
2401 Bristol Court SW
Olympia, WA 98502
(360) 754-4266 Phone
(360) 754-2135 Fax

Client: ________________ G-O # _______

Electronic File Transfer-

Ridgefield Draft SAP.doc	**Content-Type:** application/msword **Content-Encoding:** base64

Subject: RE: Reclaimed water irrigation systems
From: "Riley, Craig" <Craig.Riley@DOH.WA.GOV>
Date: Tue, 19 Oct 2004 15:31:01 -0700
To: 'David Jansen' <djansen@g-o.com>, "Riley, Craig" <Craig.Riley@DOH.WA.GOV>
CC: "Cupps, Katharine" <KCUP461@ECY.WA.GOV>

Dave: The answer to your question - is yes. To follow-up on Kathy's comments, it is common and even advisable to have the capability to supplement the reclaimed water supply with potable water so that the reclamation utility is able to assure the ability to meet the irrigation demands when the reclaimed water supply can't keep up. The only requirement is that the makeup flow be provided with an approved air gap that the local water utility approves in addition to our review and approval process. I would suggest also that City consider the requirement to use Class A reclaimed water for toilet flushing in the new the commercial / industrial developments. The biggest difference is the requirement for separate potable and non-potable plumbing lines in the new buildings, but this should be a relatively small increase in the total cost of construction. One reference estimates that close to 90% of the demands in office buildings goes to cooling & heating, landscaping & restroom uses. Using reclaimed water would relieve a substantial load from new commercial / office buildings demands.

I trust this answers your question. If you need more detail, please let me know.

From: David Jansen [mailto:djansen@g-o.com]
Sent: Monday, October 18, 2004 10:42 AM
To: Riley, Craig
Cc: kcup461@ecy.wa.gov
Subject: Reclaimed water irrigation systems

Craig, I wanted to get your opinion on an idea we have for a client that is looking at reclaimed water for at least part of their wastewater system. We are working for the City of Ridgefield. The community is growing rapidly and is in the process of revising their general sewer plan to keep up with growth. One part of the community is going to be primarily a commercial/ industrial area and we are considering a satellite reclaimed water plant in that location. And, as you know however, reclaimed water is not just about creating the reclaimed water, it is also about getting the water to where it can be used.

Some of the expected development will occur before the plant is built. The city is requiring that irrigated landscape strips, walkways, parks and wetlands buffers be provided in these commercial developments. These locations would all be good candidates for the use of reclaimed water.

My question is, can we have the developers install their irrigation systems using purple pipe and then allow potable water to be used in the purple pipe irrigation systems until reclaimed water becomes available? Then, when reclaimed water becomes available, the potable water connection would be removed and the reclaimed water would be used for irrigation instead.

I spoke with Kathy Cupps about this and she thought it was ok, subject to making certain that the necessary line separations were maintained during initial installation and that the potable water system was removed to the necessary distance when the reclaimed system was put on line. I wanted to check with you also concerning this question to see if Health had any other concerns.

Please let me know if this idea works for you or if you are aware of any problems that might occur in trying this approach. Also, if you know of any communities where this is being done, that would also be helpful. Thanks!

--
David Jansen, P.E.
Project Manager
Gray & Osborne, Inc.
Olympia Office
2401 Bristol Court SW
Olympia, WA 98502
(360) 754-4266 Phone
(360) 754-2135 Fax

Client: __________ G-O # ______

Electronic File Transfer-

Subject: RE: Reclaimed water irrigation systems
From: "Riley, Craig" <Craig.Riley@DOH.WA.GOV>
Date: Mon, 15 Nov 2004 11:29:20 -0800
To: 'David Jansen' <djansen@g-o.com>
CC: "Cupps, Katharine" <KCUP461@ECY.WA.GOV>

Dave: I think car washing is an acceptable use even though it is not specifically identified in our standards. I would require Class A quality due to potential for aerosol mists, although we might have to consider other restrictions. California allows for car washing, and requires quality to be Title 22-Tertiary which is equivalent to our Class A, requires that the water be heated and the public be excluded from the car wash. Florida just requires quality equivalent to our Class A.
I have never heard of any problems with finishes to cars, or interference with detergents or waxes and haven't found any prohibitions on the web, except for a site that says you shouldn't wash *any* car at an automatic car wash because the automated process of high detergent concentrations and high pressure ruins any car finish...

If I find out any more information, I will let you know.

> -----Original Message-----
> **From:** David Jansen [mailto:djansen@g-o.com]
> **Sent:** Wednesday, November 10, 2004 2:23 PM
> **To:** Riley, Craig; Cupps, Katharine
> **Subject:** Re: Reclaimed water irrigation systems
>
> Ok, now I'm getting some interest from developers. Next question. Can reclaimed water be used for vehicle washing?
>
> In a sense, it's a two part question. First, is it suitable from a health/regulatory perspective?
>
> and
>
> Is it suitable from a vehicle finish perspective? I have a new fire station that might be interested in using reclaimed water for truck washing, but not if it will damage the finish or interfere with the detergents and waxes. Do either of you have any info on that?
>
> Thanks!
>
> Riley, Craig wrote:
>
>> Dave: The answer to your question - is yes. To follow-up on Kathy's comments, it is common and even advisable to have the capability to supplement the reclaimed water supply with potable water so that the reclamation utility is able to assure the ability to meet the irrigation demands when the reclaimed water supply can't keep up. The only requirement is that the makeup flow be provided with an approved air gap that the local water utility approves in addition to our review and approval process. I would suggest also that City consider the requirement to use Class A reclaimed water for toilet flushing in the new the commercial / industrial developments. The biggest

difference is the requirement for separate potable and non-potable plumbing lines in the new buildings, but this should be a relatively small increase in the total cost of construction. One reference estimates that close to 90% of the demands in office buildings goes to cooling & heating, landscaping & restroom uses. Using reclaimed water would relieve a substantial load from new commercial / office buildings demands.

I trust this answers your question. If you need more detail, please let me know.

From: David Jansen [mailto:djansen@g-o.com]
Sent: Monday, October 18, 2004 10:42 AM
To: Riley, Craig
Cc: kcup461@ecy.wa.gov
Subject: Reclaimed water irrigation systems

Craig, I wanted to get your opinion on an idea we have for a client that is looking at reclaimed water for at least part of their wastewater system. We are working for the City of Ridgefield. The community is growing rapidly and is in the process of revising their general sewer plan to keep up with growth. One part of the community is going to be primarily a commercial/ industrial area and we are considering a satellite reclaimed water plant in that location. And, as you know however, reclaimed water is not just about creating the reclaimed water, it is also about getting the water to where it can be used.

Some of the expected development will occur before the plant is built. The city is requiring that irrigated landscape strips, walkways, parks and wetlands buffers be provided in these commercial developments. These locations would all be good candidates for the use of reclaimed water.

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Please let me know if this idea works for you or if you are aware of any problems that might occur in trying this approach. Also, if you know of any communities where this is being done, that would also be helpful. Thanks!

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David Jansen, P.E.
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(360) 754-2135 Fax

Client: ________________ G-O # ________

Electronic File Transfer-

Note that these electronic files are provided as a courtesy only. Gray & Osborne, Inc. in no way guarantees the accuracy or completeness of the digital data contained within these files. Further more, Gray & Osborne, Inc. assumes no liability for any errors or omissions in the digital data herein. Anyone using the information contained herein should consult the approved or certified hard copy drawings or reports for the most current information available.

--

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Client: ________________ G-O # ________

Electronic File Transfer-

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Subject: RE: A reclaimed water question
From: "Cupps, Katharine" <KCUP461@ECY.WA.GOV>
Date: Thu, 17 Feb 2005 08:25:52 -0800
To: "Riley, Craig" <Craig.Riley@DOH.WA.GOV>, 'David Jansen' <djansen@g-o.com>

HI Dave - I was waiting for Mr. Riley to weigh in on the public health side of this question.

For ground water quality protection, site specific conditions could be important in determining whether or not Class B reclaimed water would be OK for subsurface drip irrigation as described. Depending on the site conditions, subsurface application might have a greater chance for percolation to groundwater. If so, Class B may still be OK for public health protection but there may be additional requirements to protect groundwater quality - particularly if the water is going to be applied during the non-growing season. Antidegradation provisions for ground water protection would apply.

You should contact the appropriate Ecology region for this project to discuss the ground water quality issues. We will permit through the regional office. I work closely with them to both support reclaimed water use and to assure environmental protection in the process.

From Katharine C. (Kathy) Cupps, P.E.
360-407-6452
http://www.ecy.wa.gov/programs/wq/reclaim/index.html

-----Original Message-----
From: Riley, Craig
Sent: Wednesday, February 16, 2005 11:06 AM
To: 'David Jansen'
Cc: Cupps, Katharine
Subject: RE: A reclaimed water question

Dave: Sorry for the delay in responding; I've been out of the office and have had some deadlines also. I see two answers to your question - regulatory and realistic.

From the regulatory aspect, I think it would be possible to use irrigate a park & ball fields using underground drip irrigation with Class B reclaimed water. The standards require Class A for unrestricted access and Class C for restricted access, which means access to the site and the reclaimed water. To be approved, there could be no hose bibbs, quick connects or any other access to the RW system, and all valves and appurtenances would have to be secured in vaults and color coded.

A realistic answer is probably no - for two reasons. In my opinion, it would be very difficult to consistently and reliably produce a water with microbial quality of Class B (<2.2 TC - 7 day median and not to exceed 23) without filtering the water prior to disinfection. I think it would be difficult to produce Class C also. Total coliform levels of 23 & 240 TC are roughly equivalent to fecal coliform limits of 2 and 24 per 100 mls. Secondly, although the manufacturers do NOT require filtered water for the drip systems, they tell us that they would really, really, really like to have filtered water to protect the drip orifices. The O&M considerations for the drip system will probably change quite a lot depending on whether or not the water is filtered.

I can also see that providing filtration for a 10,000 gpd flow to be available for just the summer would be pretty difficult. I would think the only cost effective alternatives may be slow sand filtration or a small package plant from manufacturers US Filter, Ashbrook or Bio Pure.

I hope this answers your question. If you need anything more, please feel free to contact me.

-----Original Message-----
From: David Jansen [mailto:djansen@g-o.com]
Sent: Wednesday, February 09, 2005 9:33 AM
To: Craig.Riley@DOH.WA.GOV; KCUP461@ECY.WA.GOV
Subject: A reclaimed water question

Craig and Kathy:

We have a client who is considering generating a reclaimed water sidestream off of their secondary treatment process. Not much, they just want enough to irrigate some ball fields and a new park. Maybe 10,000 gpd, summer only.

Their question concerned whether an irrigation method would affect the class of reclaimed water that they have to meet. If they use drip irrigation, can they go with class B for the publicly accessible landscaped and play areas?

As I understand the requirements, they should generate class A for a park/ball field, regardless of their irrigation method. But, I thought I would check with you guys on this in case I was wrong.

--

David Jansen, P.E.
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Client: ________________ G-O # _______

Electronic File Transfer-

Gray & Osborne, Inc.
CONSULTING ENGINEERS

February 7, 2005

Ms. Jennifer C. Brown
United States Department of the Interior
U.S. Fish and Wildlife Service
Ridgefield National Wildlife Refuge Complex
301 N. Third Avenue
P.O. Box 457
Ridgefield, Washington 98642

SUBJECT: RIDGEFIELD OUTFALL, GENERAL SEWER/FACILITY PLAN
CITY OF RIDGEFIELD, CLARK COUNTY, WASHINGTON
G&O #04326

Dear Ms. Brown:

Thank you for your list of questions concerning the City of Ridgefield's proposal for placing a wastewater discharge pipeline across the Refuge. We also received a copy of the compatibility determination software.

I would like to provide you with some preliminary answers to your questions. Some of the answers will require us to compile information; other answers may involve conducting additional research or obtaining advice from the Refuge as to how to minimize any impact on the Refuge. I will address your questions in the order that you provided them to me.

1. Does the City of Ridgefield possess water analysis for the treated water? Several years of analysis would be preferable.

   The City of Ridgefield has extensive analysis data for the wastewater treatment plant effluent. The last 3 years of data best reflects current effluent quality since the treatment plant was extensively rebuilt in 2001. All of the available data is being compiled and will be provided to you.

2. Has a cost analysis been performed for any of the four defined routes? If so, could the Refuge be provided a copy of this analysis?

   The proposal for construction of an effluent discharge pipeline across the Refuge was originally developed in the mid 1990's. Cost estimates were developed for the four alternatives at that time. We are currently developing an updated cost estimate for the alternative that was identified as the preferred alternative during the original evaluation. If the Refuge would like to reevaluate the initial prioritization conducted in the mid 1990's or would like to consider any routes not considered at that time, we would need to update the older estimates or generate new cost estimates.

3. What will the exact placement of the pipeline be in each proposed route (in the levee itself, on the outside of the levee, at the inside toe of the levee, etc.)?

The placement of the pipeline is an issue we would prefer to review with you. We want to avoid any location that might have a negative impact on a levee and we would be interested in obtaining your advice as to the optimum placement location.

4. What type of pipe would be used?

The pipeline segment going under Lake River would be high-density polyethylene (HDPE) pipe. The pipe across the Refuge would be polyvinyl chloride (PVC) pressure pipe. The outfall into the Columbia itself would likely be HDPE or ductile iron pipe. The location and pipe materials for the outfall would be the subject of an outfall study at the termination point of the discharge line.

5. How deep would the pipe be buried?

The pipe would be buried about 3- to 4-feet underground.

6. What will the excavation footprint be?

The excavation footprint (the area the contractor might disturb to construct the pipeline) would be approximately 10 to 20 feet.

7. How many vents would be required? How tall would they be? What would happen in the case of a flood?

A pipeline of this type requires air blow-off valves at high points in the line. Although the number of vents cannot be precisely determined without surveying a route, we estimate that four to five blow-off valves would be required. They are placed below the ground in vaults or manholes, which are installed flush with the surrounding ground surface (i.e., nothing is visible above ground). In the event the area is flooded, the valves close. They are designed to let gas escape but not to let water either leave or enter the pipe.

8. What will the maintenance schedule be?

Pipelines made of this type of material and carrying clean water typically do not require a significant amount of maintenance. A physical inspection of the pipeline route could be carried out annually. Air release valves would be serviced annually.

9. What safety features will be included to prevent leakage and inform maintenance crews of leaking pipeline?

The pipeline will be constructed with water supply system pipe. This type of pressure pipe is rated for 15 to 200 pounds per square inch (psi) pressures. The actual operating pressures that we anticipate should be around 20 pounds per square inch. The pipeline will be inspected and pressure tested during installation.

10. Is this a permanent fix, or is this a stopgap measure to be used until tertiary treatment methods (or other treatment) are required?

    The outfall line would represent a permanent element of the City of Ridgefield's infrastructure. An outfall to the Columbia River has been the Washington State Department of Ecology's preferred location for effluent discharge since the mid 1990's. If the Department of Ecology will allow us to provide a higher level of treatment and stay in Lake River, then the City would conduct a cost benefit analysis to determine the optimum choice. At this time, we are negotiating with Ecology concerning the feasibility of remaining in Lake River.

11. When the pipe is required to cross the levee, will you excavate the levee section or bore through it?

    We would prefer to use construction techniques that are the least disruptive to existing Refuge infrastructure. Specific issues such as crossing water bodies or crossing levees would be determined jointly with the Refuge Management.

12. Is this a closed system, or does it include storm water? What happens in a heavy rain/flooding event?

    The City of Ridgefield has a collection system that is dedicated solely to wastewater. The City does not have a combined sewer system (combination of sanitary and storm water). The City also does not suffer from an excessive amount of infiltration and inflow. All wastewater entering the plant is treated by the plant and there are no bypasses now or planned in the future.

As I noted above, we will provide you with all the information we have concerning the quality of the effluent generated by the facility. In addition, the installation of the outfall would be accompanied by an expansion and enhancement of the existing treatment plant such that additional redundancy and reliability would be added to the treatment process.

We would be pleased to offer you a tour of the wastewater treatment plant so that you can better familiarize yourself with the system and the City's future plans and needs for wastewater treatment and disposal. We would also appreciate an opportunity to walk the most likely outfall alignments with you and your staff in order to identify any specific concerns that we can work around. If you could email me some possible dates that would work for you, I will set up a meeting. Please call me if you have any additional questions or need more information.

Very truly yours,

GRAY & OSBORNE, INC.

David B. Jansen, P.E.

DBJ/sn

cc: Mr. Justin Clary, City of Ridgefield

City H
230 Pion. . St.
PO Box 608
Ridgefield, WA 98642
(360) 887-3557
(360) 887-0861 fax

Police Department
116 N Main Ave.
PO Box 546
Ridgefield, WA 98642
(360) 887-3556
(360) 887-0930 fax

Com nity Development
127 N Main Ave.
PO Box 608
Ridgefield, WA 98642
(360) 887-3908
(360) 887-2507 fax

Public Works
127 N Main Ave.
PO Box 608
Ridgefield, WA 98642
(360) 887-8251
(360) 887-2507 fax

CITY OF RIDGEFIELD

December 28, 2004

Mr. Tim Bodeen
Project Leader
Ridgefield National Wildlife Refuge
P.O. Box 457
Ridgefield, Washington 98642

Subject: Outfall Review, General Sewer/Facility Plan
City of Ridgefield, Washington

Dear Mr. Bodeen:

Per conversations with David Jansen of Gray & Osborne, Inc., this letter is to formally notify the US Fish and Wildlife Service that the City of Ridgefield is considering the extension of the City's wastewater treatment plant outfall from its current location on Lake River to the main stem of the Columbia River. This extension will require crossing the Ridgefield National Wildlife Refuge. Possible pipeline routes are shown on the attached aerial photograph.

This extension proposal was originally presented to the US Fish and Wildlife Service in 1994. The proposal was deferred for some years, but the City would now like to bring this proposal forward for further consideration.

The basic outline of this proposal is as follows:

- The line would consist of an 18-inch-diameter force main.
- The line would not be visible once installation has been completed, except for some air release valves placed in below grade maintenance manholes. The flow of water in the line would also be noiseless.
- It would take approximately 6 months to complete the construction project. The pipeline route would be restored after construction was completed.
- The discharge line would carry disinfected and treated wastewater effluent at secondary or better treatment levels. Any accidental releases would not pose a human or environmental risk and would be promptly detected and repaired.
- The outfall in the Columbia River would be submerged off shore and not visible at any flow level. The effluent would be fully regulated by the state and federal requirements in the treatment plant's NPDES permit and the quality of the effluent would be documented in the monthly reporting required by that permit.

The City is presently considering other alternatives for the disposal of treated effluent. This particular alternative is one that the Washington State Department of Ecology is very interested in having the City evaluate thoroughly. Time is of the essence in the evaluation of the City's alternatives. We would appreciate a response from you outlining the regulatory and agency requirements for crossing the Refuge and timeline applicable to this proposal.

We appreciate your assistance and consideration of our request. Please contact the undersigned if I can answer any questions.

Very truly yours,
The City of Ridgefield

George Fox
City Manager

Enc: Aerial Photograph – Potential Outfall Routes

cc: Justin Clary, City of Ridgefield Public Works Director
David Jansen, Gray & Osborne, Inc.

United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Ridgefield National Wildlife Refuge Complex
P.O. Box 457 - 301 N. Third Avenue
Ridgefield, Washington 98642

January 19, 2005

Mr. David Jansen, PE
Gray & Osborne, Inc.
2401 Bristol Court
SW Building A
Olympia, Washington 98502

Dear Mr. Jansen:
As indicated in yesterday's discussion, there are several baseline questions that must be answered before Ridgefield National Wildlife Refuge can proceed with the Compatibility Determination process. This process must be completed before a decision can be made on routing Ridgefield's wastewater discharge pipeline across the Refuge. It would be extremely helpful if you could please provide details on the following issues:

- Does the City of Ridgefield possess water analyses for the treated water? Several years of analysis would be preferable.
- Has a cost analysis been performed for any of the four defined routes? If so, could the Refuge be provided a copy of this analysis?
- What will the exact placement of the pipeline be in each proposed route (in the levee itself, on the outside of the levee, at the inside toe of the levee, etc.)?
- What type of pipe would be used?
- How deep would the pipe be buried?
- What will the excavation footprint be?
- How many vents would be required? How tall would they be? What would happen in the case of a flood?
- What will the maintenance schedule be?
- What safety features will be included to prevent leakage and inform maintenance crews of leaking pipeline?
- Is this a permanent fix, or is this a stop gap measure to be used until tertiary treatment methods (or other treatment) are required?

- When the pipe is required to cross the levee, will you excavate the levee section or bore through it?
- Is this a closed system, or does it include storm water? What happens in a heavy rain/flooding event?

I appreciate your help in answering these questions and providing some necessary detail. If you need any further explanation of these issues, please give me a call or send an email to jennifer_brown@fws.gov. I look forward to working with you on the Compatibility Determination process.

Sincerely,

Jennifer C. Brown

Jennifer C. Brown
Refuge Manager

cc:// Justin Clary – Town of Ridgefield

Subject: Letter concerning the outfall line
From: David Jansen <djansen@g-o.com>
Date: Fri, 11 Feb 2005 11:24:28 -0800
To: Jennifer_Brown@fws.gov

Jennifer:

We sent you a letter this week answering some of your questions about the proposal to place an outfall line across the Refuge. There was a typo that I'd like to correct. In response # 9, the pipe pressure rating would be 150 to 200 psi. The zero was left off of the 150.

I apologize if that created any confusion. Have a good weekend!

--
David Jansen, P.E.
Project Manager
Gray & Osborne, Inc.
Olympia Office
2401 Bristol Court SW
Olympia, WA 98502
(360) 754-4266 Phone
(360) 754-2135 Fax

Client: ________________ G-O # ________

Subject: Ridgefield outfall
From: David Jansen <djansen@g-o.com>
Date: Wed, 06 Apr 2005 13:14:17 -0700
To: Jennifer_Brown@fws.gov
CC: jdougherty <jdougherty@g-o.com>, "Justin.Clary" <Justin.Clary@ci.ridgefield.wa.us>

Jennifer:

Just wanted to stay in the loop with you regarding the outfall to the Columbia. Would you be interested in a tour of the treatment plant and possibly giving us a tour of the Refuge dikes? If you have some time free in May, that might be a good target. If you'd like to provide some dates and times, we would try to match your availability. Thanks!

--

David Jansen, P.E.
Project Manager
Gray & Osborne, Inc.
Olympia Office
2401 Bristol Court SW
Olympia, WA 98502
(360) 754-4266 Phone
(360) 754-2135 Fax

Client: ____________________ G-O # _________

Electronic File Transfer-

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ Telephone Conversation	**Location of Phone Conversation:** GRAY & OSBORNE INC.
☐ Meeting	**Place of Meeting:**

Date	3-24-05	Time	0930 a.m.	p.m.
Discussed with	Jennifer Brown			
[illegible]	Ridgefield Wildife Refuge Manager, USFWS			
Phone Number	360 887-4106			
Gray & Osborne Personnel	Jim Dougherty			
Project	WWTF Outfall Compatibility Analysis			
Subject	Compatibity Analysis, Refuge Concerns, other permit requirements, routing considerations			
G&O Job Number	04326.02			

REMARKS:

Jennifer Brown, USFWS Ridgefield Wildlife Refuge Manager, returned my call this morning to discuss the Compatibility Analysis process and their concerns regarding the placement of the outfall pipe on Refuge property. She said that, because four alternative routes have been presented to her, a Compatibility Analysis should be done for each alternative. However, she said that if we selected a preferred alternative, less thorough coverage of the other alternatives would likely be ok.

She said that she didn't really want to take the time to do a Compatability Analysis until the City has determined that the outfall alternative is the most viable long-term alternative. I reminded her that none of this work would be occur immediately, and that construction of the outfall is likely up to ten years out. She said that it would be good to get some sort of reading from Ecology regarding their position regarding final WWTF location and layout, so that she could be sure that the proposed outfall line across Refuge Property would not be abandoned in the future. She said that she was most concerned about the outfall conveyance pipe and any ventilation structures, and the potential for water and land contamination during flood events. She said that she didn't have specific ideas about how these issues should be resolved, and she suggested that we submit a proposal for USFWS review, once most of the design issues have been resolved. She said that there haven't been any Compatibility Analyses completed in the two years since she became Refuge Manager, so she couldn't be much help with time budgeting.

We talked about other permitting requirements, and she assumed that there would be Shoreline permit(s) with both the City of Ridgefield and Clark County, Corps Permits for the outfall (Rivers & Harbors Act Section 10) and the project could require CWA Section 404 permitting for wetland impacts. She said that USFWS would want a copy of the NPDES permit for the outfall and any outfall analysis prepared for Ecology's approval. Jennifer said that the route to the west along Lake River to the Columbia contains an archaeological site that should be avoided.

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ **Telephone Conversation**	**Location of Phone Conversation:** GRAY & OSBORNE INC.
☐ **Meeting**	**Place of Meeting:**

Date:	3-24-05	Time:	0930 a.m.	p.m.
Discussion with:	Jennifer Brown			
From/City with:	Ridgefield Wildife Refuge Manager, USFWS			
Phone Number:	360 887-4106			
Gray & Osborne Personnel:	Jim Dougherty			
Project:	WWTF Outfall Compatibility Analysis			
Subject:	Compatibity Analysis, Refuge Concerns, other permit requirements, routing considerations			
G&O Job Number:	04326.02			

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United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Ridgefield National Wildlife Refuge Complex
P.O. Box 457 - 301 N. Third Avenue
Ridgefield, Washington 98642

January 7, 2005

George Fox, City Manager
City of Ridgefield
P.O. Box 608
Ridgefield, WA 98642

Dear Mr. Fox:

I received your letter requesting the Ridgefield National Wildlife Refuge (Refuge) review and consider the City's wastewater treatment plant outfall extension proposal that would directly transit near or through Refuge lands. To address your request, we will evaluate, review, and consider this proposal by using the required National Wildlife Refuge System Compatibility Determination process. The Compatibility Determination process takes from 6 months to one year to complete depending upon how many public comments are received during the public comment period and the detail of the request.

The first step will be to meet with David Jansen of Gray & Osbourne, Inc. to discuss and gather project engineering, design, testing, and monitoring information. The more information we have the more complete Compatibility Determination we can put together.

Jennifer Brown (Refuge Manager) and myself will be your points of contact for this proposal. We will call you intermittently to provide updates or to discuss critical proposal issues.

If have any questions or concerns feel free to contact us at 360/887-4106.

Best Regards

T Bodeen

Tim Bodeen
Project Leader

Gray & Osborne, Inc.

CONSULTING ENGINEERS

August 18, 2006

Mr. David Knight, P.E.
Washington State Department of Ecology
Southwest Regional Office
Water Quality Program
P.O. Box 47775
Olympia, Washington 98504-7775

SUBJECT: REVISED GENERAL SEWER PLAN AND WASTEWATER FACILITY PLAN
CITY OF RIDGEFIELD, CLARK COUNTY, WASHINGTON
G&O #04326

Dear Mr. Knight:

Enclosed for your review and approval are three copies of the revised City of Ridgefield General Sewer and Wastewater Facility Plan, which describes the City's existing wastewater facilities and recommends improvements to these facilities to provide adequate capacity through planning year 2024. We have revised this Plan to address the comments in your letter dated August 10, 2005, concerning your review of the 2005 draft Plan. To facilitate your review of this revised Plan, we have provided responses to each of your earlier comments below. Your comments are repeated below, with each comment followed by our response in italics. Revisions to the Plan have been made as identified in this letter. This letter will also be included in an appendix of the final Plan.

GENERAL COMMENTS ON THE DRAFT GENERAL SEWER AND FACILITY PLAN – ENCLOSURE 1

1. The GSP/FP is not stamped and signed by the Engineer. To be approved, it must be submitted under the seal and signature of the responsible licensed Engineer (in accordance with Chapter 173-240 WAC).

   The revised Plan is stamped by the Engineer.

2. Only one copy has been provided (a minimum of two are required by regulation – three for projects requesting funding through programs administered by Ecology).

701 Dexter Avenue N., Suite 200 Seattle, Washington 98109 (206) 284-0860 Fax (206) 283-3206

Three copies of the revised Plan are provided.

3. The GSP is titled "Draft" and cannot be approved as such.

   The revised Plan is no longer titled "Draft."

4. Page E-4 of the plan questions Ecology's determination that Lake River is a river rather than an estuary. Citations in the Enclosure have been discussed with the City, and Ecology's experts consulted to ensure that Ecology's conclusion that this is a "river" for purposes of mixing zone determinations is the correct one. Ecology cannot approve a plan that does not protect the receiving water as a river.

   It is recognized that Ecology believes that Lake River should be classified as a river, though we contend that the river does exhibit characteristics of an estuary. Obviously, this classification significantly affects the ability of the WWTP to discharge to Lake River at greater flows and remain in compliance with water quality standards. The Plan is revised to recognize this "river" classification by Ecology, and to include discussion indicating that the City will move forward with the planning for the installation of an outfall in the Columbia River. Mixing zone studies (Appendix D) are included in the Plan to demonstrate that critical minimum flows in Lake River are influenced by recirculation flow from the Columbia River, to the degree that adequate dilution of WWTP flow should be provided in Lake River at effluent discharges as high as 1.0 mgd.

5. The plan should acknowledge that the current GSP which is being superceded by this submittal recommends moving the outfall to the Columbia River. As such it was included as a permit requirement in the prior permit, but was not accomplished by the City because of their desire to explore other options.

   The Plan now acknowledges the General Sewer Plan dated April 1994 recommended moving the outfall to the Columbia River.

6. The draft GSP misrepresents the facts on page 1-3 by not acknowledging that the "final Phase 1" capacity of 0.75 mgd capacity was to be achieved when the outfall to the Columbia River and pump station to pump that outfall were constructed. What is in place now is referred to as "interim Phase 1" in the 1997 Facility Plan and that document stipulates it has a capacity of 0.5 mgd. Ecology has recognized this capacity in the City's

NPDES permit. The "final Phase 1" design was to include a new outfall in the Columbia River and a pump station to get the water there, and was not anticipated to have to nitrify. Because nitrification requires significantly greater tankage and aeration capacity, it is easy to see why the discharge to Lake River, which must nitrify to avoid violating WQ Criteria, has a lower capacity than a discharge to the Columbia, which would not. The 1997 plan was that when the City built the outfall line and pump station (for Columbia River discharge), and built another clarifier, the POTW would have a 0.75 mgd capacity. This capacity was lowered to 0.7 mgd in plans and specifications for the "interim Phase 1" system because the clarifier constructed (50 feet diameter) was smaller than called for in the approved facility plan (55 feet diameter). Also, since these plans were approved, the backup (rectangular) clarifier has failed and was not operational during Ecology's last inspection. This component is required to be maintained in a ready status until a replacement clarifier is available.

The description has been updated in the current Plan to include the recommendations made in the 1997 Plan for achieving "Phase 1" capacity, consistent with your comment, and to reflect Ecology's concerns regarding the available dilution in Lake River and the need to construct a Columbia River outfall. Mixing zone studies in the current Plan provide additional information to establish the amount of dilution provided by Lake River, which will continue to be used as a receiving water until relocation of the outfall to the Columbia River.

7. A similar misrepresentation appears on page 3-8 under "Growth Increments." This section should reflect that in addition to the noted redundancy and outfall deficiencies, the POTW (by the approved 1997 Plan) must discharge to the Columbia River to achieve the "final Phase 1" capacity. Discharging to Lake River requires a high degree of nitrification, which lowers the organic capacity of the POTW. The topic of what level of nitrification is required to avoid violating WQ Criteria is discussed in text and appendices to the City's current NPDES permit fact sheet.

   The Plan has been revised to be consistent with the 1997 Facility Plan.

8. Pages 4-5 to 4-7 discuss MCRI development ordinance contents, but not the current status of such an ordinance. This should be included. The document also must clarify that the SEPA process has been completed and that the Environmental Report has been completed. Appendix C is a

SEPA checklist, but the text does not address where the project is in the SEPA process, or the SERP process.

The Plan has been revised to include the status of SEPA and an MRCI ordinance. On April 27, 2006, the Ridgefield City Council passed Ordinance No. 903, adopting the City's updated Critical Areas Ordinance. With respect to SEPA, the City has issued a Determination of Non-Significance for the Plan, and a copy of this signed SEPA document is included in the Plan appendices. An Environmental Report is being produced to comply with SERP, and this Report will be provided to Ecology shortly.

9. Page 4-16 discusses "secondary treatment" standards, and contains a table of these standards. This table is missing weekly average BOD and TSS criteria, 85 percent removal requirements, and pH limits of 6 to 9. All of these are important "secondary treatment" standards. It also shows incorrect numbers for the Fecal Coliform criteria. The criteria, for secondary treatment, are 400/100 ml (weekly average) and 200/100 ml (monthly average) taken as a geometric mean in both cases. It should be understood that secondary standards were developed for "conventional pollutants," and do not establish AKART for toxic pollutants. Ammonia is a toxic pollutant, and therefore, not the subject of Chapter 173-220 WAC, but of Chapter 173-201A WAC.

    The additional standards and corrections are included in the revised Plan.

10. Page 5-11 speculates as to potential benefits of the leaking sewer outfall. Ecology's position is that if the outfall is leaking it needs to be fixed or abandoned unless those responsible for the cleanup of the Pacific Wood Treating site provide a determination that the benefit speculated here is a vital component of the cleanup. The City is not authorized to discharge to ground.

    This section on the condition of the outfall has been deleted. There is no direct evidence that the pipeline is leaking.

11. Page 6-14 fails to perform the analysis of excessive <u>infiltration</u>. Excessive infiltration is defined as flows in excess of 120 gallons per capita per day over a period of 7 to 14 days in which groundwater is seasonally high, but there are no storm events. This is the flow to the POTW during non-storm

events, but during periods of seasonally high groundwater tables. The report must estimate whether infiltration is excessive.

The infiltration analysis is corrected to incorporate "7 to 14 days in which groundwater is seasonally high, but there are no storm events." We have repeated the analysis to include 7 to 14 days rather than a 4-day period as was done in the draft Plan. We used flow data from February 3 through February 13, 2003; the conclusion remains the same, which is that Ridgefield is not considered to have excessive infiltration by EPA criteria.

12. Page 6-14 estimates that inflow is just under the limit of what is considered excessive, but apparently does so by inappropriately excluding the flows from six businesses from the total flows in order to get the number below the criteria of 275 gpd/c. The value after subtracting these six businesses is 274 gpd/c. According to EPA's guidance, this calculation should only exclude major commercial and industrial flows (defined as those greater than 50,000 gpd each). The City listed no industries in their NPDES permit application, and the permit fact sheet (page 5) memorializes Ecology's determination that there are no Industrial Users of the system. None of these businesses meet this criteria, and the total flow from these six businesses was only 16,000 gpd. Therefore, they are considered "nominal commercial and industrial flows" as defined by the Ecology Publication 97-03, "Infiltration/Inflow – I/I Analysis and Project Certification" (USEPA, May 1985). The analysis should consider the last 7 years of flow data, of which the peak flow appears to be the February 1999 peak day flow of 0.626 mgd. We will allow that additional population since this time may be presumed to have a peak flow impact of only 100 g/c*d for purposes of seeing if inflow is presently still excessive.

    The inflow analysis was corrected to incorporate the flow from the previously excluded six businesses. The calculation was revised and still meets the EPA criteria of less than 275 gpcd. The calculation includes a peak day flow of 0.626 mgd from February 1999 plus the additional flow of 100 gpcd since that time and for a population of 2,495 in 2005.

13. Page 6-15 reviews existing BOD loadings, but only covers the last 2 years. Typically the last 5 years should be reviewed. The rationale for not using the prior 5 years should be explained.

    The flow meter data preceding January 2002 was determined unreliable by our analysis, and this situation is explained in greater detail in the *section titled "Existing Wastewater Service Population" in Chapter 6. Rapid population growth since the draft Plan was first issued in 2005 has made the accurate determination of the current population very difficult. Also, significant residential construction in the service area is believed to have produced high levels of suspended solids in the wastewater entering new sewer connection installations. These factors render flow and loading data in the past year inaccurate with respect to per capita or per household generation. Consequently, only the data from the period 2002 through 2004 is used, and it is believed that these data adequately represent per capita flows and loadings in the future.*

14. Page 6-19 is titled "Projected Effluent NPDES Permit Limits." It is important for this plan to estimate the standards to which treatment needs to be provided. Given the recent mixing zone study's estimation of mixing provided by the current outfall, the limits for metals and toxic pollutants would be quite stringent. The report must estimate what effluent quality will be required to meet Water Quality criteria at the present situation, and also based on the 7Q10 of the river when a new outfall is installed (if that is more limiting than dilution at the edge of the allowed zones).

    The revised Plan includes estimates of the projected future effluent limits for BOD_5, TSS, fecal coliform, pH, and ammonia and copper limits determined by the mixing zone studies for the flows predicted for the years 2009 (0.7 mgd), 2019 (1.83 mgd), and 2024 (1.72 mgd).

15. Page 6-20 states that "from a mixing zone perspective the receiving water studies conclude that Lake River can continue to receive effluent from the POTW through 2024."

    Ecology does not concur with this assessment (which appears to have been made without the benefit of a reasonable potential analysis or estimate of the effluent and ambient water qualities presumed). The City has been informed the mixing zone ratios available to the POTW are limited to 25 percent of the 7Q10 (7Q10 = lowest 7-day average flow with a recurrence interval of 10 years) for mixing at the edge of the chronic boundary, and 10 percent of this (2.5 percent of 7Q10 flows) for mixing at the acute boundary. For purposes of mixing zone ratio determination, the discharge is to a river, not an estuary (this is consistent with all EPA and FR definitions which could be located – see below). Where river flows reverse, Ecology allows river mixing zones to be centered over the discharge point (the default situation for an estuary). This does not, however, equate to classifying the receiving water as an estuary for purposes of mixing zone ratios.

Also, the study showed a very small mixing zone ratio for the existing diffuser which discharges to ground. This is what must be modeled for the present situation. These facts should be reflected in the GSP.

From: GUIDANCE FOR EVALUATING THE ADVERSE IMPACT OF COOLING WATER INTAKE STRUCTURES ON THE AQUATIC ENVIRONMENT: SECTION 316(b) P.L. 92-500 U.S. Environmental Protection Agency, Office of Water Enforcement, Permits Division, Industrial Permits Branch, Washington, D.C., May 1, 1977, "Estuary: An estuary is defined as a semi-enclosed coastal body of water which has a free connection with the open sea; it is thus strongly affected by tidal action and within it sea water is mixed (and usually measurably diluted) with fresh water from land drainage. It may be difficult to precisely delineate the boundary of estuarine and river habitats in the upper reaches of a fresh water river discharging into marine waters. The interface is generally a dynamic entity varying daily and seasonally in geographical location. In such cases, determination of habitat boundaries should be established by mutual agreement on a case-by-case basis. Where boundary determination is not clearly established, both estuary and river habitat biological survey requirements should be satisfied in a combined determination for environmental effects and best available technology for minimizing adverse impact."

The Environmental Protection Agency's Environmental Monitoring and Assessment Program (EMAP) includes the following definition: "*estuary* is defined as any water body that is tidally influenced, is saline, and has less than 50 percent of its perimeter adjacent to the ocean. As a result, an estuary is defined at its lower boundary by its articulation with the ocean or another estuary and its upper boundary by the head of tide. The lateral boundaries of an estuary are defined as the mean high water mark."

For the Marine Managed Areas Inventory, an ***estuary*** is defined as: "part of a river or stream or other body of water having unimpaired connection with the open sea, where the sea water is measurably diluted with fresh water from land drainage, and extending upstream to where ocean-derived salts measure less than 0.5 parts per thousand during the period of average annual flow."

The ESTUARY HABITAT RESTORATION PARTNERSHIP ACT OF 1999, October 14, 1999, defines estuary: "*Section 4. Definitions,* This section defines terms used throughout the Act including: "Estuary" is defined as a body of water and its associated physical, biological, and chemical elements, in which fresh water from a river or stream meets and mixes with salt water from the ocean. An exception to this definition is made for estuary-like areas in the Great Lakes biogeographic regions that are part of the National Estuarine Research Reserve system at the time of enactment of this legislation."

To address the need to provide adequate dilution of future WWTP discharges, the Plan includes a recommendation to construct an outfall in the Columbia River as part of the Phase 2A upgrade of the treatment facility. The City is in the process of conducting environmental studies and permitting of this new outfall and associated effluent pipeline to the Columbia River. Due to the challenging and lengthy process posed by the permitting and construction activities, the City is requesting Ecology to allow the City to continue to discharge to Lake River until the necessary permit can be obtained and construction can be completed. (See also the response to Comment #4 above.)

16. Figure 7-2 shows a new force main extending outside of the UGA boundary. This is at odds with the Growth Management Act and Ecology cannot approve it.

The force main outside the UGA is actually an existing force main. The figure is corrected in the revised Plan to show the force main as existing. The force main was established prior to GMA and serves the Washington State Department of Transportation weigh station, a public facility, and is maintained by the City. New connections to this force main are not permitted outside the current UGA.

17. Page 8-7 describes Alternative 2 as being what is described on page 8-6 as Alternative 3. The numbering of the alternatives needs to be consistent.

The numbering of the alternatives has been changed in the revised Plan, for clarification. The alternatives are numbered as follows:

Alternative No. 1	*Conventional Activated Sludge*
Alternative No. 2	*Activated Sludge with Membrane Bioreactor*

Alternative No. 3 Sequencing Batch Reactor

18. The plan does not evaluate the feasibility of a new POTW on the Columbia River to supplement this facility, and perhaps take the flows from the new areas. This alternative was briefly alluded to earlier in the report, but received no discussion in Chapter 8 (but appears to merit consideration).

The option to build a new POTW on the Columbia River to supplement the present facility is another alternative, but, in our assessment, not an economically viable one. We chose not to evaluate this alternative in any detail because we believe it a reasonable assumption that a new POTW would not be cost competitive with existing site options. New influent and effluent pipelines would be necessary to connect the new POTW to the existing facility (the existing collection system drains to the existing facility, and the outfall pipe originates at the existing facility), which would result in significant capital costs. In addition, all Columbia River shoreline north and south of the City for a considerable distance is either wildlife refuge or wetlands, and purchasing and permitting a site in these areas would be extremely costly and difficult to obtain. Upland sites outside of the refuge and wetlands could potentially be found, but their capital and operating cost would be significantly greater than development of a single POTW at the existing site, and the permitting requirements for constructing a new POTW at a new site would be extensive.

19. Page 8-8 describes Alternative 1 Phases 1 and 2, but there is only one drawing (Figure 8-1). The drawing does not clearly show the components in place during each of these two phases. Each phase must be illustrated separately. In fact, since the final recommendation is for three phases, a description of, and plan showing the location of components present in each of the three phases must be included.

We have included the additional necessary figures. Figures 8-3, 8-4, and 8-1 show the components in place during Phase 1, 2A, and 2B, respectively. A description of each phase is also included in the Plan.

20. Page 8-10 discusses a new outfall modification to extend the outfall so that it's submerged throughout the day in lower flow times of the year. This work would need to be done before the next permit application is due if the POTW wishes to have greater mixing zones than those estimated by

their mixing zone study for the current outfall configuration. There did not seem to be a timeline on that action (at least in Chapter 8). A recommended timeline for this should be included.

We have added clarifying language to Chapter 8 of the revised Plan. Construction of the outfall extension is planned to begin in 2006 as part of the Phase 1 (2009, 0.7 mgd) expansion.

21. Figures 8-3 and 8-4 need to identify the flows for which these hydraulic profiles were developed (also a hydraulic profile for the "2019" situation is missing and must be included). Table 6-4 indicates peak flows of 1.51 mgd for 2009, 3.52 mgd for 2019, and 4.93 mgd for 2024. The hydraulic profiles must note the flows for which these hydraulic profiles were evaluated. The hydraulic profile at peak flows and high river gage is of particular concern.

    We have added design peak flows to the figures displaying the hydraulic profiles for Phase 1 (2009) (Figure 8-5), Phase 2A (2019) (Figure 8-6) and, Phase 2B (2024) (Figure 8-7).

22. Table 8-9 does not reiterate the design flows and loadings for which the "2024" POTW is being designed to accommodate. Reference to prior tables is acceptable.

    We have added the design flows and loadings to the table.

23. Following is our analysis of the 2024 design (2.68 mgd, 3,588 lb BOD_5 and TSS, MMA):

    A. We concur that aeration basin and clarifier sizing are sufficient for the anticipated 2024 flow and loadings shown on Tables 6-4 and 6-5 (proving nitrification is not required – discharge to Columbia River).

       No comment.

    B. At this flow capacity we urge consideration of having the backup screen also be a mechanical fine screen rather than a manual screen.

The manual screen will be retained in the Plan to reduce project costs. We will consider a mechanical fine screen rather than a manual screen in the design stage once project costs are better known.

C. The sizing of this plant is based on a peaking factor max hour to average annual flow of 2.9, which predicts a peak flow of 5.0 mgd. A community of this size would, under Metcalf and Eddy 4th edition Figure 3-13, normally have a peaking factor (peak hour:annual average) of about 3.5. This would lead to building the POTW to handle 1.0 mgd more peak hour flow (6.0 mgd vs. 5.0 mgd), and subsequently sizing a slightly larger headworks. The analysis should justify why this lower peaking factor is appropriate.

The method used in the Plan to determine the peaking factor is suggested in the Department of Ecology's Criteria for Sewage Works Design. Metcalf & Eddy 4th Edition suggests there are several different sources for peaking factor data (page 202). The graph in Figure 3-13 of Metcalf & Eddy 4th Edition was determined from a number of different communities throughout the United States; the text suggests this is merely an example. We cannot justify the use of this general example as a better method than the method suggested in the Department of Ecology's Criteria for Sewage Works Design. We believe the method for calculation of the peaking factor suggested in the Department of Ecology's Criteria for Sewage Works Design, extracted from "Recommended Standards for Wastewater Facilities, 1990 Edition (10 States Standards) produces a reasonable result for the City of Ridgefield.

D. The grit classifier motor size was presumed to be 0.75 hp (listed as 0.75 inch).

The error is corrected in the revised Plan.

E. The POTW currently is being run with a MLSS typically closer to 2,500. At the design MLSS of 3,000 mg/L MLSS we concur that the POTW designed for 2024 can fully nitrify; however, at 2,500 MLSS it may not, and therefore it should be confirmed that the POTW can be operated at this higher MLSS.

The secondary clarifiers can effectively operate at 3,000 mg/L MLSS. The recommended solids loading rates (SLR) to the secondary clarifier for activated sludge from Metcalf & Eddy 4th Edition (page 687, Table 8-7) are an average SLR of 19 to 29 lb/ft^2-d (0.8 to 1.2 lb/ft^2-h) and a peak SLR of 38 lb/ft^2-d (0.8 to 1.2 lb/ft^2-h).

The secondary clarifiers described in the Plan for 2024 have a solids loading rate at peak hour flow of 30 lb/ft^2-d. This loading is well below the maximum suggested SLR in Metcalf & Eddy 4th Edition.

F. The design needs a backup aeration basin blower and may require additional aeration tank blower capacity to work properly. The 2024 design uses three 50-hp blowers (no backup) to aerate 1.426 MG of aeration basin volume in three tanks. Ecology's assessment is that a backup blower must be installed, and 50 hp per basin only works if high efficiency blowers (90 percent vs. 70 percent) and high efficiency motors (90 percent vs. 85 percent) are used. With normal efficiency blowers and motors, at least 65 hp per basin would be needed (plus backup). Ecology's analysis presumes the following factors not specifically described in Tables 6-4, 6-5, and 8-9. Specifically that the diffusers are mounted 6 inches from the bottom of the tanks, and total head losses of the air pipeline and aerators (a function of the type and quantity of aerators) is sufficient to maintain a backpressure of only 3 psi (in addition to the pressure head due to the diffuser depth).

The design for Phase 2B (2024, 2.68 mgd) includes two aeration basin blowers to meet the air requirements for the aerobic zones and the mixing requirements for the selector zones. The third aeration basin blower satisfies redundancy.

We believe the supplied air is sufficient to meet the oxygen and mixing requirements of the design load. The horsepower has been changed to 60 hp to meet peak demands. The two aeration basin blowers will supply sufficient air to meet the demands.

24. Table 8-9 needs to be repeated in similar fashion for the "2009" and "2019" phases of the POTW to ensure that the design capacity and component sizes of these interim phases are approvable.

We have included the design criteria for Phase 1 (2009, 0.7 mgd), Phase 2A (2019, 1.83 mgd), and Phase 2B (2024, 2.68 mgd) in the revised Plan.

25. Appendix C: Our analysis confirms that the POTW with only an additional clarifier and outfall to the Columbia River would be able to treat up to 1.0 mgd and 1,380 lb/day of BOD_5. The draft Environmental Checklist (Appendix C) notes, however, a Phase 2 capacity of 1.83 mgd. It is unclear whether this is an earlier or different version of the plan, or if not, how this capacity is to be attained.

The design details of Phase 2A (2019, 1.83 mgd) are included in the revised Plan.

26. Appendix H: Local limits on pages 19 and 20 of this draft ordinance are listed for six metals, cyanide, phenols and cresols, and fats, oils, and grease. There is no technical basis shown for the proposed limits (there needs to be one to be defensible). Also, according to EPA guidance, when local limits are developed, they should also be developed for cadmium, mercury, nickel, selenium, silver, and molybdenum.

In July 2005, the City adopted a pretreatment regulation titled "Pretreatment Standards for the Sanitary Sewer Collection System," which replaced the draft pretreatment ordinance included in the draft Plan appendix. We understand that these standards are consistent with similar standards used by neighboring communities and agencies, including Clark County. We will have the City furnish you a copy of these standards if requested.

27. Appendix H: Also regarding local limits: For conventional pollutants, EPA also recommends limits address BOD, TSS, and ammonia where the POTW must treat ammonia (as Ridgefield does). The ordinance, on page 20, does not describe how the surcharge amounts will be calculated, or reinforce ammonia as a surcharge pollutant. It might, for example, establish that the business would pay the base monthly amount for a residential unit (one ERU) for each (X) pound per day (average) of BOD_5

discharged above residential strength wastewater. TSS and ammonia would also need to be similarly addressed.

See response to previous item (Comment #26).

The Ecology checklist titled **Contents Required for General Sewer Plan** (Ecology Enclosure 2 in the draft Plan comments) was reviewed and additional requested information was incorporated into the revised Plan. A completed **Facilities Plan Review Checklist** (Ecology Enclosure 3 in the draft Plan comments) is attached.

Please note that the Ridgefield ordinances included in the appendices of the draft Plan have been removed from the current Plan to eliminate any issues concerning the need for Ecology's approval of these City regulations.

Please call me if you have any questions about the information presented. We are available also to meet with you and the City to discuss these matters, if desired.

Very truly yours,

GRAY & OSBORNE, INC.

John P. Wilson

John P. Wilson, P.E.

JPW/hj
Encl.

cc: Mr. Justin Clary, P.E., Public Works Director, City of Ridgefield
Mr. Steve Wall, P.E., City Engineer, City of Ridgefield

APPENDIX B

SEPA ENVIRONMENTAL CHECKLIST

SERP DOCUMENTATION

CITY OF RIDGEFIELD

RIDGEFIELD COMMUNITY DEVELOPMENT DEPARTMENT
127 North Main Avenue
PO Box 608
Ridgefield, Washington 98642

DETERMINATION OF NONSIGNIFICANCE (DNS)

FILE NAME: City of Ridgefield General Sewer Plan/Facilities Plan

DESCRIPTION OF PROPOSAL: The General Sewer Plan/Facilities Plan prepared for the Ridgefield WWTP and collection system reviews the infrastructure improvements required to provide service to the City of Ridgefield and the surrounding UGA for the next 20 years (2025). Approximately $20 million of collection system expansion projects are also identified. Three construction phases were identified as necessary to serve projected growth. The Plan proposes multiple phases consisting of: Phase 1 that proposes the extension of the outfall diffuser pipe discharging to Lake River to ensure dilution at low tide and expansion of the existing Activated Sludge WWTP capacity to 0.7 MGD; Phase 2 that proposes expansion of the WWTP to 1.83 MGD to serve portion of the UGA, extension of the outfall to the Columbia River to facilitate dilution, acquisition of property for future expansion and Class A biosolids handling; and Phase 3 that proposes the expansion of the WWTP capacity to 2.68 MGD.

APPLICANT: City of Ridgefield Public Works Department, PO Box 608, 127 North Main Avenue, Ridgefield, WA 98642, (360) 887-8251.

PROPERTY OWNER: City of Ridgefield, PO Box 608, 230 Pioneer Street, Ridgefield, WA 98642, (360) 887-3557.

LOCATION OF PROPOSAL: Citywide

EAD AGENCY: City of Ridgefield Community Development Department

DETERMINATION: The lead agency has determined that this proposal does not have a probable significant adverse impact on the environment. The lead agency will not act on this proposal for fourteen (14) calendar days from the issuance date of August 24, 2005. **The Ridgefield Community Development Department must receive written comments on the DNS no later than 5:00 p.m. on September 6, 2005.** An Environmental Impact Statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency.

RESPONSIBLE OFFICIAL / STAFF CONTACT: Kevin H. Snyder, AICP, Community Development Director, Ridgefield Community Development Department, 127 North Main Avenue, PO Box 608, Ridgefield, WA 98642, PH: (360) 887-3908 / FX: (360) 887-2507, kevin.snyder@ci.ridgefield.wa.us.

DATE ISSUED: <u>August 24, 2005</u> **SIGNATURE:** Kevin H. Snyder

APPEAL: An appeal of this determination must be submitted to the Community Development Department within fourteen (14) calendar days from the date issued. This appeal must be written and make specific factual objections to the City's threshold determination. Appeals shall be conducted in conformance with RDC 18.810.205 (Appeals) of the City's Environmental Ordinance, and any required fees pursuant to RDC 18.810.205.F shall be paid at time of appeal submittal.

PART ELEVEN – FORMS

WAC 197-11-960 Environmental Checklist.

ENVIRONMENTAL CHECKLIST

Purpose of checklist:

The State Environmental Policy Act (SEPA), chapter 43.21C RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an EIS is required.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant, requiring preparation of an EIS. Answer the questions briefly, with the most precise information known, or give the best description you can.

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, write "do not know" or "does not apply." Complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Use of checklist for nonproject proposals:

Complete this checklist for nonproject proposals, even though questions may be answered "does not apply." IN ADDITION, complete the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D).

For nonproject actions, the references in the checklist to the words "project," "applicant," and "property or site" should be read as "proposal," "proposer," and "affected geographic area," respectively.

A. Background

1. Name of proposed project, if applicable.

   Facilities Plan for the City of Ridgefield WWTP and Collection System Improvements.

2. Name of Applicant:

   City of Ridgefield.

3. Address and Phone Number of Applicant and Contact Person:

   Justin Clary, P.E., Public Works Director, (360) 887-8251
   230 Pioneer Avenue
   P.O. Box 608
   Ridgefield, Washington 98642-0608

4. Date Checklist Prepared:

   May 5, 2005.

5. Agency Requesting Checklist

   Washington State Department of Ecology.

6. Proposed Timing or Schedule (including phasing, if applicable)

   Phase 1, 2007
   Phase 2, 2008
   Phase 3, 2017
   Separate SEPA documents will be prepared for Phase 2 and Phase 3, as construction plans and details become available.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

   - ***The Ridgefield WWTP must be upgraded from a current capacity of 0.5 MGD to 0.7 MGD to provide adequate service to serve the growing population through 2009 (Phase 1).***
   - ***Wastewater treatment capacity must be expanded to serve the Urban Growth Area surrounding downtown as Ridgefield grows (1.83 MGD) (Phase 2).***
   - ***The ultimate capacity of the WWTP will be approximately (2.68 MGD) (Phase 3).***

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

   - ***City of Ridgefield and Clark County Shoreline Substantial Development Permit Application (JARPA, etc.).***
   - ***City of Ridgefield and Clark County Grading Permit Application.***
   - ***U.S. Fish & Wildlife Service Refuge Compatibility Analysis.***
   - ***National Environmental Policy Act Environmental Report/EIS.***
   - ***Biological Assessment for Endangered Species Act compliance.***
   - ***National Historic Preservation Act compliance.***
   - ***Rivers & Harbors Act, Section 10, and possibly Clean Water Act, Section 404 permits from the U.S. Army Corps of Engineers.***

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

   No.

10. List any government approvals or permits that will be needed for your proposal, if known.

   - ***City of Ridgefield and Clark County Shoreline Substantial Development Permit.***
   - ***City of Ridgefield and Clark County Grading Permit.***
   - ***City of Ridgefield and Clark County Critical Areas Ordinance compliance.***
   - ***Rivers and Harbors Act, Section 10 Permit (ACOE).***
   - ***Clean Water Act, Section 404 Permit (ACOE).***
   - ***Finding of No Significant Impact for a NEPA Environmental Report, or Record of Decision for a NEPA Environmental Impact Statement from the federal funding or permitting agency.***
   - ***Hydraulic Project Approval from WDFW.***

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

   The General Sewer Plan/Facilities Plan prepared for the Ridgefield WWTP and collection system reviews the infrastructure improvements required to provide service to the City of Ridgefield and the surrounding UGA for the next 20 years (2025). Approximately $20 million of collection system expansion projects are also identified. Three construction phases were identified as necessary to serve projected growth:

   Phase 1:
   - ***Extension of the outfall diffuser pipe discharging to Lake River to ensure dilution at low tide (i.e., -7 feet depth).***
   - ***Expansion of the existing Activated Sludge WWTP capacity to 0.7 MGD.***

   Phase 2:
   - ***Expansion to 1.83 MGD to serve portions of the UGA.***
   - ***Extension of the outfall to the Columbia River to facilitate dilution.***
   - ***Acquisition of property for future expansion.***
   - ***Class A biosolids handling.***

   Phase 3:
   - ***Expansion of capacity to 2.68 MGD.***

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including the street address, if any, and section, township, and range, if known. If a proposal would occur over a range of areas, provide the range or boundaries of the site(s). While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The City of Ridgefield WWTP is located on the northeast bank of Lake River, which is a tributary/oxbow of the Columbia River that runs north along the east side of Bachelor Island. The upgrades would occur within the existing footprint of the facility and 1 acre to the north of the existing facility within a disturbed area historically used as a log sort yard. The Phase 2 outfall proceeding west to the mainstem Columbia River is the most significant departure from the current footprint. A separate environmental assessment is planned to evaluate pipeline routes for this element of the Plan. The project area lies in Section 24, Township 4 North, Range 1 West in Clark County, Washington.

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site (check one): ☒ flat, ☒ rolling, ☐ hilly, ☐ steep slope, ☐ other. . . .

The Columbia and Lake River floodplains are fairly flat with gradual slopes approaching 3 to 4 percent grade with steeper levee embankments.

b. What is the steepest slope on the site (approximate percent slope)?

Levee embankments in the area approach 50 percent grade.

c. What general types of soils are found at on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.

Soil Survey of Clark County, Washington (USDA, SCS, 1972). Soils on Bachelor Island and along the Ridgefield Waterfront include Sauvie-Puyallup association: deep nearly level to gently sloping, somewhat poorly drained to somewhat excessively drained, moderate fine textured to moderately coarse textured soils of the floodplains. Specific soil classifications on the site include:

- ***SmB, Sauvie silt loam, 3 to 8 percent slopes.***
- ***SpB, Sauvie silty clay loam, 0 to 8 percent slopes.***
- ***CvA, Cove silty clay loam, 0 to 3 percent slopes.***

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

No, however, soils on Bachelor Island may be soft enough to require that heavy dense structures are not located in shoreline areas.

e. Describe the purpose, type, and approximate quantities of any grading proposed. Indicate source of fill.

Phase 1:
Improvements within the WWTP for Phase 1 would involve minimal amounts of ground disturbance within the developed footprint of the plant. An estimated 1,400 cubic yards of soils within the existing footprint would be disturbed in order to provide footing and tank capacity. No import of fill is anticipated.

Phase 2:
Filling and grading quantities for the proposed outfall extension have not been determined at this time because the preferred route has not been selected. This information will be evaluated as part of the environmental assessment to be conducted as part of the pipeline route determination study. No import of fill is anticipated.

Phase 3:
Implementation of Phase 3 would require expansion of the WWTP footprint by approximately 1 acre. No import of fill is anticipated.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

Yes, grading and excavation will expose soils to potential erosive forces of wind and water. Temporary Erosion and Sediment Control Measures will be implemented to limit erosion. The project will be constructed during the summer months to reduce the potential for erosion and sediment transport. Disturbed areas will be repaved or revegetated in-kind, as required.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

The first phase of construction would require installation of new equipment and some reorganization of the existing WWTP site. Little, if any, new impervious surfaces would be created. Phase 2 of the project would expand impervious surfaces somewhat, while Phase 3 would require creation of approximately 1 additional acre of impervious surfaces for treatment facilities.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

Temporary Erosion and Sediment Control (TESC) measures will be implemented in compliance with the Department of Ecology 2001 Surface Water Design Manual as part of the construction project. Components of the project requiring extensive ground disturbance will be constructed during the dry summer months and construction BMPs for control of sedimentation and erosion will be implemented.

2. **Air**

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

Gas and diesel exhaust emissions and dust typical of construction activities will be generated during construction of the various phases of the proposed project. Phase 2 of the project will involve expanding WWTP capacity beyond 1 MGD and installation of a new emergency generator. Both of these activities would require preparation of a Notice of Construction and an Air Quality Permit from the SW Washington Air Pollution Control Board.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

TESC measures and compliance with existing air quality standards for construction equipment and operations will be used to limit emissions. Construction equipment will be properly operated and maintained and dusty areas will be watered during particularly dry conditions.

3. **Water**

a. Surface:

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

Yes, the Ridgefield WWTP discharges to Lake River, which lies immediately south of the plant and flows northwest to its confluence with the Columbia River approximately 2 miles downstream. The upstream end of Lake River connects to Bachelor Island Slough and the Columbia River approximately 1 mile south of the WWTP near one of the proposed outfall sites. The Columbia River flows northwest past Bachelor Island approximately 1 mile south of the WWTP site. Wetlands may be present along the proposed pipeline route to the outfall.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

Phase 1:
Approximately 110 feet of 16-inch pipe will be attached to the existing Ridgefield WWTP outfall to extend the outfall to a depth of minus 7 feet in Lake River at low tide.

Phase 2:
Installation of a new outfall to the Columbia River would require crossing of Lake River and running the new outfall line along the existing levee to a new outfall extending into the Columbia River.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

No fill and dredge will occur in Phase 1. Quantities of dredge and fill for a pipeline to the main stem Columbia will be estimated in the outfall alternatives evaluation that will be completed prior to the selection of a preferred route.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

Phase 1 of the proposed project would occur within the existing plant footprint and would not involve surface water withdrawals or diversions. Phase 2 would involve construction of an effluent pipeline to the new outfall on the Columbia River. A segment of a new effluent pipeline must be laid across the bottom of Lake River in order to cross the river. Phase 3 would involve expansion of the WWTP facility footprint to an adjacent site. No surface water diversion or withdrawals necessary for any phase.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

Yes. The Ridgefield WWTP and the proposed outfall lie within the 100-year floodplain of the Columbia River, Lake River, or other drainages.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

Phase 1 of the proposed projects involves extension of the existing Lake River outfall by approximately 110 feet to improve effluent dilution and dispersal. Phase 2 of the project would involve upgrading the existing WWTP and relocating the outfall to a site on the Columbia River. Relocation of the outfall to the Columbia River would provide adequate dilution and dispersal of effluent from the Ridgefield WWTP through the planning period (2025). No discharge of waste will be permitted as a result of construction activities.

b. Ground:

1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.

No groundwater withdrawals are required for any phase of the projects identified in this Plan.

2) Describe the waste material that will be discharged into the ground from septic tanks or other sources if any (for example: domestic sewage; industrial, containing the following chemicals; agricultural; etc.).

No waste materials will be discharged to the ground associated with the various phases of the proposed project. A small number of existing septic systems in the Ridgefield Urban Growth Area will be abandoned, as sewer collection and treatment facilities become available.

3) Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

Phase 1 of the proposed Ridgefield WWTP Improvements would expand capacity of the system from 0.5 to 0.7 MGD. Phase 2 would expand capacity of the system to 1.83 MGD as the service area extends from the downtown core into the UGA. Phase 3 would expand capacity to 2.68 MGD in approximately 2025. The completion of Phase 3 contemplates a population of 12,000 within the City of Ridgefield.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including stormwater) and method of collection and disposal, if any (include quantities, if known). Where will the water flow? Will this water flow into other waters? If so, describe.

No runoff would be generated by development and implementation of the proposed Wastewater Facilities Plan. Phase 1 of the proposed WWTP improvements would involve upgrades within the existing footprint and would not increase impervious surfaces within the plant significantly; extension of the outfall to a depth of –7 feet MLLW would not generate a significant amount of stormwater runoff. Relocation of the outfall to the Columbia River during Phase 2 would require excavation of a trench approximately 1 mile long, which would cross Lake River and run across the floodplain of the Columbia River. All new infrastructures would be located below ground and disturbed surfaces would be revegetated or repaved in-kind, so that stormwater runoff would not be increased significantly.

2) Could waste materials enter ground or surface waters? If so, generally describe.

Small amounts of sediment-laden runoff from excavation areas associated with the various phases of the proposed project could eventually reach Lake River and the Columbia River.

3) Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

Temporary Erosion and Sediment Control (TESC) measures will be implemented in compliance with the Department of Ecology 2001 Surface Water Design Manual as part of the construction project. Components of the project requiring extensive ground disturbance will be constructed during the dry summer months and construction BMPs for control of sedimentation and erosion will be implemented.

4. Plants

a. Check types of vegetation found on the site:

- ☒ Deciduous tree: alder, maple, aspen, cottonwood, other
- ☐ Evergreen tree: fir, cedar, pine, other
- ☒ Shrubs
- ☒ Grass
- ☒ Pasture
- ☐ Crop or grain
- ☒ Wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
- ☒ Water plants: water lily, eelgrass, milfoil, other
- ☐ Other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

***Phase 1:** Upgrading the existing WWTP would likely involve removal of small areas of vegetation (upland grasses typical of lawns) from within the existing WWTP footprint, and small amounts of invasive black berry plants will be disturbed during extension of the sewer outfall to a depth of –7 feet in Lake River.*

***Phase 2:** Depending on the selected route, construction of the new outfall to the Columbia River may involve temporary disturbance of upland, wetland, and riparian plant communities. A complete delineation of impacted vegetation will be made in the route selection study.*

***Phase 3:** Construction of additional facilities at a 1-acre site adjacent to the Ridgefield WWTP would involve removal of upland grass.*

c. List threatened or endangered species known to be on or near the site.

None known.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any.

Restoration in kind.

5. Animals

a. Check any birds and animals which have been observed on or near the site or are known to be on or near the site:

- ☒ Birds: hawk, heron, eagle, songbirds, other (***waterfowl on Lake River)***
- ☒ Mammals: deer, possum, raccoons, beaver, other small mammals:
- ☒ Fish: bass, salmon, trout, other;

b. List any threatened or endangered species known to be on or near the site.

It is likely that bald eagles forage along the Columbia and Lake Rivers in the vicinity of the project area throughout the year. It is possible that they may nest in large trees overlooking these streams, but it is unlikely that bald eagles nest in the project area.

Salmonids protected under the authority of the Endangered Species Act in the vicinity of Ridgefield include:

- ***Lower Columbia River steelhead***
- ***Lower Columbia River chinook***
- ***Columbia River chum salmon***
- ***Columbia River bull trout***

Listed salmonids that may pass by the project area en route to spawning habitat farther up river include:

- ***Upper Columbia Spring chinook, listed "endangered"***
- ***Snake River sockeye, listed "endangered"***
- ***Upper Columbia steelhead, listed "endangered"***
- ***Snake River fall chinook, listed "threatened"***
- ***Snake River spring/summer chinook, listed "threatened"***
- ***Mid Columbia steelhead, listed "threatened"***
- ***Snake River steelhead, listed "threatened"***
- ***Upper Willamette steelhead, listed "threatened"***
- ***Columbia River bull trout, listed "threatened"***

c. Is the site part of a migration route? If so, explain.

The Lower Columbia River (including the Ridgefield Wildlife Refuge) lies along the Pacific Flyway and is a stopover point for waterfowl during the spring and fall migrations. The Columbia River is a migratory artery for anadromous salmonids, sturgeon, lampreys etc. Lake River likely provides rearing habitat for juvenile salmonids and provides migratory habitat for adults.

d. Proposed measures to preserve or enhance wildlife, if any:

- ***Upland portions associated with extension of the existing outfall during Phase 1 and extension of the outfall to the Columbia River during Phase 2 will occur during the dry summer & early fall.***
- ***In-water work will be limited to the WDFW in-water work window for the Lower Columbia River, which extends from November through early February.***
- ***Disturbed areas will be replanted with native grasses and shrubs to stabilize the site and minimize erosion and sedimentation.***
- ***Construction BMPs for the control of sedimentation and erosion will be implemented to minimize water quality impacts associated with excavation.***

6. **Energy and Natural Resources**

a. What kind of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Electrical energy will be used to pump effluent. Electrical energy from diesel generators may be used to pump effluent under emergency conditions (generally associated with flooding).

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No.

c. What kind of energy conservation features are included in the plans of this proposal? List other proposed measures to control energy impacts, if any.

The effluent conveyance infrastructure and outfall structures will be graded to flow by gravity as much as possible to minimize pumping.

7. **Environmental Health**

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

None, other than the fuels, lubricants, and coolants present in the construction vehicles and equipment.

1) Describe special emergency services that might be required.

Emergency service for construction-related incidents may be required. Construction equipment will be fitted with Hazardous Materials Spill Containment Kits and construction crews shall be trained in their use.

2) Proposed measures to reduce or control environmental health hazards, if any.

Safety measures for utility construction in accordance with the Washington State Department of Labor and Industries Standards will be implemented. Construction equipment will be fitted with Hazardous Materials Spill Containment Kits and construction crews shall be trained in their use.

8. **Noise**

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

The Ridgefield WWTP lies just to the north of the railroad tracks. Trains passing the site are the source of the loudest noise in the project area.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Phase 1 would involve upgrades within the footprint of the existing WWTP and extension of the outfall to Lake River to a depth of –7 feet MLLW. Neither of these activities would be particularly loud.

Phase 2 construction of a new effluent line and outfall to the Columbia River would involve use of heavy machinery and construction vessels in areas where they are not usually present, either on, or adjacent to, the USFWS Ridgefield Wildlife Refuge. While none of the equipment used would be particularly noisy (medium-sized trackhoe), wildlife accustomed to quiet conditions would likely leave the construction area until work is complete and noise levels return to preconstruction conditions.

9. Land and Shoreline Use

a. What is the current use of the site and adjacent properties?

The Ridgefield WWTP is the site of most of the improvements in Phase 1 and Phase 3, and a major portion of Phase 2 upgrades outlined in the Facilities Plan. The lot adjacent to the WWTP that will be utilized for the expansion in Phase 3 is currently vacant land. Phase 2 involves extending the WWTP outfall to the Columbia River along shorelines that are part of the USFWS Ridgefield National Wildlife Refuge.

b. Has the site been used for agriculture? If so, describe.

The Ridgefield WWTP site has not likely been utilized for agriculture. Aerial photographs of the Ridgefield National Wildlife Refuge from the 1990s indicate that much of Bachelor Island has been used for production of grains, hay, and forage crops.

c. Describe any structures on the site.

The various components of the Ridgefield WWTP are present on the site. The existing outfall to Lake River consists of a 10-inch concrete pipe, which is exposed at low tide.

d. Will any structures be demolished? If so, what?

No demolition of structures will occur during project Phase 1. Phase 2 will involve the demolition of existing metal storage sheds to allow the construction of a solids handling building in the same footprint. No demolition is anticipated for Phase 3.

e. What is the current zoning classification of the site?

Public Facility at WWTP site.

f. What is the current comprehensive plan designation of the site?

Public Facility.

g. If applicable, what is the current shoreline master program designation of the site?

Urban at the WWTP site and Rural on the Wildlife Refuge.

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

The Ridgefield WWTP site lies within 200 feet of Carty Lake and is, therefore, within Shoreline jurisdiction. The existing outfall to Lake River and the proposed outfall to the Columbia and the entire conveyance pipeline route would lie within Shoreline jurisdiction. Portions of the WWTP and conveyance line lie within an area designated as a "Severe Erosion Hazard Area." Most of the existing and proposed sewer outfall pipelines lie within the 100-year floodplain.

i. Approximately how many people would reside or work in the completed project?

The Ridgefield WWTP Operator and maintenance crew would work in the vicinity of the completed project. NO residential use is anticipated.

j. Approximately how many people would the completed project displace?

None.

k. Proposed measures to avoid or reduce displacement impacts, if any:

NA.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any.

Proposed upgrades to the Ridgefield WWTP will occur within the footprint of the existing facility. The proposed extension of the existing outfall to Lake River will not result in a change in land use at this location. The City of Ridgefield is in the process of preparing a U.S. Fish & Wildlife Service Wildlife Refuge Compatibility Analysis for the proposed projects.

10. Housing

a. Approximately how many units would be provided, if any? Indicated whether high, middle, or low-income housing.

None.

b. Approximately how many units, if any, would be eliminated? Indicated whether high, middle, or low-income housing.

None.

c. Proposed measures to reduced or control housing impacts, if any:

NA.

11. Aesthetics

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

NA. All effluent conveyance lines will be installed below existing grade. Tanks will not exceed 8 feet in height, similar to the existing equipment on site.

b. What views in the immediate vicinity would be altered or obstructed:

During construction of Phase 1 improvements, views of the Ridgefield WWTP and outfall site will be modified temporarily. Once the WWTP improvements are completed, views of the area would be essentially the same as pre-project conditions. New pipelines would be installed below grade and disturbed areas would be reseeded to stabilize slopes and minimize erosion, so views of the project areas will remain essentially the same.

c. Proposed measures to reduce or control aesthetic impacts, if any.

Once construction is complete, disturbed areas will be repaved or replanted with native plant materials.

12. Light and Glare

a. What type of light or glare will be proposal produce? What time of day would it mainly occur?

Light and glare may bounce off construction equipment during midday.

b. Could light and glare from the finished project be a safety hazard or interfere with views?

There would be no increase in light and glare associated with the finished project, as all effluent conveyance mains would be located underground.

c. What existing off-site sources of light or glare may affect your proposal?

NA.

d. Proposed measures to reduce or control light and glare impacts, if any:

NA.

13. Recreation

a. What designated and informal recreational opportunities are in the immediate vicinity?

The Ridgefield National Wildlife Refuge lies immediately west of Lake River and the Ridgefield WWTP. It provides opportunities for hiking, boating, bird, and wildlife viewing. Fishing and swimming occur along the Columbia River in season.

b. Would the proposed project displace any existing recreational uses? If so, describe.

Extension of the existing WWTP outfall pipe to Lake River would not displace any recreational uses in the area. However, extending an outfall to the Columbia River would result in restrictions on fishing and contact recreation near the end of the new outfall pipe. Noise from construction equipment may temporarily discourage use of small portions of the Wildlife Refuge by wildlife.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any.

Access to recreational areas would be maintained during construction.

14. Historic and Cultural Preservation

a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.

There are no places or objects listed on, or proposed for inclusion on State or local historic preservation registers on the site of the Ridgefield WWTP. It is not known whether objects of cultural, historic, or archaeological significance are located along the proposed route of the proposed outfall extension to the Columbia River. It is anticipated that the Washington Office of Archaeology and Historic Preservation will require a survey of potential outfall routes by a professional archaeologist/cultural resources specialist.

b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.

There are no known elements of this nature that have been identified to date. However, the area has been known for Native American use in the past and a survey of potential outfall routes by a professional archaeologist/cultural resources specialist will need to be conducted as part of the route selection process. Potentially impacted tribal interests include the Cowlitz and Yakima Tribes.

c. Proposed measures to reduce or control impacts, if any.

An archaeological/cultural resources survey of the proposed outfall extension route will occur prior to any construction associated with the proposed project. In the event that materials of cultural, historic, or archaeological significance are disturbed/discovered during construction, work shall be halted in that area and the Washington State Office of Archaeology and Historic Preservation and the Cultural Resources Department of the Tribes shall be consulted. Tribal and OAHP guidance regarding the handling and storage of potentially significant materials in compliance with Section 106 of the National Historic Preservation Act (NHPA) shall be observed.

15. Transportation

a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.

The City of Ridgefield can be accessed from Interstate 5 via SR 501. The WWTP lies west of the railroad tracks along a line approximately even with Cook Street.

b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

No. Approximately 1 mile.

c. How many parking spaces would the completed project have? How many would the project eliminate?

The number of parking spaces would not change as a result of the proposed WWTP improvements or the outfall extension project.

d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveway? If so, generally describe (indicated whether public or private).

The project will not require new roads or streets.

e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe?

Extension of the WWTP outfall to Lake River and eventual extension of a new outfall to the Columbia River would occur near established commercial water traffic routes. No traffic will be impaired by this work. Depending on the selected outfall route, a portion of the project may be constructed from a barge.

f. How many vehicle trips per day would be generated by the completed project? If known, indicated when peak volumes would occur.

None.

g. Proposed measures to reduce or control transportation impacts, if any.

NA.

16. Public Services

a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.

No, however, it would provide increased wastewater treatment capacity for Ridgefield and the surrounding UGA.

b. Proposed measures to reduce or control direct impacts on public services, if any.

NA. The proposed project will improve wastewater conveyance and treatment processes in Ridgefield and the surrounding UGA to comply with NPDES Permit requirements through 2025.

17. Utilities

a. Check utilities currently available at the site:
- ☒ electricity
- ☒ natural gas
- ☒ water
- ☒ refuse service
- ☒ sanitary service
- ☐ septic system
- ☐ other:

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction on the site or in the immediate vicinity which might be needed.

The proposed project will provide adequate wastewater treatment and disposal through the planning period (2025).

C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: ______________________________

Date Submitted: ______________________________

D. SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS

(Do not use this sheet for project actions.)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent of the proposal, or the types of activities likely to result from the proposal, would affect the item in a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

The three phases of wastewater treatment plant and conveyance infrastructure improvements for the Ridgefield WWTP proposed in the Facilities Plan would provide adequate wastewater treatment and conveyance through 2025. The only hazardous substances associated with the proposed project would be coolants, fuels, and lubricants used in construction equipment & vehicles. Noise generated by construction activity would be short term and generally limited to daylight working hours to minimize potential impacts to wildlife in the area.

The project is adjacent to the Pacific Wood Treating Hazardous Waste Site (MTCA cleanup site). However, the location for the improvements identified in this plan has been tested and the soils meet MTCA industrial cleanup standards.

Proposed measures to avoid or reduce such increases are:

Phase 1: Extending the WWTP outfall to Lake River to a depth of –7 feet MLLW would provide additional dilution in the vicinity of the outfall. Relocating the outfall from Lake River to the Columbia River will provide additional water volume for dispersal of the WWTP effluent.

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

Extension of the Lake River Outfall under Phase 1 of the proposed WWTP upgrades would likely be completed in near dry conditions at low tide. Potential impacts of laying 110 feet of 16-inch outfall pipe across the bottom of Lake River will have minimal potential for adverse impacts to plants and animals in the area. The new pipe would provide additional hard substrate on a muddy benthic surface, to which algae and invertebrates could attach. Extending the pipe to –7 feet MLLW would increase nutrient levels in the immediate vicinity of the outfall for approximately 2 years or until the new outfall to the Columbia River is completed.

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

Relocation of the outfall to the Columbia River would eliminate discharge to Lake River, reducing nutrient and bacterial loading. Discharging to the Columbia River would increase dilution of the effluent and minimize water quality impacts as the service area and population grow.

3. How would the proposal be likely to deplete energy or natural resources?

Installation of new effluent conveyance pipelines and improvements to the WWTP during Phases 1 and 2 would have minimal energy requirements associated with burning of diesel and gas in construction equipment for a few weeks at a time. The operation of the expanded plant will require additional electricity. Construction of the new pipeline and outfall to the Columbia River would cause mobile fish and wildlife to avoid the area until activity ceases, returning once noise and activity levels subside. Disturbed areas would be replanted with native vegetation, or would be allowed to revegetate naturally if the native plant materials were common fast-spreading grasses. Energy and natural resources would not be significantly depleted.

Proposed measures to protect or conserve energy and natural resources area:

The new effluent pipeline and outfall would be designed and constructed to minimize energy usage associated with pumping.

4. How would the proposal be likely to use or affect environmentally sensitive areas or area designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

The new effluent conveyance pipeline would be bored beneath the bottom of Lake River and extended along either the foot or the top of the existing levee system. Disturbed areas would be replanted with native vegetation. A Use Compatibility Analysis will be prepared for the USFWS Ridgefield Wildlife Refuge.

Proposed measures to protect such resources or to avoid or reduce impacts are:

Boring beneath Lake River would eliminate benthic disturbance and eliminate the potential for turbidity associated with placement of the new outfall pipe across Lake River en route to the new Columbia River outfall. The outfall would be designed to maximize dilution of the effluent from the Ridgefield WWTP.

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses compatible with existing plans?

The implementation of the wastewater treatment plant improvements proposed in the Facilities Plan will involve minimal potential for adverse impacts to shoreline land use. Extending the outfall in Lake River under Phase 1 will not change existing land use. Eventual construction and operation of the new outfall to the Columbia River is not likely to significantly impact land uses at the USFWS Ridgefield Wildlife Refuge, once the Use Compatibility Analysis is completed.

Proposed measures to avoid or reduce shoreline and land use impacts are:

Location of the sewer main extensions below ground as much as possible reduces the potential for disturbance of sensitive areas and would continue to allow the area to function as a wildlife refuge. Navigation on Lake River would not be impacted, once construction is complete.

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

Implementation of the proposed WWTP improvements would require additional truck trips into the Ridgefield WWTP over the course of several months. Upgraded WWTP processes would likely require additional electrical energy. Pumping of effluent to the Columbia River would also require additional energy, especially during high tide periods.

Proposed measures to reduce or respond to such demand(s) are:

Additional electrical infrastructure and wiring would likely be required at the WWTP to run the new systems and to pump effluent to the Columbia River.

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

The proposed improvements to the Ridgefield WWTP are not likely to conflict with State and local laws or requirements, as they will allow the WWTP to operate within its NPDES permit, and preserve water quality in the area through the planning period. A Use Compatibility Analysis will be prepared for the U.S. Fish & Wildlife Service regarding the potential effect of the proposed pipeline on the Ridgefield Wildlife Refuge.

WAC 197-11-965 Adoption notice.

ADOPTION OF EXISTING ENVIRONMENTAL DOCUMENT

Adoption for (check appropriate box) ☐ DNS ☐ EIS ☐ other:

Description of current proposal: ______________________________

____

Proponent: ______________________________

Location of current proposal: ______________________________

____

Title of document being adopted: ______________________________

Agency that prepared document being adopted: ______________________________

The document is available to be read at (place/time): ______________________________

Description of document (or portion) being adopted: ______________________________

____

If the document being adopted has been challenged (WAC 197-11-630), please describe:

The document is available to be read at (place/time): ______________________________

____

We have identified and adopted this document as being appropriate for this proposal after independent review. The document meets our environmental review needs for the current proposal and will accompany the proposal to the decision maker.

Name of agency adopting document: ______________________________

Contact person of other than Responsible official: ______________________________ Phone: __________

Responsible official: ______________________________

Position/Title: ______________________________ Phone: __________

Address: ______________________________

Date: __________ Signature: ______________________________

WAC 197-11-970 Determination of Nonsignificance (DNS).

DETERMINATION OF NONSIGNIFICANCE

Description of proposal:

Proponent: ______________________________

Location of proposal, including street address, if any:

____

Lead Agency: ______________________________

The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030 (2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request.

☐ There is no comment period for this DNS.

☐ This DNS is issued after using the optional DNS process in WAC 197-11-355. There is no further comment period on the DNS.

☐ This DNS is issued under WAC 197-11-340(2); the lead agency will not act on this proposal for 14 days from the date below.

Comments must be submitted by : (insert date)

Responsible official: ______________________________

Position/Title: ______________________________ Phone: __________

Address: ______________________________

Date: __________ Signature: ______________________________

(OPTIONAL)

☐ You may appeal this determination to (name)

at (location) ______________________________
No later than (date) ______________________________
by (method) ______________________________

You should be prepared to make specific factual objections.
Contact _ _to read or ask about the procedures for SEPA appeals.

☐ There is no agency appeal.

WAC 197-11-970 Determination of Nonsignificance (DNS).

DETERMINATION OF SIGNIFICANCE
AND REQUEST FOR COMMENTS ON SCOPE OF EIS

Description of proposal:

Proponent: ______________________________

Location of proposal, including
street address, if any:

____

Lead Agency: ______________________________

EIS Required: The lead agency has determined this proposal is likely to have a significant adverse impact on the environment. An environmental impact statement (EIS) is required under RCW 43.21C.030 (2)© and will be prepared. An environmental checklist or other materials indicating likely environmental impacts can be reviewed at our offices.

The lead agency has identified the following area for discussion in the EIS:

Scoping. Agencies, affected tribes of the public are invited to comment on the scope of the EIS. You may comment on alternatives, mitigation measures, probable significant adverse impacts, and licenses or other approvals that may be required. The method and deadline for giving us your comments is:

Responsible Official: ______________________________

Position/Title: ______________________ Phone: ____________

Address: ______________________________

Date: ______________ Signature: ______________________

(OPTIONAL)

☐ You may appeal this determination of significance

To (name) ______________________
At (location) ______________________
No later than (date) ______________________
By (method) ______________________

You should be prepared to make specific factual objections. Contact to read or ask about the procedures for SEPA appeals.

☐ There is not agency appeal.

National Environmental Policy Act (NEPA)

ENVIRONMENTAL REPORT
WASTEWATER TREATMENT FACILITY
1.0 MGD
UPGRADE PROJECT

CITY OF RIDGEFIELD

Prepared for

USDA Rural Development Administration

December 2007

Table of Contents

LIST OF ABBREVIATIONS

- BFE: Base Flood Elevation = 100-year flood
- BMPs: usually Construction Best Management Practices for the control of sedimentation and erosion
- CWA: Clean Water Act
- Critical Areas: Areas determined to be of significant importance to fish and wildlife species, as determined by WDFW and presented in the Growth Management Act
- DPS: Distinct Population Segment (US Fish & Wildlife Service)
- Ecology: Washington State Department of Ecology
- EFH: Essential Fisheries Habitat (pursuant to the Magnuson Stevens Act as amended)
- ESA: Endangered Species Act
- ESU: Evolutionarily Significant Unit (National Marine Fisheries Service)
- 500-year Flood Elevation: Flood level with 0.2 percent chance of recurrence during any given year
- G&O: Gray & Osborne, Inc
- GMA: Growth Management Act
- NMFS: National Marine Fisheries Service
- NOC: Notice of Construction
- NPDES: National Pollutant Discharge Elimination System
- 100-year Flood Elevation: Flood level with 1 percent chance of recurrence during any given year
- PHS Data: Priority Habitats and Species information prepared by WDFW
- Section 10 Permit: Army Corps of Engineers permit for work in navigable waters, under Rivers & Harbors Act of 1899.
- Section 404 Permit: Army Corps of Engineers permit for work in wetlands and waters of the US pursuant to Section 404 of the CWA
- SEPA: Washington State Environmental Protection Act
- TMDL: Total Maximum Daily Load
- US ACOE: US Army Corps of Engineers
- USFWS: US Fish & Wildlife Service
- UV: Ultra Violet Disinfection
- WDFW: Washington Department of Fish & Wildlife
- WWTP: Wastewater Treatment Plant

CHAPTER 1

PURPOSE AND NEED

1 PURPOSE AND NEED

The sources of most of the information for this chapter are the *General Sewer and Wastewater Facility Plan* prepared for the City of Ridgefield (hereafter, the City) by Gray & Osborne, Inc. and the Ridgefield *WWTP Mixing Zone Study, Part 1 – Existing Discharge* prepared by Cosmopolitan Engineering, January 2005. Letters have been forwarded to federal, tribal, state and local agencies with interest in the project area requesting their comments on the proposal. Concerns presented in their responses will be incorporated into this report.

The City of Ridgefield service area included approximately 2,195 people in 2004. According to the City's 2004 Comprehensive Plan, the population of the service area is projected to grow to 3,755 by 2009 and to 12,000 by the year 2024. These population figures correspond to Maximum Month Flows of 0.32 mgd (million gallons/day), 0.70 mgd and 2.68 mgd, respectively. Development constraints at the current WWTP site include wetlands and culturally sensitive sites to the west, contaminated soils associated with a former creosote and wood products facility to the south and Union Pacific Railroad Tracks to the east. The Ridgefield WWTP currently discharges to Lake River via a submerged discharge outfall approximately 100 feet offshore of the WWTP. Prior to the 2007 upgrades, the WWTP discharged to a shoreline outfall to Lake River about 0.25 miles to the west. The Facility Plan proposes to construct improvements to the WWTP on the existing site (and potentially on a one acre site to the north) in four phases to provide adequate wastewater treatment through 2024. The existing outfall has adequate capacity to discharge the City's treated wastewater up to a maximum month flow of 1.0 mgd. A new effluent pipeline and outfall to the Columbia River is proposed to discharge flows beyond 1.0 mgd to satisfy Department of Ecology requirements to provide effluent dilution through build out. **With the proposed project, the City would construct improvements at the WWTP to provide service up to a capacity of 1.0 mgd. This project is the subject of the current financial assistance application to USDA Rural Development.**

NOTE: Phases have been renamed to simplify this Environmental Report, i.e.:
Phase 1C is now being called Phase 2
Phase 2A is now called Phase 3
Phase 2B is now called Phase 4
Phase 3 is now called Phase 5

1.1 Project Description (Proposed Action or Proposed Project)

Phase 1, 0.7 mgd (completed in 2007):

- Convert the existing 50-foot diameter aerobic digester to a secondary clarifier and install a new RAS pump and WAS pump in the existing Equipment Building.
- Convert the existing standby secondary clarifier to an aerobic digester.
- Install a new waste sludge thickening facility.
- Construct a new secondary clarifier splitter box.
- Extend the existing shoreline outfall by 100 feet into Lake River to a new diffuser located –7 feet MLLW.

Phase 2, 1.0 mgd (current project):

- Modify existing headworks. The influent box will be modified to increase energy dissipation and reduce surging that occurs when multiple pumps are in operation simultaneously.
- Construct a third aeration basin (0.174 million gallons), with fine-bubble diffusers and an internal recycle pump.
- Construct a new aerobic digester tank (0.080 million gallons) and three new positive displacement digester blowers.
- Replace the existing 10-inch Effluent Pipeline with a 12-inch pipe by pipe-bursting between Effluent Manhole #1 (nearest the outfall) and Effluent Manhole #3.

Phase 3, 1.83 mgd

- Construct new headworks.
- Construct new Aeration Basins No.1 and No. 2.
- Install new aeration basin blowers.
- Convert existing aeration basin to an aerobic digester.
- Install sludge dewatering system and solids handling building.
- Modify/upgrade UV disinfection system.
- Construct new Operations Building.
- Construct Columbia River Outfall.
- Construct new Effluent Pump Station.

Phase 4, 2.68 mgd:

- Construct third aeration basin.
- Construct third secondary clarifier.
- Expand UV disinfection system.
- Requires acquisition of property for future expansion.
- Install sludge dryer for Class A biosolids handling.

Phase 5, Buildout:

- Expansion of WWTP capacity to 4.2 mgd.

1.2 Background, Purpose and Need for the Project

Clark County has designated Ridgefield and the surrounding area as a "Growth Area." The City has recently extended its UGA to the east and has permitted a number of large residential development projects in this area. According to the 2004 Ridgefield Comprehensive Plan, the population of Ridgefield is projected to grow from 2,195 people in 2004 to 3,755 by 2009 and to 12,000 by the year 2024. Wastewater flows are projected to grow from approximately 0.5 mgd (2006) to 2.68 mgd during the planning period. The new Ridgefield UGA proposed by Clark County in September of 2007 will result in larger population and wastewater flows than were anticipated in the 2004 Comprehensive Plan.

The outfall to Lake River was extended offshore 100 feet in early 2007 to ensure coverage of the outfall by at least seven feet of water at low tide. The Department of Ecology is requiring the City to plan for construction of a new outfall to the Columbia River to provide proper dilution and disposal of effluent or other alternative disposal, once flows reach 1.0 mgd (2009). The Phase 2 project is designed to provide adequate wastewater treatment and conveyance at the existing facility through 2012, so that the City has time to plan for future WWTP upgrades and construction of the new outfall to the Columbia River. Failure to comply with Ecology requirements could result in a growth and development moratorium until wastewater treatment and disposal infrastructure in Ridgefield is upgraded. Further upgrades to the WWTP discussed in the Facilities Plan of this Environmental Assessment will be required to provide adequate wastewater treatment and disposal through 2024.

CHAPTER 2

ALTERNATIVES TO PROPOSED ACTION

2 ALTERNATIVES TO THE PROJECT ACTION

Preliminary Alternatives

The source of the information for this chapter is the *General Sewer and Wastewater Facility Plan* prepared for the City of Ridgefield by Gray & Osborne, Inc. This report discusses preliminary treatment alternatives available to meet the needs of the City's service area for the next 20 years. **Preliminary Alternatives** analyzed included: Preliminary Alternative 1, Conventional Activated Sludge; Preliminary Alternative 2, Activated Sludge/Membrane Bioreactor; and Preliminary Alternative 3, Sequencing Batch Reactors. The Facilities plan analyzed these preliminary alternatives in terms of permitting requirements, construction and operational costs over a 20-year timeline and compatibility with existing infrastructure. Permitting requirements for each of the construction alternatives would be similar, as each alternative involves modification of existing structures and construction of new infrastructure on the existing WWTP site. Expansion of wastewater treatment and conveyance infrastructure beyond 2024 may require construction of new treatment and conveyance infrastructure at alternative sites in the Ridgefield service area. These infrastructure improvements will be addressed in future Facilities Plans and NEPA and SEPA documents.

2.1 Screening Evaluation for Preliminary Alternatives

Preliminary Alternatives 2 and 3 presented in the Facilities Plan were eliminated due to high costs and inadequate compatibility with the existing WWTP structures. The following alternatives involve the use of **Conventional Activated Sludge** treatment technology. This Environmental Report will discuss the Environmental consequences associated with construction and operation of a conventional activated sludge facility with the following alternatives:

- **Alternative 1: No Action.**

- **Alternative 2: Upgrade the capacity of present WWTP to 1 mgd without Solids Dewatering:**

  - Headworks modifications performed.
  - Replacement of the current 10-inch effluent pipeline with a 12-inch pipe by pipe-bursting.
  - Construction of an additional 174,000-gallon aeration basin with anoxic zone/splitter box within existing footprint of WWTP.
  - Construction of a new 80,000-gallon Aerobic Digester (#3) with blowers also within the existing footprint.

- **Alternative 3: Upgrade the capacity of present WWTP to 1 mgd with Solids Dewatering:**

  - Headworks and Effluent Pipeline modifications would remain the same as in Alternative 2.
  - Two new Aeration Basins (626,000 gallons each) would be constructed outside of the existing footprint of the WWTP.
  - The existing Aeration Basins would be converted to Aerobic Digesters with the existing blowers being reused.
  - A Sludge Dewatering Unit and Solids Handling Building to house it would be constructed.
  - A generator would be added at the site.

2.2 Findings

The Facilities Plan concludes that implementation of the proposed Conventional Activated Sludge Alternative, coupled with the interim Lake River Outfall Extension (which was completed in 2007) and eventual construction of a new outfall to the Columbia River, as required by the Department of Ecology, would provide adequate wastewater treatment and disposal through the planning period (2024). The City proposes to implement Alternative 2 to provide adequate capacity to the system to allow time to plan, evaluate alternatives, and permit the required improvements to treat and dispose of wastewater beyond 1.0 mgd.

2.3 Additional Environmental Review

- An Informal Endangered Species Act Consultation document (Biological Evaluation) for the Lake River Outfall Extension was submitted to the Corps of Engineers along with a Joint Aquatic Resources Permit Application in December of 2005. The Section 10 permit was issued in late 2006 and the outfall was extended 100 feet off-shore in early 2007.

- A Shoreline Substantial Development Permit was issued by the City of Ridgefield for the outfall extension and a conditional use permit was issued for the Phase 1 0.7 mgd WWTP Upgrade. A similar Shoreline permit will be required for work on the effluent pipeline within 200 feet of Lake River.

CHAPTER 3

AFFECTED ENVIRONMENT/ ENVIRONMENTAL CONSEQUENCES

3 Affected Environment/Environmental Consequences

3.1 Land Use/Important Farmland/Formally Classified Lands

3.1.1 Affected Environment

Existing WWTP Site

The City of Ridgefield Wastewater Treatment Facility is located approximately 0.25 mile to the east of Lake River, a Type F (2) Stream, in Section 24, Township 4 North, Range 1 West in Clark County, Washington. The existing WWTP covers approximately two acres of property west of the *BNSF* railroad tracks. The site is bordered by Port of Ridgefield property to the north, west and south. The outfall is located on Lake River approximately 0.25 mile to the west of the WWTP site. The outfall is located approximately two miles upstream of the confluence of Lake River and the Columbia River, and 2.5 miles upstream of the mouth of the Lewis River.

The WWTP site was historically used as a log loading and transfer site for a wood products facility located on Port property to the south and east. The WWTP site may have been utilized for production and transport of forest products and agricultural production prior to industrialization of the area in the mid 1900s. The area to the west of the site is largely wetlands associated with Carty Lake and was identified as the site of a large Native American village in the journals from the Lewis and Clark Expedition. The Ridgefield National Wildlife Refuge extends north and west of the WWTP site and includes Bachelor Island and the River S Unit on the west side of Lake River. The area to the south of the WWTP is largely industrial and includes Boat Launching Facilities and the Lake River Marina.

According to the Soil Survey of Clark County, Washington (USDA, SCS, 1972), Soils on Bachelor Island and along the Ridgefield Waterfront include Sauvie-Puyallup association: Deep nearly level to gently sloping, somewhat poorly drained to somewhat excessively drained, moderate fine textured to moderately coarse textured soils of the floodplains. Vegetation has been largely eliminated from the WWTP site. The surrounding Lake River floodplain is covered by grass, shrubs and trees including black cottonwood, alder, maple and willows. Spruce, cedar and fir are also present in upland areas. Soils information presented in the Facilities Plan includes:

Gee Soil Series

The Gee Soil Series is the predominant soil series throughout much of the City of Ridgefield. Slopes are generally level to undulating, ranging from 0 to 60 percent slope. These soils are moderately well drained with slow runoff. These soils are utilized for woodlands and croplands, including hay, pasture, and small grain cultivation. Native vegetation includes Douglas fir, grand fir, western red cedar, and red alder with an understory of sword fern, salal, Oregon grape, vine maple and western bracken.

Hillsboro Soil Series

Hillsboro soils are found in the older part of Ridgefield and appear to be associated with drainages in the City. Slopes range from 0 to 65 percent, and the series consists of deep, well-drained soils that formed in mixed alluvium. Hillsboro soils are found on level to gently undulating broad valley terraces; they are well drained with slow to medium runoff and moderate permeability. These soils are used for orchards, berries, nursery stock, vegetables, small grain, hay and pasture. Native vegetation includes Douglas fir, hazelbrush, blackberries, grasses and weeds.

Sara Soil Series

Sara soils are found along the northern edge of the City limits. Slopes for this soil series range from 0 to 50 percent. They are very deep, moderately well drained formed in old alluvium on terraces and terrace escarpments, usually having a perched water table during the winter and early spring, but dry for 45 to 60 days following the summer solstice. These soils are utilized for production of hay, pasture, small grain, and some potatoes and strawberries are grown. Native vegetation includes Douglas fir, red alder, western red cedar, and big leaf maple, with an understory consisting of salal, Oregon grape, sword fern, bracken fern, salmonberry and Douglas spirea.

Sauvie Soil Series

Sauvie soils are found immediately adjacent to Lake River and range from 0 to 8 percent slopes. These areas will not be suitable for development of any kind. This series consists of deep, poorly drained soils that formed in alluvium; they are sticky and highly plastic. These soils are saturated with water from December through June and are subject to overflow during high tides unless diked and artificially drained. When diked, these soils are used for improved hay and pasture, small grain and truck crops. Areas outside dikes are used for hay, pasture and commercial waterfowl areas. Native vegetation is red alder, ash, willow, cottonwood, grasses and tussocks.

Cove Silty Clay Loam Soils

Cove silty clay loam soil is found in a few isolated locations within the City. Slopes range from 0 to 3 percent. These locations are affiliated with small isolated wetlands and are not suitable for future development. They are found on floodplains and low stream terraces, formed in deep clayey recent alluvium washed mainly from areas underlain by sedimentary and basic igneous rocks. These soils are poorly drained, often covered by ponded runoff during brief periods of flooding from December through April. Most of this soil is in hay and pasture; some spring wheat is grown. Native vegetation includes sedges, grasses and a few ash, willows, etc.

Odne Silt Loam Soils

Odne silt loam is generally found in concave drainage ways and depressions within areas of Gee soils. Slopes are generally 1 to 2 percent with a few steeper areas. These soils are poorly drained and very slowly permeable with compact subsoil, which limits effective root penetration to a depth of less than 30 inches.

Prime Farmland

The area owned by the Port of Ridgefield including the Ridgefield WWTP and the existing effluent pipeline and outfall do not meet the criteria for either Prime Forest Land or Prime Farm Land, as they have been fully developed for some time.

Hydric Soils

There are no hydric soils on the Ridgefield WWTP Site, as the area has been filled for development, but areas to the north and west of the site in the Ridgefield Wildlife Refuge exhibit wetland character.

Potential for Soil Contamination

The Ridgefield WWTP is located next to the Pacific Wood Treating Corporation hazardous-waste cleanup site. The property to the south of the WWTP was used for the manufacture of chemically treated wood products containing a variety of hazardous materials. The Port of Ridgefield is managing remediation of the contaminated site. Soils on the south end of the WWTP site are among the most contaminated in the area with creosote and pentachlorophenol contamination just below the surface, as this area was adjacent to the area where creosote and other hazardous materials were applied to raw wood products. Soils on the north end of the WWTP site are thought to have much lower levels of contamination, as this area was historically used for transport of untreated logs.

3.1.2 Environmental Consequences

Alternative 1: No Action

Taking no action to improve the wastewater treatment and conveyance system in Ridgefield would have no impact on Important Farmlands, Forestlands, or other classified lands. Contaminated soils on the WWTP site and soils throughout the

Ridgefield WWTP service area would not be disturbed. Land use on the existing WWTP site and at the existing outfall to Lake River would not change.

Taking No Action to improve wastewater conveyance and treatment capacity in Ridgefield area would likely result in enforcement actions on the part of the Department of Ecology, likely a connection moratorium after 2010. A connection moratorium would severely restrict land use options available to the City of Ridgefield and portions of unincorporated Clark County within the City's WWTP service area. Sludge from the facility would continue to be hauled to the Salmon Creek WWTP

Alternative 2: Upgrade the capacity of present WWTP to 1 mgd without Solids Dewatering:

Expanding the capacity of the Ridgefield WWTP by making improvements within the present footprint of the WWTP and up-sizing the Effluent Pipeline landward of the new outfall using pipe-bursting technology would have no adverse impacts to important farmlands, forestlands or other classified lands. Minor construction on the site of the WWTP has the potential to disturb contaminated soils; however, as BMPs for the control of sedimentation and erosion will be implemented during construction, contamination of adjacent areas and other adverse impacts are unlikely. Any contaminated soils identified during excavation will be hauled to a disposal area approved by the Department of Ecology and the Project Engineer.

Alternative 2 would give the City of Richfield additional time (past 2010) to develop a plan that will result in a more long-term solution to the city's wastewater treatment system challenges. Without additional capacity, the City could face a moratorium on additional sewer connections by 2010. Under this alternative, the City would continue to haul sludge to Clark County's Salmon Creek WWTP or to a permitted land application site.

Alternative 3: Upgrade the capacity of present WWTP to 1 mgd with Solids Dewatering:

Upgrading the capacity of the present WWTP to 1 mgd by constructing new aeration basins, converting the existing aeration basins to aerobic digesters, installing a sludge dewatering unit and a Solids Handling Building to house it, modifying the existing headworks, expanding the existing Effluent Pipeline, and adding a generator would likely cause significant soil disturbance on the WWTP site.. Alternative 3 would cause more ground disturbance over a longer period of time than Alternative 2 would. Any contaminated soils identified during excavation will be hauled to a disposal area approved by the Department of Ecology and the Project Engineer. The Ridgefield National Wildlife Refuge and any Prime Farmland or Prime Forestland would not be impacted

3.1.3 Mitigation

Alternative 1: No Action

Taking no action to improve the wastewater treatment and conveyance system in Ridgefield would have no impact on Important Farmlands, Forestlands, or other classified lands, and thus not require any mitigation.

Alternative 2: Upgrade the capacity of present WWTP to 1 mgd without Solids Dewatering:

Expansion of the Ridgefield WWTP on the current site will not change the land use or impact important farmland or previously classified lands. Implementation of Alternative 2 would not require mitigation because the footprint of the current facility would not be altered and land use in the area would not change. By using pipe-bursting to replace the existing Effluent Pipeline excavation of soil would be kept at a minimum.

Alternative 3: Upgrade the capacity of present WWTP to 1 mgd with Solids Dewatering:

This alternative would cause more ground disturbance at the site because more construction will take place than in Alternative 2. Any areas disturbed by construction of additional structures on the WWTP site and expansion of the Effluent Pipeline would be restored using Best Management Practices (BMPs) in accordance with Permit requirements from the City of Ridgefield.

3.2 Floodplain

3.2.1 Affected Environment

According to the Flood Insurance Rate Map Panel Number 530298 0001B, the existing Ridgefield Wastewater Treatment Plant is located outside of the 100-year floodplain of Lake River. The existing outfall lies within the 100-year floodplain of Lake River.

3.2.2 Environmental Consequences

Alternative 1: No Action

Taking no action to upgrade the Ridgefield WWTP would have no impact on the floodplain of Lake River.

Alternative 2: Upgrade the capacity of present WWTP to 1 mgd without Solids Handling.

Upgrading the Ridgefield WWTP to 1.0 mgd would have no impact on the floodplain of Lake River because the site lies outside the 100-year floodplain. The expansion of the Effluent Pipeline would result in no long term disturbance of the floodplain because all new infrastructure in the floodplain will be installed underground using pipe-bursting technology, which limits surface disturbance.

Alternative 3: Upgrade the capacity of present WWTP to 1 mgd with Solids Handling.

Upgrading the Ridgefield WWTP to 1.0 mgd would have no impact on the floodplain of Lake River because the site lies outside the 100-year floodplain. The expansion of the Effluent Pipeline will have no floodplain impacts (See Alternative 2).

3.2.3 Mitigation

Alternative 1: No Action

Alternative 1 would require no mitigation, because there would be no work within the 100-year floodplain of the Columbia River.

Alternative 2: Upgrade the capacity of present WWTP to 1 mgd without Solids Handling.

Because the WWTP site lies outside of the 100-year floodplain, expansion of the Ridgefield WWTP on the current site would not require floodplain impact mitigation. Upsizing the effluent pipeline would involve replacement of a buried pipeline underground using pipe-bursting so no floodplain impacts are anticipated.

Alternative 3: Upgrade the capacity of present WWTP to 1 mgd with Solids Handling.

Continued use of the existing WWTP site eliminates potential for floodplain impacts, as the site lies above the 100-year flood elevation. The effluent pipeline for the Columbia River Outfall will be constructed below the ground surface so no floodplain impacts are anticipated.

3.3 Wetlands

3.3.1 Affected Environment

There are no wetlands on the site of the Ridgefield WWTP, but areas to the north and east between the WWTP and Carty Lake and Lake River exhibit wetland character. The uplands immediately adjacent to the existing outfall do not appear to be jurisdictional wetlands, as vegetation is dominated by Scotch broom and Himalayan blackberries.

3.3.2 Environmental Consequences

Alternative 1: No Action

Taking no action to improve wastewater treatment efficiency and capacity would have no impact on wetlands adjacent to the Ridgefield WWTP to the north and west.

Alternative 2: Upgrade the capacity of present WWTP to 1 mgd without Solids Handling.

Upgrading the Ridgefield WWTP to 1.0 mgd would have no impact on the wetlands adjacent to the WWTP. There are no wetlands on the project site or along the effluent pipeline route. Providing additional wastewater treatment plant capacity would minimize potential contamination from wastewater discharges (at high flow and low tide) through the year 2012.

Alternative 3: Upgrade the capacity of present WWTP to 1 mgd with Solids Handling.

Construction of the WWTP improvements on the site of the existing WWTP would avoid impacts to adjacent wetlands.

3.3.3 Mitigation

Expanding the existing WWTP at the current site will not impact jurisdictional wetlands in adjacent areas therefore no mitigation would be necessary.

3.4 Cultural Resources

3.4.1 Affected Environment

There are no known places or objects listed or proposed for listing on federal, state or local historic registers on the site of the Ridgefield WWTP. The area to the west of WWTP between Carty Lake and the Columbia River was a large Native American village at the time of the Lewis and Clark Expedition. On

September 5, 2006 Robert Whitlam, State Archaeologist, issued a letter that included the following recommendations:

> "Given the area's landforms and environment that are sensitive for cultural resources in the area, we recommend a professional survey of any area proposed for alteration. We also recommend consultation with the concerned tribe's cultural committees and staff regarding cultural resource issues."

Mr. David Burlingame of the Cowlitz Tribe Cultural Resources Department and Robert Whitlam, Ph.D., State Archaeologist with the Department of Archaeology and Historic Preservation, were contacted regarding the proposed project in 2006. Letters were written regarding Phase 2/Alternative 2 in October 2007. Any concerns identified by the Tribes and/or DAHP will be addressed in the final edition of this Environmental Assessment.

3.4.2 Environmental Consequences

Alternative 1: No Action

Taking no action to improve wastewater treatment capacity at the Ridgefield WWTP would not involve ground disturbance, so there would be no potential for discovery or disturbance of culturally or historically significant materials.

Alternative 2: Upgrade the capacity of present WWTP to 1 mgd without Solids Handling.

Installation of a third aeration basin, new digester tanks within the existing WWTP footprint and upsizing the effluent pipeline using pipe-bursting has the potential for disturbance of materials of cultural, historic or archaeological significance. In the event that materials of cultural, historic or archaeological significance are disturbed during construction, work in the area would be halted and the Project Manager and the USDA Rural Development Project Manager would be notified immediately. The Cultural Resources Department of the Cowlitz Tribe and the Washington State Office of Archaeology and Historic Preservation would also be consulted.

Alternative 3: Upgrade the capacity of present WWTP to 1 mgd with Solids Handling.

Building the proposed structures at the WWTP under Alternative 3 and upsizing the effluent pipeline using pipe-bursting will cause significant ground disturbance and has the potential to disturb materials of cultural, historic or archaeological significance. In the event that materials of cultural, historic or archaeological significance are disturbed during construction, work in the area would be halted and the Project Manager and the USDA Rural Development Project Manager would be notified immediately. The Cultural Resources Department of the Cowlitz Tribe and the Washington State Office of Archaeology and Historic Preservation would also be consulted.

3.4.3 Mitigation

Alternative 1: No Action

Alternative 1 would have no potential for discovery or disturbance of culturally or historically significant materials.

Alternatives 2 and 3:

The City of Ridgefield has contracted Jo Reese of Archaeological Investigation Northwest, Inc. to conduct an archaeological survey of the existing WWTP site and the route of the effluent pipeline completed prior to construction of Alternatives 2 or 3.

Alternative 3 has a greater risk of disturbing cultural artifacts, but in the event an artifact was unearthed the procedure would be the same. During construction, any excavation by the Contractor that uncovers an historical or archaeological artifact shall be immediately reported to the Project Engineer, the USDA Rural Development Project Manager, and the Cowlitz Tribe. The Washington State Office of Historic and Archeological Preservation shall also be consulted. Construction shall be temporarily halted pending the notification process and further directions issued by OAHP and the Department of Ecology after consultation with the State Historic Preservation Officer (SHPO) and the Tribal Officials.

3.5 Biological Resources

3.5.1A. Threatened & Endangered Species Affected Environment

The Ridgefield WWTP is located in an industrial area adjacent to BNSF Railroad Tracks approximately 0.25 mile east of the Lake River shoreline. Effluent from the WWTP flows to the existing outfall near mid-channel in Lake River (outfall was extended to mid channel in early 2007). The following table presents evolutionarily significant units (ESUs) of salmon that pass Ridgefield in Lake River and the Columbia during rearing and transport portions of their life cycles.

Species/ESU	Status	Date	FR Notice
Salmonids Under NMFS Jurisdiction:			
Lower Columbia Chinook	Threatened Crit. habitat	3-24-98 9-2-05	63 FR14308 70 FR 52631
Lower Columbia steelhead	Threatened Crit. habitat	3-19-98 9-2-05	63 FR 13347 70 FR 52631
Columbia River chum	Threatened Crit. habitat	3-25-99 9-2-05	63 FR 30455 70 FR 52631
Lower Columbia coho	Threatened	6-28-05	C.H. in dev
Upper Columbia spring chinook	Endangered Crit. habitat	3-24-99 9-2-05	64 FR 14308 70 FR 52631
Snake River sockeye	Endangered Crit. habitat	11-20-91 12-28-93	56 FR 58619 58 FR 53635
Upper Columbia steelhead	Endangered Crit. habitat	8-18-97 9-2-05	62 FR 43937 70 FR 52631
Snake River fall chinook	Threatened Crit. habitat	4-22-92 12-28-93	57 FR 14653 58 FR 68543
Snake River spring/summer chinook	Threatened Crit. habitat	4-22-92 12-28-93	57 FR 14653 58 FR 68543
Mid Columbia steelhead	Threatened Crit. habitat	3-25-99 9-2-05	64 FR 14517 70 FR 52631
Snake River steelhead	Threatened Crit. habitat	8-18-97 9-2-05	62 FR 43937 70 FR 52631
Upper Willamette steelhead	Threatened Crit. Habitat	3-25-99 9-2-05	64 FR 16397
USFWS Salmonids			
Southwest Washington & Lower Columbia cutthroat trout	Proposed Removed	4-26-99 7-5-02	
Columbia River bull trout	Threatened Crit. habitat	6-10-98 9-25-05	

Fish and wildlife in the immediate vicinity of the Ridgefield WWTP protected under the authority of the Endangered Species Act of 1973 include:

Lower Columbia River chinook salmon, *Oncorhynchus tshawytscha,* Listed Threatened:

The Lower Columbia River Chinook salmon ESU listed as "threatened" on March 24, 1998, by the National Marine Fisheries Service. Critical habitat was designated on September 2, 2005, and does not include Lake River.

Lower Columbia River steelhead, *O. mykiss*, Listed Threatened:

The Lower Columbia River steelhead ESU listed as "threatened" on March 19, 1998, and critical habitat was designated on September 2, 2005. According to the SASSI Columbia River Appendix, the Lower Columbia River supports five summer steelhead stocks and eighteen winter steelhead stocks. Run timing of the summer steelhead extends from May through October, and run timing of winter steelhead stocks extends from December through April in the Lower Columbia River.

Columbia River chum salmon, *O. keta,* Listed Threatened:

Columbia River chum salmon were once widespread in the lower Columbia River. They were listed as threatened on March 25, 1999. Today chum salmon produced in the lower Columbia are concentrated in the Grays River system near the mouth of the Columbia and near Bonneville Dam in Hardy and Hamilton creeks. Some non-native chum introductions have been attempted, with little apparent success. Chum enter the Columbia in October and November, and spawn in November and December. The present run size is estimated to range between 3,000 and 10,000 fish annually. Lake River is designated as Critical Habitat for Columbia River chum salmon (Federal Register Vol. 70, Number 170, June 14).

Lower Columbia River coho salmon, *O. kisutch*, Listed Threatened:

The Lower Columbia River coho ESU was listed as threatened on June 28, 2005. Fish from this ESU are present in Lake River throughout the year. Critical Habitat is under development.

Listed Species under the Jurisdiction of the US Fish & Wildlife Service in Clark County (November 1, 2007).

- Bull trout, *Salvelinus confluentus,* Threatened
- Gray wolves, *Canis lupus,* Endangered
- Northern spotted owls, *Strix occidentalis caurina,* Threatened
- Golden paintbrush, *Castilleja levisecta*, Threatened

- Water howellia, *Howellia aquatilis,* Threatened
- Bradshaw's lomatium, *Lomatium bradshawii,* Threatened

Candidate Species

- Oregon spotted frog, *Rana pretiosa*
- (Brush Prairie) Mazama pocket gopher (*Thomomys mazama ssp. oregonus*)

US Fish & Wildlife Species potentially present in the project area:

Columbia River bull trout:

Bull trout are known to spawn in Cougar Creek above Yale and Merwin Dams, which lie 15 and 30 miles up the Lewis River, respectively. Apparently, only a few bull trout have been collected in the lower Lewis River, below these impassable dams. The mouth of the Lewis River is approximately three miles to the northwest of the project area. It is unlikely that bull trout migrating toward the Lewis River would stray into Lake River to forage. No in-water work will be completed as part of this project. Therefore, the proposed project will have **no effect** on the Columbia River bull trout or it's Critical Habitat on the lower Lewis River.

The Informal ESA Consultation for the Rivers and Harbors Act Section 10 Permit determined that the WWTP improvements and Effluent Pipeline expansion would have **no effect** on the following listed species, which are unlikely to be present in the project area:

- Gray wolf
- Marbled murrelet
- Northern spotted owl
- Golden paintbrush
- Water howellia
- Bradshaw's lomatium

Further, the Informal ESA Consultation also indicated that the project would **not jeopardize the continued existence of** the Oregon spotted-frog.

It should be noted that according to Sandy Moody of the Washington Department of Natural Resources, The National Heritage Resources Database indicates that water howellia, which is federally listed as "threatened" is present on the Ridgefield National Wildlife Refuge, but they would not be impacted by the proposed 1 mgd WWTP Upgrade.

3.5.1B Fish & Wildlife

Fish & Shellfish

In addition to the populations of listed fishes presented in Section 3.5.1 A., fish species likely to be present in Lake River include the following: cutthroat trout, pink salmon, smelt, perch, sturgeon (both white and green), Pacific lamprey, shad, bass, etc.

Wildlife

Large game animals present in the vicinity of Lake River are likely to include, black-tailed deer and elk. River otters, beaver, coyote, raccoons, mountain beaver, brush rabbit, striped skunk, opossum, mink, weasels and red squirrels are also present. Less common mammals include cougar, bobcat, muskrat, flying squirrel and porcupine. Various species of shrews, rodents and bats are also common.

Waterfowl in the vicinity of the WWTP includes mallards, wood ducks, common merganser, great blue heron, green heron, belted kingfisher and the American dipper. Many species of migrating ducks, geese and swans also migrate through Lake River and the Columbia. Birds of prey include the goshawk, Cooper's hawk, sharp shinned hawk, red-tailed hawk, kestrel and northern harrier. Golden eagles and osprey are also present in the area. Owls that may be present in the vicinity include the great horned owl, western screech owl, northern sawhet and northern pygmy owl. The City's WWTP and surrounding service area lie within the range of the northern spotted owl. However, no "northern spotted owl centers" were indicated on the Habitats and Species Map prepared for the vicinity of the Ridgefield WWTP on August 16, 2005.

A variety of upland birds may be present in the vicinity of Lake River. Species of concern to the US Fish & Wildlife Service include Peregrine falcon and the olive-sided flycatcher. Other common birds present may include Steller's jay, American crows, and a variety of woodpeckers, kingfishers, swallows, nuthatches, wrens, sparrows, vireos, and finches. Sand hill cranes often stop at the Ridgefield Wildlife Refuge during their spring and fall migrations.

The only snake species common to the project area is the northwestern garter snake. It is unlikely that turtles would be found in the vicinity of the Ridgefield WWTP or in Lake River. The lizard most likely to be present is the American alligator lizard. Species of Concern to the USFWS include the long-eared myotis *(Myotis evotis)*, long-legged myotis *(M. volans)*, and western toad *(Bufo boreas)*.

3.5.1C Vegetation

Lake River and the Lower Columbia River near Ridgefield were originally forested with wetlands and tidal marshes surrounding islands separating the various sloughs and the mainstem of the Columbia River. Most of the hillsides in the area have been logged and most of the uplands have been converted to agricultural, residential and commercial development. Lowland areas adjacent to the River have been largely diked to allow agricultural activities.

Common tree species include: black cottonwood *(Populus trichocarpa)*, red alder *(Alnus rubra)*, and big-leaf maple (*Acer macrophyllum)*. Other species found in the area include Douglas-fir *(Pseudotsuga menziesii)* and western red cedar *(Thuja plicata)* and Oregon ash *(Fraxinus latifiola)*. Various species of undergrowth include salal, blackberries, salmon berries, many species of brush, ferns, honeysuckle, vine maple and others. Grasses on both sites are dominated by reed canarygrass. Crops grown in the lowlands include corn, strawberries, raspberries, potatoes, pumpkins and a variety of other fruits and vegetables. The area surrounding Ridgefield has historically been used for production of dairy products, and the farm on Bachelor Island was once used for the production of potatoes, wheat and other grains.

The US Fish and Wildlife Ridgefield National Wildlife Refuge was established on the River S Unit, Bachelor Island and the area to the north and west of the City of Ridgefield WWTP in the late 1960s. Wetland and riparian plantings in these areas have allowed vegetation to return to near natural conditions since that time.

3.5.2A Threatened & Endangered Species Environmental Consequences

Alternative 1: No Action

Taking no action to upgrade the City of Ridgefield WWTP and the associated conveyance system and outfall would eventually result in violations of the NPDES permit for the facility as the population grows past 2009. Taking No Action would eventually lead to the discharge of effluent with elevated levels of nutrients and coliform bacteria into Lake River, especially during storm events. This nutrient and bacterial loading would increase as the population of the Ridgefield WWTP service area grows, potentially impacting Lower Columbia River chinook and coho salmon, Lower Columbia River steelhead and Columbia River chum salmon present in Lake River. Eventual discharge of poorly treated effluent could result in reductions in prey organism (small fish) populations in Bachelor Slough, which would be likely to adversely affect listed salmonids, and other sensitive fish and wildlife foraging in the area.

Alternative 2: Upgrade the capacity of present WWTP to 1 mgd without Solids Handling.

The expansion of the Ridgefield WWTP from 0.7 mgd to 1.0 mgd capacity would not require in-water work. Therefore, the proposed project will not result in any direct impacts to threatened or endangered species under the Endangered Species Act of 1973. In addition, by adding capacity to the treatment plant, the potential for discharge of effluent with elevated levels of nutrients and coliform bacteria would be reduced for a number of years. The proposed 1.0 mgd Upgrade would have no effect on listed salmonids in Lake River or the Columbia River downstream.

Alternative 3: Upgrade the capacity of present WWTP to 1 mgd with Solids Handling.

Construction of upgrades to the existing activated sludge wastewater treatment plant on the site of the existing WWTP would have minimal potential for adverse impacts to listed species because no in-water work will be necessary for this Phase of the WWTP development process. On-site construction best management practices (BMPs) for the control of erosion and sedimentation will be implemented to ensure that potential adverse impacts to any listed salmonids in the Lake or Columbia Rivers be minimized.

3.5.2B Fish & Wildlife Environmental Consequences

Alternative 1: No Action

Taking no action to improve wastewater treatment capacity for the City's service area would involve no construction activity and no temporary construction disturbance to wildlife at the existing WWTP site. Implementation of this alternative would eventually result in WWTP upsets and the potential for adverse impacts to water quality and fish and wildlife habitat in Lake River. Increases in bacterial loading, nutrients and Biological Oxygen Demand (BOD) could result in depleted oxygen levels in Lake River, which could jeopardize habitat for salmonids and other fish species, waterfowl and other water-dependent wildlife.

Alternative 2: Upgrade the capacity of present WWTP to 1 mgd without Solids Handling.

The expansion of the Ridgefield WWTP from 0.7 mgd to 1.0 mgd capacity would not require any in-water work or significant above-ground work outside the WWTP footprint. Therefore, implementation of this alternative will not result in any direct impacts to fish and other wildlife in the area. Adding capacity to the treatment plant will allow it meet NPDES Permit requirements through 2012, minimizing potential adverse impacts to fish and other aquatic wildlife while the City of Ridgefield plans for future wastewater treatment and disposal needs.

Alternative 3: Upgrade the capacity of present WWTP to 1 mgd with Solids Handling.

Upgrading the City of Ridgefield WWTP on the existing site would involve construction of two new aeration basins and a Solids Handling Building, modification of the existing headworks, replacement of the existing Effluent Pipeline, and the addition of a new generator. The new structures would generate additional noise during construction, but beyond that, noise associated with regular plant operations would not be significantly increased. Due to the plant's location adjacent to the railroad tracks and the Port of Ridgefield industrial area to the south and west, potential for adverse impacts to noise-sensitive wildlife will be minimal.

3.5.2C Vegetation Environmental Consequences

Alternative 1: No Action

Taking no action to improve efficiency or capacity of the Ridgefield WWTP and conveyance system would result in potential nutrient and bacterial loading of the waters of Lake River in excess of the plant's NPDES Permit Limits after 2009. Nutrient loading of tidal marsh areas could result in increased plant productivity and possible algal blooms as the population of the service area increases. Post bloom algal die-off could increase Biological Oxygen Demand (BOD) and adversely impact aquatic life near the outfall. Larger plant life adjacent to the existing WWTP and on the site of the proposed WWTP relocation site would remain undisturbed.

Alternative 2: Upgrade the capacity of present WWTP to 1 mgd without Solids Handling.

The expansion of the Ridgefield WWTP to 1.0 mgd capacity would not result in direct impacts to vegetation in the project area. Therefore the potential for impacts to vegetation would be minimal. All disturbed areas would be replanted or repaved in-kind. By adding capacity to the treatment plant, fewer nutrients and coliform bacteria would be released into the River and the chances of algal blooms occurring would be reduced.

Alternative 3: Upgrade the capacity of present WWTP to 1 mgd with Solids Handling.

Improvements to the Ridgefield WWTP would require disturbance of gravel and grassy areas on the site in order to make room for new structures to be built on the site. No wetland or wetland buffer areas associated with the WWTP expansion would be disturbed.

3.5.3 Mitigation

- Construction BMPs for the control of sedimentation and erosion shall be implemented to minimize potential short-term water quality impacts.
- Major ground-disturbing construction activities shall be restricted to the drier summer months as much as possible, to minimize the potential for erosion and sedimentation.
- Disturbed areas not covered by new structures will be landscaped with native vegetation to minimize the potential for erosion and sedimentation.

3.6 Water Quality

3.6.1 Affected Environment

Surface Water

Lake River and the Columbia River are classified as Class A fresh waters according to the Washington Administrative Code (WAC) 173-201A-140. The outfall for the Ridgefield WWTP lies along the northeastern shore of Lake River approximately two miles upstream from the confluence with the Columbia and about 2.5 miles above the mouth of the Lewis River. The Ridgefield WWTP is currently designed to discharge 0.7 mgd (maximum month flow) of secondary effluent. Lake River flows north to intersect the Columbia River at approximately RM 87. It is tidally influenced with average daily amplitude of approximately eight feet. The WWTP is located adjacent to (west of) the BNSF Railroad Tracks and is above the 100-year flood elevation for this portion of the Columbia and Lake River. The WWTP site is located on property adjacent to the Port of Ridgefield and areas that were used by the Pacific Wood Treating Corporation until the 1970s. Soils in the area are known to contain creosote and other wood treating chemicals in significant concentrations. Maul, Foster, and Alongi completed a preliminary analysis of Lake River sediments for the City of Ridgefield in March 2007. The analysis of three core samples taken along the length of Lake River showed no significant impact from organic chemicals or metals.

Surface Water Quality

Both Lake River and the Columbia River are on the CWA Section 303(d) List for fecal coliform and temperature exceedances. The Columbia is also on the list for invasive aquatic species, dioxin and total dissolved gases.

Groundwater

The aquifers in and around Ridgefield are highly productive, providing a large volume of potable water for the area. Most of the City of Ridgefield and the surrounding service area is designated as a Category 2 Aquifer Recharge Area with several Category 1 Recharge Areas surrounding wells scattered from just east of old downtown Ridgefield to the area east of the I-5 corridor.

The groundwater in the vicinity of the WWTP has been impacted by the contamination from the former Pacific Wood Treatment operation. The Port of Ridgefield is currently using a steam injection, and pump and treat system to mobilize and clean up the contamination.

3.6.2 Environmental Consequences

Alternative 1: No Action

Taking no action to improve efficiency and increase capacity of the Ridgefield WWTP would result in degradation of the waters of Lake River once the existing facility reaches and exceeds design capacity, especially during storm events (likely after 2009). Nutrient and bacterial loading to Lake River would increase and the WWTP would eventually fail to produce effluent consistent with the requirements of the NPDES permit. This would lead to restrictions on new connections to the wastewater conveyance and treatment system, and the associated disruption of economic activity (growth) in the City's service area. Growth occurring without access to the wastewater collection, conveyance and treatment system would be forced to rely on septic tanks for wastewater treatment, which could jeopardize groundwater and potentially surface water quality in these areas.

Alternative 2: Upgrade the capacity of present WWTP to 1 mgd without Solids Handling.

Increasing the capacity of the Ridgefield WWTP to 1.0 mgd would have no adverse impact on the water quality of the Lake and Columbia Rivers. (Refer to Cosmopolitan mixing zone studies.) The additional capacity of the WWTP will help to reduce the possibility of contamination from untreated wastewater discharges. Construction of the proposed upgrades on the WWTP site has limited potential for adverse impacts to surface or groundwater in the area. BMPs will be implemented to control any erosion during the construction process.

Alternative 3: Upgrade the capacity of present WWTP to 1 mgd with Solids Handling.

Upgrading of the existing facility by constructing two new aeration basins and conversion of the existing aeration basins to aerobic digesters will expand WWTP capacity to 1.00 mgd and have no adverse impact on the water quality of the Lake and Columbia River. Construction of the proposed upgrades on the WWTP site has limited potential for adverse impacts to surface or groundwater in the area. BMPs will be implemented to control sedimentation and erosion during construction.

3.6.3 Mitigation

Alternative 1: No Action

No mitigation would be required in the short-term in the event that no action is taken to improve wastewater treatment capacity in Ridgefield. Implementation of the "No Action" Alternative would eventually lead to degradation of the waters of Lake River once the existing facility reaches and exceeds design capacity, especially during storm events (likely after 2009). Nutrient and bacterial loading to Lake River would increase and the WWTP would eventually fail to produce effluent consistent with the requirements of the NPDES permit. Ridgefield would face a moratorium on new sewer connections if improvements were not made prior to this moment in time.

Alternative 2: Upgrade the capacity of present WWTP to 1 mgd without Solids Handling.

Implementation of Alternative 2 would require that construction BMPs for control of sedimentation and erosion be implemented during construction on the WWTP Site along the Effluent Pipeline.

Alternative 3: Upgrade the capacity of present WWTP to 1 mgd with Solids Handling.

Ground-disturbing construction activities shall take place during the dry season as much as possible, and construction BMPs for control of sedimentation and erosion shall be implemented to minimize the potential for generation of sediment-laden runoff from the construction site at the WWTP.

3.7 Coastal Lands

3.7.1 Affected Environment

Clark County is not included in the list of "Coastal Counties" regulated by the Department of Ecology, so a Coastal Zone Consistency Determination is not required for this project.

The Ridgefield WWTP is located approximately 0.25 mile from the east bank of Lake River and lies outside of Shoreline Jurisdiction. A Shoreline Substantial Development Permit was issued by the City of Ridgefield in August 2006 for extension of the existing streambank discharge by 100 feet into Lake River. Another Shoreline Substantial Development Permit may be required for replacement of the effluent pipeline.

3.8 Socioeconomic/Environmental Justice

3.8.1 Affected Environment

Demographics & Waste Load Projections

According to the General Sewer Facilities Plan prepared for the City of Ridgefield (Gray & Osborne, August 2006). The City service area population was 2,195 residents in 2004, representing approximately 878 equivalent dwelling units (EDUs). The population is projected to grow to 12,000 by 2024.

According to the Census Bureau American Quick Facts Databases for the City of Ridgefield (Census Designated Place) the year 2000 population for the area was 2,147. The population is 95.2 percent white, 0.3 percent black, 1.1 percent American Indian, 0.7 percent Asian. Approximately 2.5 percent of the population is of two or more races, and 1.8 percent is Hispanic or Latino. Approximately 6.3 percent of the population is living below the poverty level.

Employment

The median household income in Ridgefield is approximately $46,012, which is above the Washington State poverty level. Approximately 30 percent of the population works in management positions, 14.6 percent in service industries, 26.1 percent in sales related jobs, 0.4 percent in farming, approximately 11.4 percent in construction, and about 17.6 percent in production, transportation, and material moving occupations. The agriculture forestry and fishing industry comprise 2.6 percent of the population, while manufacturing comprised 14.7 percent of the population and government employees constituted 15.4 percent.

3.8.2 Environmental Consequences

Alternative 1: No Action

Taking no action to improve efficiency and capacity of the Ridgefield WWTP would result in situations where the plant is unable to meet the requirements of its NPDES permit. Failure of the WWTP to meet NPDES permit requirements could result in a moratorium on new connections to the system. Placing a moratorium on construction and economic development could stifle economic activity and future growth in the District service area, which could result in disproportionate adverse impact on minority and low-income individuals.

Alternative 2: Upgrade the capacity of present WWTP to 1 mgd without Solids Handling.

Federal and state grant and loan programs will be pursued to minimize the potential adverse financial effects on minority and low-income residents in Ridgefield associated with proposed improvements to the City's wastewater treatment and conveyance systems. Upgrading the WWTP would reduce the potential for NPDES Permit violations and the wastewater system connection restrictions that would likely be implemented by the Department of Ecology to encourage permit compliance. Population growth within the City's service area would spread the cost of wastewater treatment and disposal over a larger population, which would help to maintain rates at current levels, or at least slow rate increases. Planning for wastewater treatment and conveyance infrastructure to serve population growth in Ridgefield would improve conditions for minority and low-income residents.

Alternative 3: Upgrade the capacity of present WWTP to 1 mgd with Solids Handling.

As with Construction Alternative 2, the City will continue to apply for financial assistance from federal and state funding agencies to minimize adverse financial impacts on minority and low-income groups in Ridgefield. Because Alternative 3 includes more extensive construction on the WWTP site, it would be more expensive and thus, be more costly to users of the system. Alternative 3 has the potential to adversely affect low income taxpayers.

3.8.3 Mitigation

Implementation of the proposed WWTP upgrades will allow development to continue in the City of Ridgefield. Development will provide jobs and stimulate the economy, which would benefit minority and low-income residents in Ridgefield. Growth in the sewer system will also provide a larger ratepayer base upon which to spread the costs of operation of the system.

Applying for grants and low-interest loans from the various state and federal funding agencies would help to reduce rates the City must charge for wastewater treatment and conveyance as the City's service area population grows. This would benefit minority and low-income residents.

3.9 Air Quality

3.9.1 Air Quality - Affected Environment

Air Quality in the vicinity of the Ridgefield WWTP has improved over the past 35 years with the closure of Pacific Wood Treating, which treated raw wood with creosote and other hazardous materials. The existing Ridgefield WWTP site lies approximately 0.25 mile east of Lake River and approximately 0.3 mile from the nearest residence. Air quality at the proposed wastewater treatment plant site is generally good, due to the relatively sparse development in the immediate vicinity and prevailing winds up and down the Columbia Gorge/Valley.

3.9.2 Air Quality-Environmental Consequences

Mr. Clint Lamoreaux of the Southwest Clean Air Agency was contacted on September 15, 2006 to discuss air quality permitting requirements for the proposed Ridgefield WWTP upgrades (See Conversation Record in the Correspondence Section). He indicated that the Southwest Clean Air Agency (SWCAA) would require submittal of an Air Discharge Permit Application (Notice of Construction) for each proposed phase of the Ridgefield WWTP Improvements. His primary concerns included potential increases in chloroform and hydrogen sulfide emissions, odor control measures proposed for the new headworks, and other odor producing processes and proposed methods for controlling emissions from auxiliary generators.

Alternative 1: No Action

Taking no action to improve the efficiency and capacity of the Ridgefield WWTP would not adversely impact air quality in the short term. There could be adverse impacts to air quality (odor complaints near the plant, especially during storm events) due to overloading of the plant as the population of the service area increases over the course of the planning period.

Alternatives 2 and 3:

Upgrading the Ridgefield WWTP on the existing site would not be likely to adversely impact air quality in the area, or result in complaints from neighboring property owners because the use of the existing site and the unit processes will not change. A Notice of Construction will be sent to SWCAA prior to construction of each phase of the City's wastewater treatment and conveyance system improvements.

3.9.3 Air Quality - Mitigation

Watering will be used to control dust during ground disturbing construction activities. An Air Discharge Permit Application for each WWTP upgrade phase will be prepared and submitted to the SWCAA for review and approval prior to project implementation. Mitigation measures and conditions of the Air Discharge Permit shall be implemented during operation of the WWTP as it is upgraded. The diesel generator will be run on low sulfur diesel fuel or biodiesel to minimize emissions to the air.

3.10 Transportation

3.10.1 Transportation-Affected Environment

Washington SR 501 (Pioneer Street) provides access to the City of Ridgefield from Interstate 5 a few miles north of Vancouver, Washington. The WWTP site is accessed from Division Street. No road closures should be necessary for the improvement of the WWTP.

3.10.2 Transportation Environmental Consequences

Alternative 1: No Action

Taking no action to upgrade the wastewater treatment capacity for the City of Ridgefield would not result in impacts to transportation in the project area. However, the sludge from the WWTP would continue to be hauled to Clark County's Salmon Creek WWTP, which would require approximately five trucks going to and from the WWTP per week.

Alternative 2: Upgrade the capacity of present WWTP to 1 mgd without Solids Handling.

Alternative 2 would result in additional traffic to the site while construction was taking place, although no road closures would be expected. Following completion of the project, the lack of a Sludge Dewatering Facility would continue to require that liquid sludge be hauled to the Salmon Creek WWTP.

Alternative 3: Upgrade the capacity of present WWTP to 1 mgd with Solids Handling.

Alternative 3 would also result in additional traffic to the site during construction. Throughout the project no road closures would be expected. Following completion of the project, the Sludge Dewatering Facility thicken the sludge into a solid form that could be hauled off-site with fewer truck trips (approximately one trip per week).

3.10.3 Transportation - Mitigation

Delivery of large WWTP equipment to the site during construction should be timed to coincide with low-traffic periods in downtown Ridgefield and on the Port of Ridgefield property.

3.11 Noise

3.11.1 Noise – Affected Environment

Noise levels at the existing City of Ridgefield WWTP site are low, compared with noise levels generated by the BNSF Railroad Tracks immediately east of the plant. Traffic and noise on the rest of the Port property are typical of a shoreline industrial area with significant contributions from marine and railroad traffic.

3.11.2 Noise – Environmental Consequences

Alternative 1: No Action

Taking no action to upgrade the Ridgefield WWTP would involve no change in noise generated in the area. However, as wastewater flows to the plant exceed capacity, noise associated with alarms and emergency measures to treat and discharge flows could generate additional disturbance in the area. High flow events would require extra pumping on the site, which would involve noise associated with operation of additional electric motors and gasoline or diesel engines.

Alternative 2: Upgrade the capacity of present WWTP to 1 mgd without Solids Handling.

There would be some amount of extra noise generated at the site during construction modifications to the WWTP. Once completed, the expanded WWTP would not generate significant additional noise since most new mechanical components will be enclosed.

Alternative 3: Upgrade the capacity of present WWTP to 1 mgd with Solids Handling.

Extra noise would be generated at the site during construction and modifications to the WWTP. Because Alternative 3 requires more improvement work be done at the site than Alternative 2, noise resulting from work at the site should be a factor for a longer period of time. Once completed, the expanded WWTP would not generate significant additional noise since most new mechanical components will be enclosed.

3.11.3 Noise – Mitigation

New pumps and motors installed on the Ridgefield WWTP Site should be enclosed in buildings or placed in soundproof enclosures to minimize adverse noise impacts on the surrounding area.

CHAPTER 4

SUMMARY OF MITIGATION

4. SUMMARY OF MITIGATION

This environmental report concludes that impacts to the human environment will occur as a result of this project. Mitigation for these impacts includes:

a) City of Ridgefield to obtain NPDES Construction Stormwater Permit from Ecology and assign responsibility for permit conditions to the Contractor, if required.

b) Construction BMPs for the control of sedimentation and erosion shall be implemented during project construction.

c) Comply with requirements of the City of Ridgefield Shoreline Substantial Development permit for the Effluent Pipeline work within 200 feet of Lake River.

d) Financial impacts to low income populations shall be mitigated through the acquisition of grants and low-interest loans;

e) City to submit Notice of Construction (NOC) from Southwest Clean Air Authority for each phase of the Ridgefield WWTP Improvements involving an increase in rated capacity of the facility.

f) Mitigation measures as prescribed by City of Ridgefield Critical Area Ordinances shall be implemented.

g) An Unanticipated Discovery Plan for potential disturbance of materials of cultural, historic or archaeological significance must be in place prior to Notice to Proceed. In the event that any excavation or other earth moving activity by the contractor uncovers cultural resources, historical or archaeological artifacts, human remains, fossil or other paleontological materials, all work shall stop and the discovery shall immediately be reported to the State Historic Preservation Office (SHPO), Project Engineer and the USDA Rural Development Project Manager. Construction shall remain halted pending the notification process and further instructions issued by SHPO and the Cowlitz Tribe.

h) Construction Activities shall be scheduled to reduce traffic and noise impacts in commercial and residential areas. New pumps and motors will be enclosed in buildings or enclosures.

Summary of Environmental Affects

	Alternative 1: No Action	Alternative 2: Upgrade the capacity of present WWTP to 1 mgd without Solids Dewatering	Alternative 3: Upgrade the capacity of present WWTP to 1 mgd with Solids Dewatering
Land Use/ Important Farmland/ Formally Classified Lands	Soils on the WWTP site would not be disturbed. Land use on the existing site and at the existing outfall would not change.	The footprint of the existing site would not be altered and land use in the area would not change. Using pipe- bursting to replace the existing outfall would reduce the amount of disturbance to soil along its course.	More construction at the site would mean more soil disturbance. Using pipe-bursting to replace the existing outfall would reduce the amount of disturbance to soil along its course.
Floodplain	Taking no action to upgrade the Ridgefield WWTP would have no impact on the floodplain of Lake River.	Upgrading the WWTP would have no impact on the floodplain of Lake River because the site lies outside the 100-year floodplain. By using pipe-bursting the Effluent Pipeline capacity expansion would result in no long term disturbance of the floodplain.	Upgrading the WWTP would have no impact on the floodplain of Lake River because the site lies outside the 100-year floodplain. By using pipe-bursting the Effluent Pipeline capacity expansion would result in no long term disturbance of the floodplain.
Wetlands	Taking no action would have no impact on wetlands adjacent to the Ridgefield WWTP.	Upgrading the WWTP would have no impact on the adjacent wetlands. There are no wetlands on the project site or along the effluent pipeline route.	Upgrading the WWTP would have no impact on the adjacent wetlands. There are no wetlands on the project site or along the effluent pipeline route.
Cultural Resources	Taking no action would not involve any ground disturbance, so there would be no potential for discovery or disturbance of culturally or historically significant materials.	Installation of a third aeration basin, new digester tanks within the existing WWTP footprint and upsizing the effluent pipeline using pipe-bursting has the potential for disturbance of materials of cultural, historic or archaeological significance.	Building the proposed structures at the WWTP under Alternative 3 and upsizing the effluent pipeline using pipe-bursting will cause significant ground disturbance and has the potential to disturb materials of cultural, historic or archaeological significance.
Biological Resources	Taking no action to upgrade the WWTP would eventually result in the discharge of effluent with elevated levels of nutrients and coliform bacteria. This would affect the entire food chain in the area.	By adding capacity to the treatment plant, the potential for discharge of effluent with elevated levels of nutrients and coliform bacteria would be reduced for a number of years.	By adding capacity to the treatment plant, the potential for discharge of effluent with elevated levels of nutrients and coliform bacteria would be reduced for a number of years. Construction activity could cause erosion and sedimentation however, BMPs will be implemented to mitigate any negative consequences of the construction.
Water Quality	Taking no action would result in degradation of the Lake River once the facility exceeds design capacity. The WWTP would eventually fail to produce effluent consistent with the requirements of the NPDES permit.	Increasing the capacity of the Ridgefield WWTP to 1.0 MGD would have no adverse impact on the water quality of the Lake and Columbia Rivers.	Increasing the capacity of the Ridgefield WWTP to 1.0 MGD would have no adverse impact on the water quality of the Lake and Columbia Rivers.

Coastal Lands	Because Clark County is not included in the list of "Coastal Counties" regulated by the Department of Ecology, a Coastal Zone Consistency Determination is not required for this project.		
Socioeconomic/ Environmental Justice	Taking no action would eventually result in a failure to meet the requirements of its NPDES permit and a moratorium on new connections. A moratorium could stifle economic activity and result in adverse impacts on minority and low-income individuals.	Government grant and loan programs will help to minimize adverse financial effects on minority and low-income residents associated with proposed improvements to the WWTP and conveyance systems. Population growth, made possible by the additional capacity of the WWTP, would spread the cost of wastewater coverage over a larger population, helping to maintain rates at current levels.	Alternative 3 requires more construction costs than Alternative 2 and would result in higher costs for sewer coverage. This would have the biggest impact on low-income residents.
Air Quality	Taking no action to improve the WWTP's capacity would not adversely impact air quality in the short term. Adverse impacts to air quality and odor could result due to overloading of the plant as the population of the service area increases.	Upgrading the WWTP on the existing site would not adversely impact air quality in the area.	Upgrading the WWTP on the existing site would not adversely impact air quality in the area.
Transportation	Taking no action would not result in impacts to transportation in the project area. However, the sludge from the WWTP would continue to be hauled off-site, requiring approximately five trucks going to and from the WWTP per week.	Alternative 2 would result in additional traffic to the site while construction was taking place. Following completion of the project, the lack of a Sludge Dewatering Facility would require that liquid sludge continue to be hauled off-site.	Alternative 3 would also result in additional traffic to the site during construction. Following completion of the project, the Sludge Dewatering Facility would thicken the sludge into a solid form that could be hauled off-site in only one trip per week.
Noise	Taking no action would cause no consistent change in noise. However, as wastewater flows exceed capacity, noise associated with alarms and emergency measures could generate additional disturbances. High flow events would require extra pumping on the site, involving noises associated with the operation of additional electric motors and gasoline or diesel engines.	Some amount of extra noise would be generated at the site during construction. Once completed, the expanded WWTP would not generate significant additional noise because most of the new mechanical components will be enclosed.	Extra noise would be generated at the site during construction. Because Alternative 3 requires more improvement work be done at the site than Alternative 2, noise resulting from work at the site should be an issue for a longer period of time. Once completed, the WWTP would not generate additional noise because most new mechanical components will be enclosed.

CHAPTER 5

CORRESPONDENCE

STATE OF WASHINGTON

DEPARTMENT OF ARCHAEOLOGY & HISTORIC PRESERVATION

1063 S. Capitol Way, Suite 106 • Olympia, Washington 98501
Mailing address: PO Box 48343 • Olympia, Washington 98504-8343
(360) 586-3065 • Fax Number (360) 586-3067 • Website: www.dahp.wa.gov

October 9, 2007

Mr. Bruce Whittle
USDA-Rural Development
1835 Black Lake Blvd., SW, Suite C
Olympia, Washington 98512

Re: Ridgefield Wastewater Treatment Facility Project
Log No.: 100907-04-USDA-RD

Dear Mr. Whittle:

Thank you for contacting our department. We have reviewed the materials for the proposed Ridgefield Wastewater Treatment Facility Project in Clark County, Washington.

We concur with your determination of the Area of Potential Effect (APE) as detailed in your letter.

We look forward to receiving the results of your review, consultations with the concerned tribes, and the findings of the professional archaeological survey report.

We would also appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

These comments are based on the information available at the time of this review and on behalf of the State Historic Preservation Officer in compliance with the Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations 36CFR800.4. Should additional information become available, our assessment may be revised, including information regarding historic properties that have not yet been identified. Thank you for the opportunity to comment and we look forward to receiving the reports on the results of your investigations.

Sincerely,

Robert G. Whitlam, Ph.D.
State Archaeologist
(360)586-3080
email: rob.whitlam@dahp.wa.gov

Gray & Osborne, Inc.
CONSULTING ENGINEERS

October 5, 2007

Dr. Robert Whitlam
State Archaeologist
Washington State Department of Archaeology & Historic Preservation
1063 Capitol Way, Suite 106
Olympia, Washington 98501

SUBJECT: NATIONAL HISTORIC PRESERVATION ACT, SECTION 106
CONSULTATION FOR WWTF 1 MGD EXPANSION
CITY OF RIDGEFIELD, CLARK COUNTY, WASHINGTON
G&O #07354

Dear Dr. Whitlam:

Gray & Osborne, Inc. is providing engineering and planning services to the City of Ridgefield associated with the 1 mgd expansion of their Wastewater Treatment Facility (WWTF) improvements, which will be funded in part by grants and loans from the USDA Rural Development Administration. This project will involve the following activities within the footprint of the existing facility (see enclosed map and drawing):

1. Modify the existing headworks.
2. Construct a new concrete aeration basin with a volume of approximately 175,000 gallons.
3. Construct an additional concrete aerobic digester.
4. Construct a new effluent pump station.
5. Install new pumps and blowers.
6. Upgrade the auxiliary generator.
7. Complete associated site work, site piping, and electrical work.

All work will be completed within the existing WWTF site and the maximum depth of excavation will be approximately 8 feet.

Please let me know of any Department of Archaeology and Historic Preservation survey requirements for compliance with Section 106 of the National Historic Preservation Act. The Cowlitz Tribe will be contacted regarding any potential concerns they may have with a project of this sort at the Ridgefield WWTF.

Very truly yours.

GRAY & OSBORNE, INC.

Jim Dougherty

Jim Dougherty

JD/hj
Encl.

cc: City of Ridgefield, Public Works Department
Mr. David Burlingame, Cowlitz Tribe Cultural Resources
Mr. Mike Johnson, P.E., Gray & Osborne, Inc., Olympia

Gray & Osborne, Inc.
CONSULTING ENGINEERS

CERTIFIED MAIL

October 5, 2007

Mr. Dävid Burlingame
Cowlitz Cultural Resources
P.O. Box 2547
Longview, Washington 98362

SUBJECT: NATIONAL HISTORIC PRESERVATION ACT, SECTION 106 CONSULTATION FOR WWTF 1 MGD EXPANSION CITY OF RIDGEFIELD, CLARK COUNTY, WASHINGTON G&O #07354

Dear Mr. Burlingame:

Gray & Osborne, Inc. is providing engineering and planning services to the City of Ridgefield associated with the 1 mgd expansion of their Wastewater Treatment Facility (WWTF) improvements, which will be funded in part by grants and loans from the USDA Rural Development Administration. This project will involve the following activities within the footprint of the existing facility (see enclosed map and drawing):

1. Modify the existing headworks.

2. Construct a new concrete aeration basin with a volume of approximately 175,000 gallons.

3. Construct an additional concrete aerobic digester.

4. Construct a new effluent pump station.

5. Install new pumps and blowers.

6. Upgrade the auxiliary generator.

7. Complete associated site work, site piping, and electrical work.

701 Dexter Avenue N., Suite 200 Seattle, Washington 98109 (206) 284-0860 Fax (206) 283-3206

All work will be completed within the existing WWTF site and the maximum depth of excavation will be approximately 8 feet.

Please let me know of any concerns the Cowlitz Tribe may have regarding a project of this nature in this location. Your comments will be included in the Environmental Assessment documentation for compliance with Section 106 of the National Historic Preservation Act. Robert Whitlam, Ph.D., State Archaeologist, with the Department of Archaeology and Historic Preservation, has been contacted regarding this project.

Very truly yours,

GRAY & OSBORNE, INC.

Jim Dougherty

Jim Dougherty

JD/hj
Encl.

cc: City of Ridgefield, Public Works Department
Mr. Robert Whitlam, Ph.D., State Archaeologist, Washington State Department of Archaeology & Historic Preservation
Mr. Mike Johnson, P.E., Gray & Osborne, Inc., Olympia

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ **Telephone Conversation**	**Location of Phone Conversation:** GRAY & OSBORNE INC.
☐ **Meeting**	**Place of Meeting:**

Date:	10-1-07		1130	
Discussion with:	Bruce Whittle			
Firm/City with:	USDA RD Olympia, Project Manager for Ridgefield WWTF			
Phone Number:	360 704-7768, fax 7775 bruce.whittle@wa.usda.gov			
Gray & Osborne Personnel:	Jim Dougherty			
Project:	WWTF Phase 1C			
Subject:	NEPA and project descriptions			
G&O Job Number:	07354			

REMARKS:

Janice Roderick transferred my call to Bruce Whittle, the project manager for the Ridgefield WWTF Project. Bruce has apparently been out of the loop with the City as much as I have, as he was interested in knowing which direction the City wanted to run their effluent pipeline to the Columbia River. He seemed to be surprised that the City had decided to implement Phase 1C from the Facilities Plan, that calls for upgrades of a few structures within the existing WWTF Site and construction of a new aeration basin effluent pump station and installation of new pumps and blowers; along with all the associated site-work, piping and electrical. I noted that the effluent would continue to be discharged to the existing Lake River Outfall under this phase.

Bruce said that if no new structures were being built, he could issue a NEPA Categorical Exclusion, but we agreed that the Environmental Report that would be required for the new structures on the site. I told him that I sent a copy of the ER from 2006 to Janice Roderick and that I would be sending a letter to Rob Whitlam at DAHP and the Cowlitz Tribe in the near future. I sent Bruce Mike Johnson's project description and a copy of the proposed site plan. Bruce said he would contact Mike or the City with any questions.

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ **Telephone Conversation**

☐ **Meeting**

Location of Phone Conversation: GRAY & OSBORNE INC.	
Place of Meeting:	

Date:	9-28-07		0915	
Discussion with:	Mike Johnson			
Firm/City with:	G&O Olympia			
Phone Number:	360 292-7481			
Gray & Osborne Personnel:	Jim Dougherty			
Project:	Ridgefield WWTF Upgrade 2008			
Subject:	NEPA documentation for upgrade from 0.7 MGD to 1.0 MGD			
G&O Job Number:	07354			

REMARKS:

I called Mike Johnson at Eric Noah's request to discuss the upcoming upgrade to the Ridgefield WWTF from 0.7 MGD (recently completed) to 1.0 MGD (to be completed by early 2009). He said that they were going to be upgrading the existing facility within the existing footprint, but they plan to continue using the outfall to Lake River. ESA concerns will be minimal to non-existent, as the BA prepared for the last upgrade included extension of the outfall into Lake River and upgrade of the facility to 1 MGD (check this to be sure).

Mike said that excavation on the WWTF site will likely extend about ten feet below the existing ground level and below the existing fill, so we'll have to consult with DAHP and any concerned tribes in the area…I'll request new Priority Habitats & Species Maps from WDFW and put together a letter to Rob Whitlam at DAHP. I'll also check to see which tribes we contacted in the area for the last project and consult with them again…Most of the information collected for the last upgrade will be good for this one.

Mike said that there is RD funding for this project, so I'll call Janice Roderick to see how she wants to handle it. I'm thinking it may qualify for a categorical exclusion, as the work will occur within the footprint of the plant…The only thing that might change that would be construction of a new effluent pump station that would only be used during extremely high flow periods.

From: Mike Johnson [mjohnson@g-o.com]
Sent: Friday, September 29, 2006 8:24 AM
To: jdougherty@g-o.com
Subject: RE: Message from Anne Friesz at WDFW re Ridgefield

Jim,

We already have an HPA for the T-7 Bridge Project. I just need to get an extension on the work window beyond September 30.

Mike

-----Original Message-----
From: Jim Dougherty [mailto:jdougherty@g-o.com]
Sent: Friday, September 29, 2006 7:59 AM
To: mjohnson@g-o.com
Subject: Message from Anne Friesz at WDFW re Ridgefield

Hi Mike!

I missed Anne's call yesterday, but she left a message stating that she could extend the in-water work window for the outfall extension project. She didn't seem to know about the T-7 Project, other than to say an HPA would be required for attaching pipes to the bottoms of bridges. She said that she will give me a call on Monday and we can finally get these questions answered.

I have assembled the References Section for the NEPA document and will pull together the Appendices either later today or on Monday. I'm thinking that we should be able to get the NEPA document out Monday afternoon, if you don't have too many comments for Shannon to work on.

Jim Dougherty
Gray & Osborne, Inc.
701 Dexter Ave N. Suite 200
Seattle WA, 98109

Ph(206)284-0860
Fx(206)283-3206

Jim Dougherty

From: Mike Johnson [mjohnson@g-o.com]
Sent: Monday, August 28, 2006 9:13 AM
To: jdougherty@g-o.com
Subject: FW: BA reviewing officials for the Ridgefield WWTP Outfall Extension into Lake River

Jim,

FYI.

Mike

-----Original Message-----
From: Justin.Clary [mailto:Justin.Clary@ci.ridgefield.wa.us]
Sent: Sunday, August 27, 2006 12:29 PM
To: Mike Johnson; Steve Wall
Subject: RE: BA reviewing officials for the Ridgefield WWTP Outfall Extension into Lake River

I spoke with Mindi on Friday. She had spoke with Ron Klump, who apologized and indicated that it was their fault. Ron indicated he would call G&O to provide status and prioritize the permit. He thought the permit could be issued within two weeks. Mindi indicated that if we have not received the permit in two weeks, call her and she would speak with Ron's supervisor.
Keep me posted, please.

-----Original Message-----
From: Justin.Clary
Sent: Tuesday, August 22, 2006 1:00 PM
To: 'Mike Johnson'; Steve Wall
Subject: RE: BA reviewing officials for the Ridgefield WWTP Outfall Extension into Lake River

I have finally gotten a hold of Mindi Lindquist in Senator Murray's office after two weeks of phone tag. Mindi indicated that she would contact Ron Klump and, if necessary, Ron's supervisor to encourage resolution of this issue.

-----Original Message-----
From: Mike Johnson [mailto:mjohnson@g-o.com]
Sent: Wednesday, August 09, 2006 3:53 PM
To: Steve Wall
Cc: Justin.Clary
Subject: FW: BA reviewing officials for the Ridgefield WWTP Outfall Extension into Lake River

Steve,

On the WWTP project we still do not have the permit from the Army Corps of Engineers to commence construction of the outfall extension into Lake River.
The ACOE has completed their review and forwarded it on to the US Fish and Wildlife Service and NOAA Fisheries for Endangered Species Act compliance review. The applications and associated biological assessment were sent in over a year ago and we still do not have the permit. Since we are getting close to our proposed start date of September 1 for this work, I am thinking that this may be the time to see if we can have some political pressure exerted on these review agencies. Contacts for USFWS and NOAA fisheries are provided below. The contact at the Corps of Engineers is Ron Klump. Let me know what you think.

Mike

-----Original Message-----
From: Jim Dougherty [mailto:jdougherty@g-o.com]
Sent: Wednesday, August 09, 2006 3:26 PM
To: mjohnson@g-o.com
Cc: jwilson@g-o.com
Subject: BA reviewing officials for the Ridgefield WWTP Outfall Extension into Lake River

Hi Mike!
The NOAA Fisheries Branch Chief for the SW Washington Habitat Branch is Dan Guy at 360 534-9342. The person I have discussed the project with at USFWS is Nancy Brennan-Dubbs at 360 753-5835. I think they are both at the USFWS/NMFS Office on the St. Martins College Campus.

Jim Dougherty
Gray & Osborne, Inc.
701 Dexter Ave N. Suite 200
Seattle WA, 98109

Ph(206)284-0860
Fx(206)283-3206

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ **Telephone Conversation**

☐ **Meeting**

Location of Phone Conversation: GRAY & OSBORNE INC.	
Place of Meeting:	

Date:	8-25-06			1400
Discussion with:	Asha Randolph			
Firm/City with:	US Army Corps of Engineers			
Phone Number:	206 764-3964			
Gray & Osborne Personnel:	Jim Dougherty			
Project:	Ridgefield WWTF Outfall Extension			
Subject:	Status and location of the Informal ESA Consultation for the Lake River Outfall Extension			
G&O Job Number:	05616			

REMARKS:

I put a call in to Asha Randolph at the Seattle District Office of the Corps of Engineers. She said that she had received the two copies of the Informal ESA Consultation Document I forwarded to her in June, but that she failed to forward them to the Agencies. She said that they would go out in today's mail. She apologized for the mistake and said that she had spoken with Tim, her supervisor about it. She said that Tim had spoken with someone from Gray & Osborne yesterday. I gave her my phone number and asked her to have her supervisor call me.

Jim Dougherty

From: Mike Johnson [mjohnson@g-o.com]
Sent: Monday, September 25, 2006 8:08 AM
To: jwilson@g-o.com;jdougherty@g-o.com
Subject: RE: Ridgefield WWTP Meeting Minutes

John,

We are still waiting on the Corps permit. The City is working with its congressional representatives to put pressure on the Corps. We have told Stellar that they can't start on the outfall until authorized. If we do not get it installed by September 30, then we will probably need to wait for the Nov-Feb Columbia River work window. Jim was going to verify this with WDFW. Jim have you heard anything on this or the T7 HPA?

Mike

-----Original Message-----
From: John Wilson [mailto:jwilson@g-o.com]
Sent: Thursday, September 21, 2006 5:59 PM
To: Mike Johnson
Subject: RE: Ridgefield WWTP Meeting Minutes

Mike:

What's going to happen to the outfall work?

No other comments.

John

John P. Wilson, P.E.
Gray & Osborne, Inc.
701 Dexter Ave N. Suite 200
Seattle WA, 98109

Ph(206)284-0860
Fx(206)283-3206

-----Original Message-----
From: Mike Johnson [mailto:mjohnson@g-o.com]
Sent: Thursday, September 21, 2006 5:34 PM
To: Larry Hartwick;Tim Bauman;Destre Leifson;Steve Wall;john.duback@ci.ridgefield.wa.us
Cc: Eric Nutting
Subject: Ridgefield WWTP Meeting Minutes

Attached are the minutes from our last construction meeting. Please let me know if you have any questions or comments.

Mike

Mike Johnson, P.E.
Civil Engineer
Gray & Osborne, Inc.
Olympia Office
2401 Bristol Court SW
Olympia, WA 98502
(360) 754-4266 Phone
(360) 754-2135 Fax

Client: ________________ G-O # ________

Electronic File Transfer-

Note that these electronic files are provided as a courtesy only. Gray & Osborne, Inc. in no way guarantees the accuracy or completeness of the digital data contained within these files. Further more, Gray & Osborne, Inc. assumes no liability for any errors or omissions in the digital data herein. Anyone using the information contained herein should consult the approved or certified hard copy drawings or reports for the most current information available.

Jim Dougherty

From: John Wilson [jwilson@g-o.com]
Sent: Thursday, August 17, 2006 8:12 AM
To: jdougherty@g-o.com;mjohnson@g-o.com;ralli@g-o.com
Cc: Eric Nutting
Subject: Ridgefield facility plan

Jim:

I'm trying to wrap up the Ridgefield General Sewer Plan/Facilities Plan. Do you know the status of SEPA and any Environmental Report for the city's wastewater system?

Rebecca:

Your response to Ecology's review comments says that "The SEPA process has also been initiated and the City is in the process of issuing a determination of nonsignificance. The city is also in the process of completing SERP."

Do you know where these SEPA and SERP documents are located? They should be included in the Plan.

Mike:

Can you shed any light on these topics? Also, did the City adopt an MCRI ordinance?

FYI, THIS IS DAVE KNIGHT'S 8/10/05 REVIEW COMMENT CONCERNING ENVIRONMENTAL REVIEW, AND OUR DRAFT RESPONSE, WHICH HAS NOT YET BEEN SENT (OUR FINAL RESPONSE WILL ACCOMPANY THE FACILITY PLAN SUBMITTAL):

DAVE KNIGHT'S COMMENT:
"8. Pages 4-5 to 4-7 discuss MCRI development ordinance contents, but not the current status of such an ordinance. This should be included. The document also must clarify that the SEPA process has been completed and that the Environmental Report has been completed. Appendix C is a SEPA checklist, but the text does not address where the project is in the SEPA process, or the SERP process."

G&O'S DRAFT RESPONSE (written in March 2006):
"The Plan has been revised to include the status of SEPA, a MRCI ordinance, and SERP. The City is in the process of adopting a MRCI ordinance. The SEPA process has also been initiated and the City is in the process of issuing a determination of nonsignificance. The city is also in the process of completing SERP. "

Thanks,
John

John P. Wilson, P.E.
Gray & Osborne, Inc.
701 Dexter Ave N. Suite 200
Seattle WA, 98109

Ph(206)284-0860
Fx(206)283-3206

Jim Dougherty

From: John Wilson [jwilson@g-o.com]
Sent: Thursday, August 10, 2006 4:07 PM
To: jdougherty@g-o.com
Subject: RE: Discussion with Ron Klump @ ACOE re the Rivers & Harbors Act, Section 10 Permit for the Ridgefield WWTP Outfall Extension

Jim:

Thanks for your help. Keep plugging away at them.

John

John P. Wilson, P.E.
Gray & Osborne, Inc.
701 Dexter Ave N. Suite 200
Seattle WA, 98109

Ph(206)284-0860
Fx(206)283-3206

-----Original Message-----
From: Jim Dougherty [mailto:jdougherty@g-o.com]
Sent: Thursday, August 10, 2006 4:00 PM
To: mjohnson@g-o.com
Cc: jwilson@g-o.com
Subject: Discussion with Ron Klump @ ACOE re the Rivers & Harbors Act, Section 10 Permit for the Ridgefield WWTP Outfall Extension

Ron called to say that he hadn't heard anything from the Services yet regarding the Ridgefield WWTP Outfall Extension Project. He said that he has contacted the ACOE Seattle Office and Dan Guy at NMFS to see where things are. He is working with the Portland Office of USFWS & hoping to get some feedback from them. I told him that Nancy Brennan-Dubbs is the person at USFWS I've spoken with regarding the project, and that she works out of Olympia. He said that there has been some reorganization at USFWS, so we shall see where the project ended up for review.

I spoke with Lisa Faubion at DNR in Castle Rock today. She said that the DNR Aquatic Lands Use Authorization for the outfall extension was mailed to the City of Ridgefield for their signature today...so that part of the process is about finished.

More later,

Jim
Jim Dougherty
Gray & Osborne, Inc.
701 Dexter Ave N. Suite 200
Seattle WA, 98109

Ph(206)284-0860

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ **Telephone Conversation**

☐ **Meeting**

Location of Phone Conversation: GRAY & OSBORNE INC.	
Place of Meeting:	

Date:	7-13-06	**Time:**	10:00 a.m.		p.m.
Discussion with:	Ann Friesz				
Firm/City with:	WDFW in Vancouver				
Phone Number:	360 906-6764				
Gray & Osborne Personnel:	Jim Dougherty				
Project:	Ridgefield WWTP Outfall Extension to Lake River				
Subject:	Upsizing the outfall pipe				
G&O Job Number:	05616				

REMARKS:

Eric Nutting asked me to check with WDFW and the Corps of Engineers to see if upsizing the proposed temporary outfall pipe from 10 inches to 12 inches would be ok. I spoke with Ann Friesz at WDFW in Vancouver and she said it was ok as long as the 8-inch reducer remained on the end of the pipe.

Jim Dougherty

From: LISA FAUBION [lisa.faubion@wadnr.gov]
Sent: Monday, June 19, 2006 3:44 PM
To: jdougherty@g-o.com
Subject: Re: FW: Outfall Plan of Operations and Maintenance

Hi Jim,

I am going to need a copy of the WWTP facilities plan (or at least copies of the cover page and relevant sections) since the plan of operations references that document. After looking over the exhibit B, I think that is all I need. It will be reviewed by my supervisors along with the easement agreement, and they may require more information. If so, I'll let you know.

Lisa

>>> "Jim Dougherty" <jdougherty@g-o.com> 6/19/2006 7:43 AM >>>
Hi Lisa!

I have been communicating with Sam Kolb at WDFW regarding the Ridgefield WWTP Outfall Extension into Lake River. He has agreed to accept our proposed design with the addition of a 10-inch to 8-inch reducer at the end to increase effluent velocity to reduce/eliminate entrapment of fish.

Jim
-----Original Message-----
From: Jim Dougherty [mailto:jdougherty@g-o.com]
Sent: Tuesday, June 13, 2006 11:52 AM
To: 'LISA FAUBION'
Subject: RE: Outfall Plan of Operations and Maintenance

Lisa

Here is a draft of the Plan of Operations & Maintenance for the Ridgefield WWTP Outfall Extension Project. Give it a look & let me know if it will do. We're still waiting on Ecology for sediment sampling requirements and we're negotiating with WDFW regarding outfall screening; the latest word from WDFW is that we are very close to meeting the critieria for a "self-screening outfall," so the current design will likely be the one used, if not we may add a slight reducer at the end of the pipe.

Jim Dougherty

-----Original Message-----
From: LISA FAUBION [mailto:lisa.faubion@wadnr.gov]
Sent: Friday, May 26, 2006 11:21 AM
To: jdougherty@g-o.com
Subject: Outfall Plan of Operations and Maintenance

Jim,

The requirements for the easement Exhibit B (Plan of Operations and Maintenance) are attached. Give me a call if you have any questions.

Lisa

Lisa Faubion, Land Manager
Department of Natural Resources
Aquatics Region/Rivers District
PO Box 280
Castle Rock, WA 98611
Phone: (360) 740-6813
Fax: (360) 748-2387

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒Telephone Conversation

☐Meeting

Location of Phone Conversation: GRAY & OSBORNE INC.	
Place of Meeting:	

Date:	6-16-06	Time:	10:00 a.m.	p.m.
Discussion with:	Lisa Faubion			
Firm/City with:	Washington DNR, Castle Rock			
Phone Number:	360 740-6813			
Gray & Osborne Personnel:	Jim Dougherty			
Project:	Ridgefield WWTP Outfall Extension			
Subject:	DNR sediment sampling and testing requirements			
G&O Job Number:	05616			

REMARKS:

After reading Sharon Brown's memo regarding Ecology's "sampling recommendations," I called Lisa Faubion at DNR to see if they would require sediment sampling prior to issuing an easement for use of the subtidal lands beneath the proposed Ridgefield WWTP outfall extension. She said that DNR defers to Ecology regarding sediment quality monitoring, but that DNR reserves the right to require sediment sampling and testing at a later date.

Lisa said that she has received the Plan of Operations I sent to her last week, and that she hasn't had a chance to review it yet, but that it looked good at first glance.

Jim Dougherty

From: Thomas Hooper [Thomas.Hooper@noaa.gov]
Sent: Friday, June 16, 2006 10:52 AM
To: jdougherty@g-o.com
Subject: Re: Outfall screening requirements?

thomas.hooper.vcf

Hi Jim, we have no such criteria for outfalls such as you've described. Flow velocities would be our only concern, and I doubt that the outfall would come anywhere close to exceeding that standard. Thom

Jim Dougherty wrote:

> Hi Tom!
>
> We are working on a project that would extend the City of Ridgefield's (just NW of Vancouver) WWTP outfall from its current location at +8 feet to a new location 100 feet offshore at approximately -10 feet to ensure proper dilution at low tide. This 10-inch outfall will be temporary; removed in three to four years, once a new outfall to the Columbia River can be permitted. The folks at WDFW have been talking about NMFS screening requirements. I know something about screening requirements for water diversions, but I am not familiar with the screening requirements for outfalls...as most wastewater treatment plant outfall pipes are unscreened. We have used Tideflex valves tideflex valves to exclude fish in the past, but WDFW is saying they don't meet NMFS requirements?
>
> What are NMFS requirements for outfall screening? & where can they be found?
>
> Talked to Dawn a few weeks back regarding an upcoming wastewater system improvement project in Skykomish. Small world!
>
> Hope all is well.
>
> Thanks,
>
> Jim Dougherty
> Gray & Osborne, Inc.
> 701 Dexter Ave N. Suite 200
> Seattle WA, 98109
>
> Ph(206)284-0860
> Fx(206)283-3206
>
> Electronic File Transfer-
>
> Note that these electronic files are provided as a courtesy only. Gray & Osborne, Inc. in no way guarantees the accuracy or completeness of the digital data contained within these files. Furthermore, Gray & Osborne, Inc. assumes no liability for any errors or omissions in the digital data herein. Anyone using the information contained herein should consult the approved or certified hard copy drawings or reports for the most current information available.

Jim Dougherty

From: Brown, Sharon R. (ECY) [sbro461@ECY.WA.GOV]
Sent: Friday, June 16, 2006 9:32 AM
To: jdougherty@g-o.com
Cc: Knight, David J. (SWRO)
Subject: RE: Ridgefield WWTP - Freshwater Sediment Requirements

Jim: Sampling in the area of the proposed Lake River outfall is recommended (not required) in order to cover Ridgefield WWTP's liability (i.e., to confirm existing sediment quality before adding the contents of their discharge). Sampling should occur before the start of construction, but the results do not need to be known before construction begins (e.g., sampling can be performed one day and construction started the next).

Per 6/15/06 Ecology Memo
Proposed Lake River Outfall
Pre-Discharge. It is recommended that baseline sediment quality at the proposed Lake River location be determined before outfall installation.

Post-Discharge. The Lake River outfall location will also be resampled at the end of use (~2009-2010).

Sharon R. Brown
Environmental Engineer
TCP/Aquatic Lands Cleanup Unit

360.407.6919 (desk)
360.407.7154 (fax)

From: **Jim Dougherty [mailto:jdougherty@g-o.com]**
Sent: **Thursday, June 15, 2006 1:42 PM**
To: Brown, Sharon R. (ECY)
Cc: jwilson@g-o.com; mjohnson@g-o.com; enutting@g-o.com
Subject: RE: Ridgefield WWTP - Freshwater Sediment Requirements

Hi Sharon!

Thanks for the **sampling plan information**. I have **forwarded it to the Project Managers & Engineers for their review**. They are chomping at the bit to **build something later this year**, so I'm **sure the "several month" sampling plan review time will generate some heartburn**. We have yet to hear much from the folks at NMFS & USFWS, however.

One of the engineers did ask whether we had to **do the sampling prior to construction (as opposed to at the same time or shortly thereafter)...I said yes**...I suspect there is some political pressure coming from the City, as the **projected loadings are growing quickly with all the new development in the area**. Let me know.

Once I get permission to proceed, I'll **start the contracting process with the folks at**

Anchor and get the sampling & analysis planning started.

Jim

-----Original Message-----
From: Brown, Sharon R. (ECY) [mailto:sbro461@ECY.WA.GOV]
Sent: Thursday, June 15, 2006 12:35 PM
To: Jim Dougherty
Cc: Adolphson, Peter (ECY);Asher, Chance (ECY);Knight, David J. (SWRO)
Subject: Ridgefield WWTP - Freshwater Sediment Requirements

Jim: Pete and I reviewed the JARPA and ESA documents you sent us and the attached file contains freshwater sediment sampling requirements for the subject facility. Please have your sediment consultant submit a Sediment Sampling and Analysis Plan (SAP) to me for review and approval several months prior to sampling.

Signed hardcopies are on the way to Jim and David. -- SRB

<<SedSampling_SMU.doc>>

Sharon R. Brown
Environmental Engineer
sbro461@ecy.wa.gov
360.407.6919 (desk)
360.407.7154 (fax)

Department of Ecology
TCP\Aquatic Lands Cleanup Unit
PO Box 47600, Olympia, WA 98504-7600

DEPARTMENT OF ECOLOGY
Toxics Cleanup Program

June 15, 2006

TO: David J. Knight, P.E., SWRO-WQP

FROM: Sharon R. Brown, TCP/Aquatic Lands Cleanup Unit (ALCU)[1]

SUBJECT: Ridgefield WWTP (Lake River) - Sediment Sampling Requirements

At Jim Dougherty's[2] request, Peter Adolphson and I reviewed the Joint Aquatic Resources Permit Application (JARPA) and Informal ESA Consultation for the subject facility. The following are our recommended requirements for sampling and analyzing freshwater sediments in the vicinity of the existing and proposed outfalls. A Sediment Sampling and Analysis Plan (SAP) is required to be submitted to and approved by ALCU several months prior to the start of a sediment sampling event.

Tiered Sediment Sampling Approach

A tiered approach is recommended in that sediments are to first undergo biological testing. If biological tests fail, then the sample is to undergo a chemical analysis. Enough sediments are to be collected during deployment in order to, if necessary, perform synoptic bioassay and chemical tests on each sample.

Sediment Toxicity Tests

The following biological tests are to be performed on each sample:

- *Hyalella azteca* 10 day survival
- Microtox 100 percent sediment porewater extract test[3]
- *Chironomus tentans* 20 day growth and survival

Chemicals

Each sample that has failed bioassays should be analyzed for the following parameters.

Conventionals

- Ammonia
- Grain Size
- Total Solids
- Total Organic Carbon
- Total Sulfides
- Total Volatile Solids

Other Chemicals (Reference 3: Table 5)

- Metals
- LPAH and HPAH Compounds
- Phthalate Esters
- Ionizable Organic Compounds

---

[1] Formerly the Sediment Management Unit (SMU).
[2] Jim Dougherty, 206.284.0860, Gray & Osborne, Inc., 701 Dexter Ave N, Suite 200, Seattle, WA 98109.
[3] Ecology 2003. *Sediment Sampling and Analysis Plan Appendix: Guidance on the Development of Sediment Sampling and Analysis Plans Meeting the Requirements of the Sediment Management Standards (Chapter 173-204 WAC)*. Subappendix C. Revised April 2003. Pub #03-09-043. http://www.ecy.wa.gov/biblio/0309043.html.

Sediment Sampling Locations

Accurate geographical coordinates for the current and proposed Lake River outfall locations in North American Datum of 1983 US Survey feet (NAD83, U.S. feet) should be provided. This may entail obtaining the information during the sampling effort.

Current Lake River Outfall

Sediment Quality. The sediment quality is required to be determined at the current Lake River outfall location.

Sampling Stations. A minimum of three sampling stations should be placed in front of and up and downstream of the outfall, as well as, an ambient station upstream from the outfall. Stations should be placed in soft sediment no less than 10 feet and no more than 40 feet from the shoreline.

Proposed Lake River Outfall

Pre-Discharge. It is recommended that baseline sediment quality at the proposed Lake River location be determined before outfall installation.

Post-Discharge. The Lake River outfall location will also be resampled at the end of use (~2009-2010).

Proposed Columbia River Outfall

Pre-Discharge. It is recommended that baseline sediment quality at the proposed Columbia River location be determined before outfall installation (~2009-2010).

3-5 Years After Start of Discharge. After several years of discharge, the Columbia River outfall location sediment quality will be re-evaluated.

Reference Stations

A site specific reference station should be collected from a *clean* area with similar grain size to the Lake River site. A potential site for collecting reference sediments may be from the waterway that runs just east of Bachelor Island.

Existing Sediment Data

I believe Jim Dougherty mentioned that Anchor Environmental may have sediment data collected for the Port of Ridgefield in the vicinity of the Ridgefield WWTP outfall. If so, Anchor should submit this information to Ecology in a hardcopy report detailing the sediment sampling event(s) and in SEDQUAL templates as described below in the *Sediment References* section.

Sediment References

- Freshwater sediment quality values have been developed by the Washington State Department of Ecology, but have not been adopted into rule. These values may be found in our publication, *Development of Freshwater Sediment Quality Values in Washington State, Phase II Report: Development and Recommendation of SQVs for Freshwater Sediments in*

Washington State, September 2003, Publication Number 03-09-088 (http://www.ecy.wa.gov/biblio/0309088.html). However, there are currently no promulgated / legal numeric sediment quality standards for chemical effects in freshwater sediments. Assessment based on biological tests is recommended on a case-by-case, site-specific basis in accordance with adopted narrative standards in the *Sediment Management Standards*, Chapter 173-204 WAC (http://www.ecy.wa.gov/biblio/wac173204.html).

- *Sediment Sampling and Analysis Plan Appendix*, revised April 2003, http://www.ecy.wa.gov/biblio/0309043.html.

- **SEDQUAL**: http://www.ecy.wa.gov/programs/tcp/smu/sedqualfirst.htm).

  Electronic SEDQUAL template data must be verified to be compatible with the current version of SEDQUAL which uses ASCII protocol, comma delimited text files prior to delivery to Ecology. Verification shall be conducted by the consultant importing each of the data templates into their SEDQUAL database, correcting any errors, and then exporting the corrected final error free templates for delivery to Ecology.

  Refer to Sections 7-11 for further detail: http://www.ecy.wa.gov/programs/tcp/policies/Final-Policy%20840.pdf.

Cc: ALCU: Peter Adolphson, Chance Asher
Gray & Osborne, Inc.: Jim Dougherty

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ **Telephone Conversation**	**Location of Phone Conversation:** GRAY & OSBORNE INC.
☐ **Meeting**	**Place of Meeting:**

Date:	6-14-06	**Time:**	0715 a.m.	p.m.
Discussion with:	Pat Klavas			
Firm/City with:	WDFW in Olympia			
Phone Number:	360 902-2606			
Gray & Osborne Personnel:	Jim Dougherty			
Project:	Ridgefield WWTP Outfall Extension			
Subject:	Outfall design for fish exclusion			
G&O Job Number:	05616			

REMARKS:

Pat Klavas called to say that he had reviewed the emails and faxes I sent over with discussion of the latest flow numbers and the cross-section of the pipe as it is proposed. He thinks that we are probably close enough, as the pipe is pretty steep and the current Max Month Flow at 1.8 feet per second is pretty close to the 2 fps target. He was fairly comfortable about it because the Max Hour Flow is high enough to blow any fish in the pipe back out. He was thinking that the reducer wouldn't be necessary, as the higher flows would attract adult salmon to the pipe…Go figure. He said that he would discuss this with Sam Cole, who will likely be the Biologist buying off on the design, as Ann Friesz will be out for the next couple of weeks. He said he would try to get back to us today.

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ **Telephone Conversation**

☐ **Meeting**

Location of Phone Conversation: GRAY & OSBORNE INC.	
Place of Meeting:	

Date:	6-5-06	**Time:**	a.m.	1215 p.m.
Discussion with:	Ann Friesz			
Firm/City with:	WDFW Vancouver			
Phone Number:	360 906-6764			
Gray & Osborne Personnel:	Jim Dougherty			
Project:	Ridgefield WWTP Outfall Extension to Lake River			
Subject:	Screening requirements, discussions re HPA conditions			
G&O Job Number:	05616			

REMARKS:

Ann called to say that she has circulated the Tideflex Valve information around the office, but that everyone she's spoken with there has been holding out for a screen of some sort. Odd, since nobody complained about the Camas outfall modifications, which will include a bunch of Tideflex valves. I asked her to fax me some screen designs WDFW would be happy with, so I can discuss them with the Engineers. She said that she would try to send me something this afternoon.

I asked about the requirement for armoring near the outfall to protect the bank, given the fact that the outfall won't be anywhere near the bank. Ann said we could ignore that condition on the HPA, as I suspect it may be a leftover from the original HPA for the existing shoreline outfall.

Jim Dougherty

From: Brown, Sharon R. (ECY) [sbro461@ECY.WA.GOV]
Sent: Tuesday, May 30, 2006 11:20 AM
To: Jim Dougherty, P.E.
Subject: FW: Ridgefield WWTP - Sediments (Freshwater)

Per our phone conversation, I am forwarding an August 2005 email that details what I know about sediments at the subject facility.

Also, please add TCP/Aquatic Lands Cleanup Unit to the Joint Aquatic Resource Permit Application (JARPA) Cc list so that we may have the specific detailed information for our files.

Thanks! — SRB

Sharon R. Brown
Environmental Engineer
sbro461@ecy.wa.gov
360.407.6919 (desk)
360.407.7154 (fax)

Department of Ecology
TCP\Aquatic Lands Cleanup Unit
PO Box 47600, Olympia, WA 98504-7600

From: **Brown, Sharon R. (ECY)**
Sent: **Friday, August 19, 2005 3:26 PM**
To: Knight, David J. (SWRO)
Cc: 'Jim Dougherty, P.E.'; Alexanian, Dan (ECY)
Subject: Ridgefield WWTP - Sediments (Freshwater)

David: I was led to this facility by a consultant inquiry [Jim Dougherty, P.E., Gray & Osborne, Inc., 206.284.0860, jdougherty@g-o.com]. Jim wanted to know what the sediment sampling requirements would be with the removal of the existing outfall from Lake River and the extension of a new outfall to the Columbia River. The following details what I learned from you, my response to Jim, and my findings regarding Lake River in the vicinity of the subject facility.

Existing Outfall - Lake River

Sediment Quality in the vicinity of the existing outfall will need to be evaluated to confirm that there are no sediment quality exceedances. A sediment sampling and analysis plan (SAP) detailing the proposed sampling effort must be submitted to Ecology [SWRO-WQP NPDES Permit Manager and TCP\Sediment Management Unit (SMU)] for approval by SMU prior to undertaking such an event. Given that the existing outfall is just off the river bank, sampling will occur along the shoreline as well as where the Lake River extension resides. The sampling analysis findings are then documented in a Data Report for submittal to Ecology and SMU approval. Electronic SEDQUAL (Sediment Quality Information System) templates shall be submitted to Ecology simultaneously with the hardcopy report.

Per the NPDES Permit Manager and consultant, Ecology has required a near term temporary fix to extend the outfall 110 feet into the Lake River for the next 3-4 years of operation.

New Outfall - Columbia River (in 5-6 years)

Sediment Quality in the new outfall vicinity should be evaluated before the outfall is built. The purpose of this sampling is to obtain a baseline for sediment quality in this area. The same SAP, Data Report, and SEDQUAL submittal and approval procedures apply.

Dredging

Per the NPDES Permit Manager and consultant, dredging will likely need to occur in order to extend the outfall to the Columbia River. The consultant stated that the north fork of the Lake and Columbia Rivers is the likely outfall relocation point. The following generally details what needs to be done given a dredging scenario.

- Before any dredging begins, preliminary sediment sampling should be performed in the proposed dredging area to ensure that it is not contaminated.

- If sediment contamination is found, then the project may go:
    - to the SWRO-TCP as a MTCA (Model Toxics Control Act) cleanup site; or
    - to the ACOE as a dredged / cleanup site in coordination w/ Ecology.

- If sediment contamination is not found, a Joint Aquatic Resource Permit Application (JARPA) should be filled out. A completed application is sent to (at least) the following agencies:
    - State: Ecology, Department of Natural Resources, WA Fish & Wildlife;
    - County: Shoreland Program;
    - Federal: ACOE, US EPA, US Fish & Wildlife Service, NOAA / NMFS; and
    - Tribes.

- Permits are required from each of the above agencies, but the ACOE is the main contact. The ACOE:
    - contacts Ecology's 401 program for a water quality certification; and
    - writes the dredging requirements (where to dredge, dredging depth, where to dispose of dredge material, etc.).

Potential Impediments to Outfall Move

Ridgefield National Wildlife Refuge

The purchase of and transformation of this former potato farm has limited the city of Ridgefield's access to the Columbia River.

Cleanup Site(s)

Known - Pacific Wood Treating (PWT) Corporation (SWRO-TCP Site Manager, Dan Alexanian)

Per the Permit Manager, I was informed of this site and located it in Ecology's Integrated Site Information System (ISIS). It appears in the vicinity of the WWTP, but due to contradicting geographical information (permit vs Ecology's Facility Site) I am not sure if it is north or south of the WWTP (Ref: Vicinity Map below).

Dan - In going through ISIS, I see that groundwater and soil are confirmed to have been effected by PWT activities with suspected surface water contamination. Has PWT's activities influence on sediment quality been investigated? I added sediment to ISIS as being suspected of having contamination for the same contaminants as soil.

Potential - Ridgefield National Wildlife Refuge
Per the Permit Manager, an inspection found that the refuge was pumping fowl waste into Lake River. A meeting with a federal representative *promised* that the practice would be stopped, but there has not been a follow-up inspection. This is a potential source of fecal coliform (fowl waste) and agricultural runoff (crops being planted to attract birds).

Interagency Cooperation

The best management practices for piping water to the Columbia River that have the least impact to the environment (water, sediment, wildlife) should take precedence over power struggles between local, state, and federal agencies. For example, maybe the city can work with / provide funds to the refuge for habitat enhancement in exchange for access to the Columbia River.

2004 Candidate 303(d) List - Lake River

Sediment
None due to the age of available data (i.e., 1986 is outside the evaluation criteria of 1991-2001).

Category 5 - Water
Listings 40869 (Temperature) and 40870 (Fecal Coliform) in the vicinity of the WWTP. <— ??? Refuge and/or WWTP.

Category 4C - Water
Listing 4858 (invasive exotic species) at the north junction of Columbia River and Lake River; just NW of the city of Ridgefield.

Overview and Vicinity Maps

The attached file contains figures of the city of Ridgefield WWTP outfall and Pacific Wood Treating Corporation site locations. SEDQUAL station locations are also shown on the figures.

Outfall / Site Locations

- Ridgefield WWTP for both the NPDES permit and Ecology's Facility / Site Identification System show the outfall location as being on land at different locations. Please correct this discrepancy.
  - SMU needs to know the in-water outfall / diffuser location.
- Pacific Wood Treating Corporation site location per Ecology's Facility / Site is also on land. Is there a point where PWT contaminants could enter Lake River?

SEDQUAL
The three stations in Lake River were sampled in 1986, thus sediment quality is unknown along this stretch of river. SMU uses data no older than 10 years to evaluated sediment conditions.

<<AV Graphics.doc>>

Freshwater Sediment

Freshwater sediment quality values have been developed by the Washington State Department of Ecology, but have not been adopted into rule. These values may be found in our publication, *Development of Freshwater Sediment Quality Values in Washington State, Phase II Report: Development and Recommendation of SQVs for Freshwater Sediments in Washington State*, September 2003, Publication No. 03-09-088 (www.ecy.wa.gov/biblio/0309088.html). However, there are currently no promulgated / legal numeric sediment quality standards for chemical effects in freshwater sediments. Assessment based on biological tests is recommended on a case-by-case, site-specific basis in accordance with adopted narrative standards in the *Sediment Management Standards*, Chapter 173-204 WAC (www.ecy.wa.gov/biblio/wac173204.html).

Sediment References

Sediment Management Standards, Chapter 173-204 WAC, amended December 1995, http://www.ecy.wa.gov/biblio/wac173204.html

Sediment Sampling and Analysis Plan Appendix, revised April 2003, http://www.ecy.wa.gov/biblio/0309043.html

SEDQUAL: http://www.ecy.wa.gov/programs/tcp/smu/sedqualfirst.htm)

Electronic SEDQUAL template data must be verified to be compatible with the current version of SEDQUAL which uses ASCII protocol, comma delimited text files prior to delivery to Ecology. Verification shall be conducted by the consultant importing each of the data templates into their SEDQUAL database, correcting any errors, and then exporting the corrected final templates for delivery to Ecology.

Refer to Sections 7-11 for further detail: http://www.ecy.wa.gov/programs/tcp/policies/policy%20840.pdf.

Sharon R. Brown

Environmental Engineer

360.407.6919 (desk)
360.407.7154 (fax)
Department of Ecology
TCP/Sediment Management Unit (SMU)

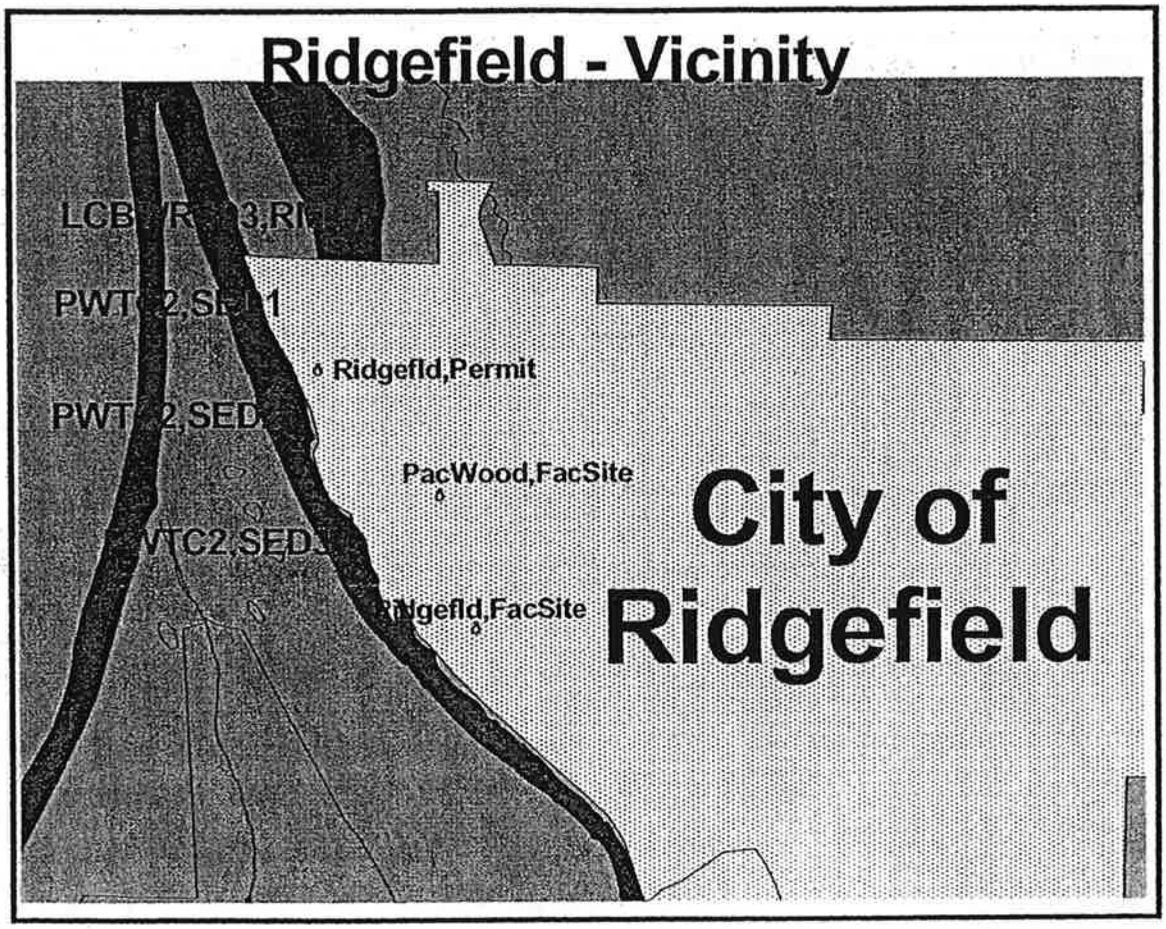
8/22: DA voice msgS/JD

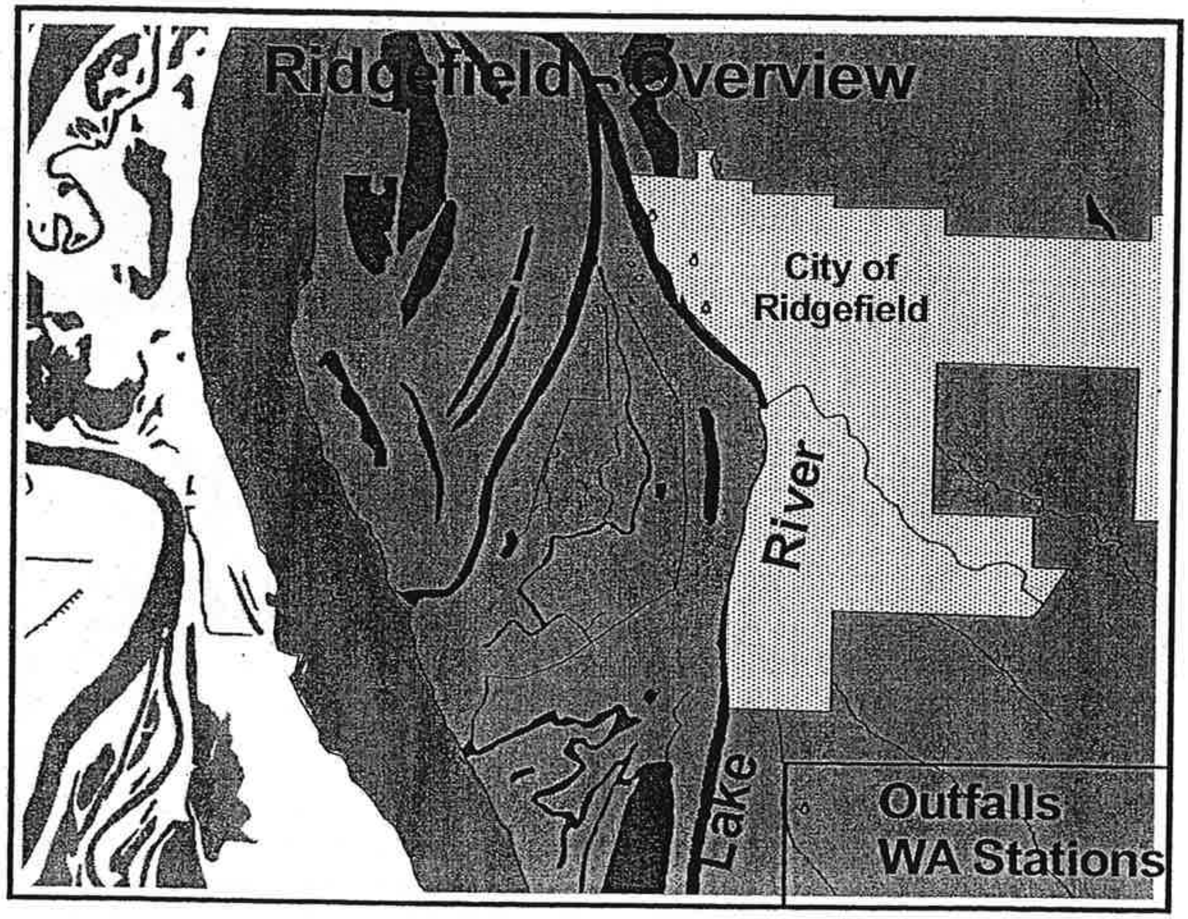
==

From: Knight, David J. (SWRO)
Sent: Friday, August 19, 2005 4:28 PM
To: Brown, Sharon R. (ECY)
Subject: RE: Ridgefield WWTP - Sediments (Freshwater)

Good summary of the situation Sharon. I'll do my best to fulfill the needs of the sediment unit.

Yours, Dave Knight.


Ridgefield - Vicinity
Ridgefld,Permit
PacWood,FacSite
City of
Ridgefield


Ridgefield - Overview
City of Ridgefield
Lake River
Outfalls
WA Stations

Jim Dougherty

From: Eric Nutting [enutting@g-o.com]
Sent: Thursday, June 15, 2006 10:58 AM
To: jdougherty@g-o.com
Cc: John Wilson;mike johnson
Subject: Ridgefield: Approval of proposed design for the Ridgefield WWTP Outfall Extension to comply with the fish exclus

Jim,
With the 8x10 reducer at the end of the outfall, the velocity at 0.5 MGD is **2.9 feet/sec**.

Eric Nutting, P.E.
Gray & Osborne, Inc.
701 Dexter Ave N. Suite 200
Seattle WA, 98109

Ph(206)284-0860
Fx(206)283-3206

Jim Dougherty wrote:

-----Original Message-----
From: Sam Kolb [mailto:KOLBSSK@DFW.WA.GOV]
Sent: Thursday, June 15, 2006 10:45 AM
To: jdougherty@g-o.com
Cc: Anne Friesz;Tim Rymer
Subject: Re: Approval of proposed design for the Ridgefield WWTP Outfall Extension to comply with the fish exclus

I thought we discussed higher velocities once the reducer was added, but given

Thanks.

"Jim Dougherty" <jdougherty@g-o.com> 06/15/2006 10:20 AM >>>

Hi Sam!

John Wilson, Director of the Gray & Osborne Wastewater Group, requested that I

1. The proposed 10-inch HDPE outfall pipeline would extend approximately 1
2. Hand excavation of the first ten feet of the existing 10-inch outfall p
3. Attachment (clamping) of a new 110 foot long, 10-inch HDPE Outfall Pipe

4. Clamping of ten 10-inch concrete collars at 10-foot intervals to the HD
5. Towing of the pipe offshore in a westerly direction and dropping it int
6. Vibration of the upper 10 to 20 feet of the pipe into the sediments usi
7. Removal of the pipe would involve hand excavation of the upper end and

Please provide me with a letter (or email) approving this design for our record

Thanks,

Jim Dougherty
Gray & Osborne, Inc.
701 Dexter Ave N. Suite 200
Seattle WA, 98109

Ph(206)284-0860
Fx(206)283-3206

Electronic File Transfer-

Note that these electronic files are provided as a courtesy only. Gray & Osbor

Jim Dougherty

From: Sam Kolb [KOLBSSK@DFW.WA.GOV]
Sent: Thursday, June 15, 2006 10:45 AM
To: jdougherty@g-o.com
Cc: Anne Friesz;Tim Rymer
Subject: Re: Approval of proposed design for the Ridgefield WWTP Outfall Extension to comply with the fish exclus

I thought we discussed higher velocities once the reducer was added, but given the fact it's a temporary outfall we can live with that. A permament outfall to the Columbia will require more stringent fish exclusion measures.

Thanks.

>>> "Jim Dougherty" <jdougherty@g-o.com> 06/15/2006 10:20 AM >>>
Hi Sam!

John Wilson, Director of the Gray & Osborne Wastewater Group, requested that I provide you with a letter detailing our proposed design for the City of Ridgefield's proposed temporary WWTP outfall extension into Lake River for your formal approval. The proposed outfall design would include:

1. The proposed 10-inch HDPE outfall pipeline would extend approximately 100 feet west into Lake River. It would be fitted with a 10-inch to 8-inch reducer at the downstream end to provide adequate flow velocity to exclude fish under most conditions, which include; current Max Month flows of 0.5 MGD (1.8 feet/second), design flows of 0.7 MGD and Max Day Flows of 1.5 MGD. Overall outfall slope averages 12%;
2. Hand excavation of the first ten feet of the existing 10-inch outfall pipe above the +8 tide elevation (and removal of this weathered 10-foot section of pipe);
3. Attachment (clamping) of a new 110 foot long, 10-inch HDPE Outfall Pipe to the existing pipe;
4. Clamping of ten 10-inch concrete collars at 10-foot intervals to the HDPE pipe to provide negative buoyancy;
5. Towing of the pipe offshore in a westerly direction and dropping it into place to lie on the bottom of Lake River;
6. Vibration of the upper 10 to 20 feet of the pipe into the sediments using a pneumatic or hydraulic vibratory head;
7. Removal of the pipe would involve hand excavation of the upper end and pulling it onshore using a tractor. The pipe will be removed from the riaparian area and will likely be reused in the Ridgefield sewer collection system.

Please provide me with a letter (or email) approving this design for our records.

Thanks,

Jim Dougherty
Gray & Osborne, Inc.
701 Dexter Ave N. Suite 200
Seattle WA, 98109

Ph(206)284-0860
Fx(206)283-3206

the approved or certified hard copy drawings or reports for the most current information available.

Jim Dougherty

From: MikeJohnson [mjohnson@g-o.com]
Sent: Monday, June 12, 2006 11:48 AM
To: jwilson@g-o.com;jdougherty@g-o.com;enutting@g-o.com;fchung@g-o.com
Subject: FW: City of Ridgefield Outfall

Does the outfall show a tideflex on the end at this time? If not does it need one by addendum based on the comments below?

Mike

-----Original Message-----
From: Anne Friesz [mailto:friesarf@DFW.WA.GOV]
Sent: Thursday, June 08, 2006 2:20 PM
To: Pat Klavas; mjohnson@g-o.com
Subject: Re: City of Ridgefield Outfall

Mike,
Thanks for getting back to me. Here are Pat's comments and questions on the outfall/fish screen.
****
Hi Anne:

I got the fax and I have a few questions and comments.

1). Is the outfall above OHW? I couldn't tell where the receiving water elevation is with respect to this gate.

2). How often will this pipe be discharging? Continuous? Hourly? Daily? And at what rate or volume?

3). How steep is the pipe? How long is the pipe?

4). This gate is a 1-dimensional flow restrictor, not a design for fish exclusion. This does not meet NOAA-NMFS criteria for fish exclusion (see file I sent yesterday).

5). This gate may be a velocity or depth barrier to some fish some of the time, but not all fish in all conditions. (low flow vs.high flow, or low stage vs.high stage) Stage-Discharge needs to be evaluated

6). Debris or current in receiving water may impact and/or deform this gate causing it to leak and allow fish access into pipe.

7). TideFlex website indicates that gate can not remain closed to a specific flow and then open entirely. (It may be open partially allowing fish to access into the pipe, see comment #3, & #4)

If this structure is high on the bank, it may be OK, but if it is submerged, I can see fish gaining access into the pipe. If this pipe is steep and long, it may be a barrier in it's own right, but should be evaluated as such, if this is the case.

I hope this helps...let me know.

- PK -
****
I am going to "cc" Pat so both of you can communicate. I know Jim wanted to get the spec's done asap, and I'm out of the office all next week. Thanks!
Anne

Anne Friesz
Area Habitat Biologist
Washington State Department of Fish and Wildlife

office: (360) - 906-6764
cell: (360) 600-1407
fax: (360) 906-6776
friesarf@dfw.wa.gov

>>> "MikeJohnson" <mjohnson@g-o.com> 06/08/06 2:15 PM >>>
Anne,

Please forward the information about the City of Ridgefield outfall issue to this email address.

Thanks,

Mike

Mike Johnson, P.E.
Gray & Osborne, Inc.
Olympia Office

Ph(360)754-4266
Fx(360)754-2135

Electronic File Transfer-

Note that these electronic files are provided as a courtesy only. Gray & Osborne, Inc. in no way guarantees the accuracy or completeness of the digital data contained within these files. Furthermore, Gray & Osborne, Inc. assumes no liability for any errors or omissions in the digital data herein. Anyone using the information contained herein should consult the approved or certified hard copy drawings or reports for the most current information available.

Jim Dougherty

From: John Wilson [jwilson@g-o.com]
Sent: Monday, June 12, 2006 11:13 AM
To: mjohnson@g-o.com;jdougherty@g-o.com
Cc: Eric Nutting;fchung@g-o.com
Subject: RE: Corps permit status for Ridgefield Outfall Extension

Mike/Jim:

If we don't have authorization by August 1, then the Contractor could be delayed. It sounds as if we should change the allowable outfall construction window to the month of September, by addendum. I will have Eric Nutting and Frank Chung put this item on the list of items for Addendum No. 2, which will need to be issued tomorrow (Tuesday).

Eric and Frank: Do we have other addendum items?

John

John P. Wilson, P.E.
Gray & Osborne, Inc.
701 Dexter Ave N. Suite 200
Seattle WA, 98109

Ph(206)284-0860
Fx(206)283-3206

-----Original Message-----
From: MikeJohnson [mailto:mjohnson@g-o.com]
Sent: Monday, June 12, 2006 10:07 AM
To: jdougherty@g-o.com
Cc: jwilson@g-o.com
Subject: RE: Corps permit status for Ridgefield Outfall Extension

Jim,

What does this mean for timing of the outfall? John, do we need an addendum to narrow the window of construction of the outfall to maybe just September?

Mike

Mike Johnson, P.E.
Gray & Osborne, Inc.
Olympia Office

Ph(360)754-4266
Fx(360)754-2135

files. Furthermore, Gray & Osborne, Inc. assumes no liability for any errors or omissions in the digital data herein. Anyone using the information contained herein should consult the approved or certified hard copy drawings or reports for the most current information available.

-----Original Message-----
From: Jim Dougherty [mailto:jdougherty@g-o.com]
Sent: Monday, June 12, 2006 9:24 AM
To: mjohnson@g-o.com
Cc: jwilson@g-o.com
Subject: Corps permit status for Ridgefield Outfall Extension

Hi Mike!

I spoke with Ron Klump at the Corps this morning regarding the Ridgefield WWTP Outfall Extension Project. He said that he is drafting the letter to the agencies requesting concurrence with the findings of the Informal ESA Consultation, and he is hoping that they will turn the concurrence letter around quickly. I let him know that Ecology is reviewing the permit application and that they may require some sediment monitoring, and that WDFW is reviewing outfall screening issues/requirements.

Jim Dougherty
Gray & Osborne, Inc.
701 Dexter Ave N. Suite 200
Seattle WA, 98109

Ph(206)284-0860
Fx(206)283-3206

Electronic File Transfer-

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Jim Dougherty

From: MikeJohnson [mjohnson@g-o.com]
Sent: Friday, June 09, 2006 12:55 PM
To: jwilson@g-o.com
Cc: jdougherty@g-o.com
Subject: FW: City of Ridgefield Outfall

John,

Let's discuss how to deal with these comments.

Mike

-----Original Message-----
From: Anne Friesz [mailto:friesarf@DFW.WA.GOV]
Sent: Thursday, June 08, 2006 2:20 PM
To: Pat Klavas; mjohnson@g-o.com
Subject: Re: City of Ridgefield Outfall

Mike,
Thanks for getting back to me. Here are Pat's comments and questions on the outfall/fish screen.
****
Hi Anne:

I got the fax and I have a few questions and comments.

1). Is the outfall above OHW? I couldn't tell where the receiving water elevation is with respect to this gate.

2). How often will this pipe be discharging? Continuous? Hourly? Daily? And at what rate or volume?

3). How steep is the pipe? How long is the pipe?

4). This gate is a 1-dimensional flow restrictor, not a design for fish exclusion. This does not meet NOAA-NMFS criteria for fish exclusion (see file I sent yesterday).

5). This gate may be a velocity or depth barrier to some fish some of the time, but not all fish in all conditions. (low flow vs.high flow, or low stage vs.high stage) Stage-Discharge needs to be evaluated

6). Debris or current in receiving water may impact and/or deform this gate causing it to leak and allow fish access into pipe.

7). TideFlex website indicates that gate can not remain closed to a specific flow and then open entirely. (It may be open partially allowing fish to access into the pipe, see comment #3, & #4)

If this structure is high on the bank, it may be OK, but if it is submerged, I can see fish gaining access into the pipe. If this pipe is steep and long, it may be a barrier in it's own right, but should be evaluated as such, if this is the case.

I hope this helps...let me know.

- PK -
****
I am going to "cc" Pat so both of you can communicate. I know Jim wanted to get the spec's done asap, and I'm out of the office all next week. Thanks!
Anne

Anne Friesz
Area Habitat Biologist
Washington State Department of Fish and Wildlife
office: (360) - 906-6764
cell: (360) 600-1407
fax: (360) 906-6776
friesarf@dfw.wa.gov

>>> "MikeJohnson" <mjohnson@g-o.com> 06/08/06 2:15 PM >>>
Anne,

Please forward the information about the City of Ridgefield outfall issue to this email address.

Thanks,

Mike

Mike Johnson, P.E.
Gray & Osborne, Inc.
Olympia Office

Ph(360)754-4266
Fx(360)754-2135

Electronic File Transfer-

Jim Dougherty

From: Brown, Sharon R. (ECY) [sbro461@ECY.WA.GOV]
Sent: Thursday, June 08, 2006 3:16 PM
To: Jim Dougherty
Cc: Adolphson, Peter (ECY)
Subject: FW: Ridgefield WWTP - Sediments (Freshwater)

Sorry I've been out of the office. Yes, I received your package. I will review and discuss with Pete in the next several weeks.

Any sediment data that David Templeton at Anchor Environmental may have needs to be submitted to Ecology in SEDQUAL template format for us to analyze the data. Anchor should be aware of this requirement. -- SRB

SEDQUAL URL: http://www.ecy.wa.gov/programs/tcp/smu/sedqualfirst.htm.

From: Jim Dougherty [mailto:jdougherty@g-o.com]
Sent: Monday, June 05, 2006 8:27 AM
To: Brown, Sharon R. (ECY)
Subject: RE: Ridgefield WWTP - Sediments (Freshwater)

Hi Sharon!

I sent the JARPA, BA and associated drawings for the City of Ridgefield's WWTP Outfall Extension Project into Lake River to you last week. Have you received it? Let me know if you don't get it in the mail in the next day or two.

Thanks,

Jim Dougherty

From: Jim Dougherty [mailto:jdougherty@g-o.com]
Sent: Wednesday, May 31, 2006 4:08 PM
To: Brown, Sharon R. (ECY)
Cc: mjohnson@g-o.com; jwilson@g-o.com; enutting@g-o.com
Subject: RE: Ridgefield WWTP - Sediments (Freshwater)
Hi Sharon!

I sent a hard copy of the JARPA form for the Ridgefield WWTF Upgrade and Outfall Extension into Lake River to you this morning.

I spoke with Mr. Adolphson this afternoon and he said that he would **review this information with you and determine what sediment and chemical sampling will be required.** The **NPDES Permit Number for the facility is WA-002327-2**. Mr. Adolphson had a **question about whether the outfall had always been in it present location in the high intertidal.**

The **1997 Facilities Plan indicates that the outfall was in this location** at that time.

I have spoken with **David Templeton at Anchor Environmental about sediment sampling** in the area. He said that there **has been some sampling and testing done in the vicinity of the outfall within the past 2 to 3 years**, and that he **would try to get a copy of it**. Apparently, he is **in the process of developing a sediment sampling plan for the Port of Ridgefield regarding the contamination associated with the wood products operation that operated there in years past.**

More later.

Jim Dougherty

-----Original Message-----
From: Brown, Sharon R. (ECY) [mailto:sbro461@ECY.WA.GOV]
Sent: Tuesday, May 30, 2006 11:20 AM
To: Jim Dougherty, P.E.
Subject: FW: Ridgefield WWTP - Sediments (Freshwater)

Per our phone conversation, I am **forwarding an August 2005 email that details what I know about sediments at the subject facility**.

Also, please add TCP/Aquatic Lands Cleanup Unit to the Joint Aquatic Resource Permit Application (JARPA) Cc list so that we may have the specific detailed information for our files.

Thanks! -- SRB

Sharon R. Brown
Environmental Engineer
sbro461@ecy.wa.gov
360.407.6919 (desk)
360.407.7154 (fax)

Department of Ecology
TCP\Aquatic Lands Cleanup Unit
PO Box 47600, Olympia, WA 98504-7600

From: Brown, Sharon R. (ECY)
Sent: Friday, August 19, 2005 3:26 PM
To: Knight, David J. (SWRO)
Cc: 'Jim Dougherty, P.E.'; Alexanian, Dan (ECY)
Subject: Ridgefield WWTP - Sediments (Freshwater)

David: I was led to this facility by a consultant inquiry [Jim Dougherty, P.E., Gray & Osborne, Inc., 206.284.0860, jdougherty@g-o.com]. Jim wanted to know what the sediment sampling requirements would be with the removal of the existing outfall from Lake River and the extension of a new outfall to the Columbia River. The following details what I learned from you, my response to Jim, and my findings regarding Lake River in the vicinity of the subject facility.

Existing Outfall - Lake River

Sediment Quality in the vicinity of the existing outfall will need to be evaluated to confirm that there are no sediment quality exceedances. A sediment sampling and analysis plan (SAP) detailing the proposed sampling effort must be submitted to Ecology [SWRO-WQP NPDES Permit Manager and TCP\Sediment Management Unit (SMU)] for approval by SMU prior to undertaking such an event. Given that the existing outfall is just off the river bank, sampling will occur along the shoreline as well as where the Lake River extension resides. The sampling analysis findings are then documented in a Data Report for submittal to Ecology and SMU approval. Electronic SEDQUAL (Sediment Quality Information System) templates shall be submitted to Ecology simultaneously with the hardcopy report.

Per the NPDES Permit Manager and consultant, Ecology has required a near term temporary fix to extend the outfall 110 feet into the Lake River for the next 3-4 years of operation.

New Outfall - Columbia River (in 5-6 years)

Sediment Quality in the new outfall vicinity should be evaluated before the outfall is built. The purpose of this sampling is to obtain a baseline for sediment quality in this area. The same SAP, Data Report, and SEDQUAL submittal and approval procedures apply.

Dredging

Per the NPDES Permit Manager and consultant, dredging will likely need to occur in order to extend the outfall to the Columbia River. The consultant stated that the north fork of the Lake and Columbia Rivers is the likely outfall relocation point. The following generally details what needs to be done given a dredging scenario.

- Before any dredging begins, preliminary sediment sampling should be performed in the proposed dredging area to ensure that it is not contaminated.

- If sediment contamination is found, then the project may go:
  - to the SWRO-TCP as a MTCA (Model Toxics Control Act) cleanup site; or
  - to the ACOE as a dredged / cleanup site in coordination w/ Ecology.

- If sediment contamination is not found, a Joint Aquatic Resource Permit Application (JARPA) should be filled out. A completed application is sent to (at least) the following agencies:
  - State: Ecology, Department of Natural Resources, WA Fish & Wildlife;
  - County: Shoreland Program;
  - Federal: ACOE, US EPA, US Fish & Wildlife Service, NOAA / NMFS; and
  - Tribes.

- Permits are required from each of the above agencies, but the ACOE is the main contact. The ACOE:
  - contacts Ecology's 401 program for a water quality certification; and
  - writes the dredging requirements (where to dredge, dredging depth, where to dispose of dredge material, etc.).

Potential Impediments to Outfall Move

Ridgefield National Wildlife Refuge

The purchase of and transformation of this former potato farm has limited the city of Ridgefield's access to the Columbia River.

Cleanup Site(s)

Known - Pacific Wood Treating (PWT) Corporation (SWRO-TCP Site Manager, Dan Alexanian)

Per the Permit Manager, I was informed of this site and located it in Ecology's Integrated Site Information System (ISIS). It appears in the vicinity of the WWTP, but due to contradicting geographical information (permit vs Ecology's Facility Site) I am not sure if it is north or south of the WWTP (Ref: Vicinity Map below).

Dan - In going through ISIS, I see that groundwater and soil are confirmed to have been effected by PWT activities with suspected surface water contamination. Has PWT's activities influence on sediment quality been investigated? I added sediment to ISIS as being suspected of having contamination for the same contaminants as soil.

Potential - Ridgefield National Wildlife Refuge

Per the Permit Manager, an inspection found that the refuge was pumping fowl waste into Lake River. A meeting with a federal representative *promised* that the practice would be stopped, but there has not been a follow-up inspection. This is a potential source of fecal coliform (fowl waste) and agricultural runoff (crops being planted to attract birds).

Interagency Cooperation

The best management practices for piping water to the Columbia River that have the least impact to the environment (water, sediment, wildlife) should take precedence over power struggles between local, state, and federal agencies. For example, maybe the city can work with / provide funds to the refuge for habitat enhancement in exchange for access to the Columbia River.

2004 Candidate 303(d) List - Lake River

Sediment

None due to the age of available data (i.e., 1986 is outside the evaluation criteria of 1991-2001).

Category 5 - Water

Listings 40869 (Temperature) and 40870 (Fecal Coliform) in the vicinity of the WWTP. <— ???Refuge and/or WWTP.

Category 4C - Water

Listing 4858 (invasive exotic species) at the north junction of Columbia River and Lake River; just NW of the city of Ridgefield.

Overview and Vicinity Maps

The attached file contains figures of the city of Ridgefield WWTP outfall and Pacific Wood Treating Corporation site locations. SEDQUAL station locations are also shown on the figures.

Outfall / Site Locations

- Ridgefield WWTP for both the NPDES permit and Ecology's Facility / Site Identification System show the outfall location as being on land at different locations. Please correct this discrepancy.
  - SMU needs to know the in-water outfall / diffuser location.
- Pacific Wood Treating Corporation site location per Ecology's Facility / Site is also on land. Is there a point where PWT contaminants could enter Lake River?

SEDQUAL

The three stations in Lake River were sampled in 1986, thus sediment quality is unknown along this stretch of river. SMU uses data no older than 10 years to evaluated sediment conditions.

<<AV Graphics.doc>>

Freshwater Sediment

Freshwater sediment quality values have been developed by the Washington State Department of Ecology, but have not been adopted into rule. These values may be found in our publication, *Development of Freshwater Sediment Quality Values in Washington State, Phase II Report: Development and Recommendation of SQVs for Freshwater Sediments in Washington State*, September 2003, Publication No. 03-09-088 (www.ecy.wa.gov/biblio/0309088.html). However, there are currently no promulgated / legal numeric sediment quality standards for chemical effects in freshwater sediments. Assessment based on biological tests is recommended on a case-by-case, site-specific basis in accordance with adopted narrative standards in the *Sediment Management Standards*, Chapter 173-204 WAC (www.ecy.wa.gov/biblio/wac173204.html).

Sediment References

Sediment Management Standards, Chapter 173-204 WAC, amended December 1995, http://www.ecy.wa.gov/biblio/wac173204.html

Sediment Sampling and Analysis Plan Appendix, revised April 2003, http://www.ecy.wa.gov/biblio/0309043.html

SEDQUAL: http://www.ecy.wa.gov/programs/tcp/smu/sedqualfirst.htm)

Electronic SEDQUAL template data must be verified to be compatible with the current version of SEDQUAL which uses ASCII protocol, comma delimited text files prior to delivery to Ecology. Verification shall be conducted by the consultant importing each of the data templates into their SEDQUAL database, correcting any errors, and then exporting the corrected final templates for delivery to Ecology.

Refer to Sections 7-11 for further detail: http://www.ecy.wa.gov/programs/tcp/policies/policy%20840.pdf.

Sharon R. Brown

Environmental Engineer

360.407.6919 (desk)
360.407.7154 (fax)
Department of Ecology
TCP/Sediment Management Unit (SMU)

8/22: DA voice msgS/JD

==

From: Knight, David J. (SWRO)
Sent: Friday, August 19, 2005 4:28 PM
To: Brown, Sharon R. (ECY)
Subject: RE: Ridgefield WWTP - Sediments (Freshwater)

Good summary of the situation Sharon. I'll do my best to fulfill the needs of the sediment unit.

Yours, Dave Knight.

Jim Dougherty

From: Jim Dougherty [jdougherty@g-o.com]
Sent: Wednesday, June 14, 2006 8:27 AM
To: 'enutting@g-o.com'
Cc: 'mjohnson@g-o.com';'jwilson@g-o.com'
Subject: Ridgefield WWTP Outfall Extension design approval from WDFW

Eric

I spoke with Pat Klavas this morning and discussed your new flow estimates and the cross section of the pipe that I sent him yesterday. He thought that the pipe was steep enough to exclude most fish, and that those that managed to get up the pipe would be blown back out by higher flows. He discussed the design and the potential for using the 10-inch to 8-inch reducer with Sam Cole, the Fisheries Biologist and Sam agreed to the design with the reducer.

Jim Dougherty
Gray & Osborne, Inc.
701 Dexter Ave N. Suite 200
Seattle WA, 98109

Ph(206)284-0860
Fx(206)283-3206

Jim Dougherty

To: Sam Kolman
Cc: jwilson@g-o.com
Subject: Approval of proposed design for the Ridgefield WWTP Outfall Extension to comply with the fish exclusion requirement of the Hydraulic Project Approval

Hi Sam!

John Wilson, Director of the Gray & Osborne Wastewater Group, requested that I provide you with a letter detailing our proposed design for the City of Ridgefield's proposed temporary WWTP outfall extension into Lake River for your formal approval. The proposed design would include:

1. The proposed 10-inch HDPE outfall pipeline would extend approximately 100 feet west into Lake River. It would be fitted with a 10-inch to 8-inch reducer at the downstream end to provide adequate flow velocity to exclude fish under most conditions, which include; current Max Month flows of 0.5 MGD (1.8 feet/second), design flows of 0.7 MGD and Max Day Flows of 1.5 MGD);
2. Hand excavation of the first ten feet of the existing 10-inch outfall pipe above the +8 tide elevation (and removal of this weathered 10-foot section of pipe);
3. Attachment (clamping) of a new 110 foot long, 10-inch HDPE Outfall Pipe to the existing pipe;
4. Clamping of ten 10-inch concrete collars to the HDPE pipe to provide negative buoyancy;
5. Towing of the pipe offshore in a westerly direction and dropping it into place to lie on the bottom of Lake River;
6. Vibration of the upper 10 to 20 feet of the pipe into the sediments using a pneumatic or hydraulic vibratory head;
7. Removal of the pipe would involve hand excavation of the upper end and pulling it onshore using a tractor. The pipe will be removed from the riaparian area and likely will be reused in the Ridgefield sewer collection system.

Please provide me with a letter (or email) approving this design for our records.

Thanks,

Jim Dougherty
Gray & Osborne, Inc.
701 Dexter Ave N. Suite 200
Seattle WA, 98109

Ph(206)284-0860
Fx(206)283-3206

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ **Telephone Conversation**

☐ **Meeting**

Location of Phone Conversation: GRAY & OSBORNE INC.	
Place of Meeting:	

Date:	June 12, 2006	Time:	0900 a.m.	p.m.
Discussion with:	Ron Klump			
Firm/City with:	US Army Corps of Engineers, Vancouver			
Phone Number:	360 902-8522			
Gray & Osborne Personnel:	Jim Dougherty			
Project:	Ridgefield WWTP Outfall Extension			
Subject:	Status of Permit Application			
G&O Job Number:	05616			

REMARKS:

Ron returned my call this morning to discuss the status of the Ridgefield WWTP Outfall Extension application for a Rivers & Harbors Act Section 10 Permit. Ron said that he is drafting the letter to US Fish & Wildlife Service and NOAA Fisheries requesting concurrence with the findings of the Informal ESA Consultation/Biological Assessment. He is hoping that they will turn the concurrence letter around quickly, as this is not a large project and the potential for adverse impacts to listed species is low.

I told him that Ecology and WDFW are looking at screening issues and that Ecology may require some sediment monitoring/analysis prior to construction. I told him I would keep him in the loop.

MEMORANDUM

TO: Lisa Faubion, Washington Department of Natural Resources, Castle Rock
FROM: Jim Dougherty
DATE: June 6, 2006
SUBJECT: Exhibit B: Plan of Operations for the Ridgefield Wastewater Treatment Plant Outfall Extension Project

---

Exhibit B: Plan of Operations for the Ridgefield WWTP Outfall Extension Project:

1. **Site Description and Present Use:**
   a. **Geographic location of outfall:** The City of Ridgefield WWTP Outfall currently discharges to the Columbia River at Latitude: North 45•49'17.969" and Longitude: West 122•45'13.665" on the northwestern portion of the City of Ridgefield, Washington (186285.2500 Northing, 1065866.7900 Easting). The existing outfall is located at an elevation of 7.95 feet NAVD.
   b. **Land ownership:** The Port of Ridgefield owns the uplands at the outfall site, and the subtidal lands are owned by the Washington State Department of Natural Resources.
   c. **Existing uses at the site:** The existing 10-inch outfall pipe terminates at an elevation of 7.95 feet NAVD. The end of the pipe is located on quarry spalls. Construction of the outfall extension will require excavation and removal of approximately ten feet of the existing outfall. The new 10-inch outfall pipe will be attached to the end of the existing pipe and run offshore (west) for approximately 100 feet. It will be weighted and dropped into place on the bottom of Lake River. The upper 10 to 20 feet will be vibrated into the sediments using either a pneumatic or hydraulic head.
   d. **Past uses and prior use authorizations on the site:** The City of Ridgefield acquired an easement for use of the existing outfall from the Department of Natural Resources in 2004. The outfall has been in its current location since before 1997. ***Easement Number 51-076024.***

2. **Future Use and Condition:**

Discharge of effluent from the Ridgefield WWTP will cease at the existing outfall site. Approximately 110 feet of 10-inch HDPE pipe will be connected to the existing pipe. This new effluent pipeline will extend offshore to the west into Lake River to a depth of at least seven feet at low tide (-10 MLLW). Weights will be attached to the new pipe at ten-foot intervals to provide negative buoyancy. The upper end of the pipe will be vibrated into the sediment using a hydraulic or pneumatic vibratory head to minimize disturbance of potentially contaminated sediments. The outfall pipe extension will be used to convey WWTP effluent treated to advanced secondary standards to the receiving waters in Lake River. Extending the outfall offshore will assure proper mixing of effluent even during low tide events.

3. **Description of the scheduled plan of development and maintenance.**
   a. **Synopsis of procedures for the inspection, routine maintenance, and emergency plans for the outfall:** Divers will inspect the outfall immediately post-installation and annually thereafter.
   b. **Construction Schedule:** The in-water work window established by the Hydraulic Project Approval for this project extends from July 1 to September 30. In-water work associated with outfall construction is not likely to take more than one or two days. Excavation of the outer ten feet of the existing outfall and attachment of the new outfall pipe to the existing effluent pipeline will occur at +7.9 feet MLLW and is not likely to take more than one day. All construction and inspection associated with construction of the 100-foot outfall extension is likely to be completed within one week during the summer of 2006, provided the Rivers & Harbors Act, Section 10 permit is issued by the US Army Corps of Engineers.
      i. **Construction Plan/Profile/Sequence:**
         1. **Footprint:** 260 square feet
         2. **Alignment:** 100 feet westerly from end of outfall
         3. **Connection location:** +7.95 ft. MLLW
         4. **Pipe material:** 10-inch HDPE
         5. **Length of outfall:** 100 feet
         6. **Diffuser details:** Single-port, outfall approx. 100 feet from shoreline
         7. **Anchoring:** Pre-weathered concrete collars at 10-foot intervals along pipe
      ii. **Construction Mitigation Methods**

1. **Type of dredge:** No in-water dredging required, hand tools (pick, shovel etc.) and possibly a backhoe will be used above +8 feet to excavate the existing outfall pipe.
2. **Pipe jointing procedure:** HDPE pipe will be fused to length prior to entering aquatic environment. HDPE pipe will be clamped to existing outfall pipe.
3. **Anchoring:** The 10-inch HDPE outfall pipeline will be anchored by pre-weathered/cured concrete collars spaced at 10-foot intervals. Anchors will be cast off-site and cured at least 21 days prior to deployment.
4. **Armor blanket:** No armoring is required, as the outfall will be temporary.
5. **Drilling vs. trenching:** No in-water trenching is anticipated or required. Upland trenching will be limited to the first 10 feet of the existing outfall pipe and will be completed by hand.
6. **Construction swath:** Upland; 3 feet X 10 feet, offshore; 1 foot X 100 feet.
7. **Sheeted trenching:** Not applicable, as no in-water trenching is proposed.

iii. **Mitigation for lost habitat:**

There will be no permanent loss of aquatic habitat associated with the proposed temporary WWTP outfall extension by 100 feet into Lake River. Mitigating design features/measures include:

- Relocation of the outfall offshore will improve water quality and fisheries habitat along the shoreline where juvenile salmonids migrate;
- Implementation of the proposed project together with proposed upgrades at the WWTP will improve dilution of the WWTP effluent and allow the plant to meet the requirements of its NPDES Permit until a new outfall to the Columbia River can be permitted and constructed (anticipated in 2010);
- The construction method chosen for installation of the outfall extension will minimize potential disturbance of contaminated sediments on the bottom of Lake River, as no in-water excavation will be required;
- The use of pre-cast & weathered concrete collars at 10-foot intervals will alleviate the need to place rock over the

pipe, installation of rocks would provide habitat for salmonid predators. This anchoring method will also facilitate removal of the temporary outfall pipe;

- The outfall pipe will be removed from the bottom of Lake River, once a new pipeline to the Columbia River is permitted and constructed;
- Sediments in the vicinity of the existing outfall and at the site of the proposed outfall will be tested for chemical and bacterial contamination and general aquatic toxicity in accordance with the requirements of the Department of Ecology's Toxics Clean-up Program prior to pipe installation and once the temporary outfall pipeline is removed.

4. **Description of Operation:**

Construction:

Contractors from Cosmopolitan Engineers will excavate the end of the existing outfall back into the bank to the point where ten feet of the pipe is exposed using hand tools (a backhoe may be used if necessary and access to the site can be provided). This portion of the pipe will be cut off and removed from the site. Ten-foot sections of HDPE pipe will be fused together at the WWTP site, or at the Ridgefield Boat Launch. The new HDPE outfall pipe will be towed to the outfall site by a workboat, and it will be clamped onto the end of the existing effluent pipeline. Once at the site, the pre-cast, pre-weathered concrete collars will be installed at 10-foot intervals along the outfall pipe. The pipe will then be capped and towed offshore by the workboat. Once the pipe is in position and properly aligned, the cap will be removed from the pipe. The outfall pipe assembly will then be lowered into place on the bottom of Lake River from the boat using a series of lines. The upper twenty feet of the outfall pipeline will be vibrated into the sediments using a pneumatic or hydraulic vibratory head. The entire construction process should take about one day. Divers will inspect the new outfall pipeline once construction is complete and annually thereafter.

Operation & decommissioning:

The Ridgefield WWTP Outfall will be in continuous operation once the new outfall is connected. Flows through the plant are anticipated to increase from 0.5 MGD to approximately 0.7 MGD over the next few years. Once the new outfall to the Columbia River is online, the temporary outfall pipe will be disconnected from the effluent pipeline upland of the intertidal area. The outfall pipeline will be towed ashore using a tractor. The HDPE outfall pipe will be cut into convenient lengths and stored on the site of the Ridgefield WWTP. It is likely that the outfall pipe will be put to other uses around the plant or in the upland conveyance system. Sediments near the outfall will be sampled and tested per the requirements of the Ecology Toxics Clean-up Group.

5. Hazardous Materials:
The only flammable, toxic, reactive/explosive materials to be utilized associated with the proposed HPDE outfall installation project are fuels, lubricants and coolants associated with operation of trucks and equipment in upland areas and in the workboat in the aquatic environment. No corrosive materials will be utilized on site, and concrete collars used to provide negative buoyancy to the outfall pipe will be cast off-site and will be weathered/cured at least 21 days prior to installation to minimize caustic chemical reactions associated with curing concrete.

6. Equipment & Maintenance:
The only power equipment directly involved in installation of the proposed outfall pipeline extension is the workboat and possibly a backhoe. Proper operation and maintenance of the boat and a requirement to equip the boat with hazardous materials spill containment kits will be included in the contract documents. A backhoe may be used to uncover the ten-foot upland portion of the existing effluent pipeline; similar operation and maintenance requirements will be in place if the backhoe is utilized.

7. Authorized Waste Discharges:
The Ridgefield WWTP will be authorized to discharge up to 0.7 MGD of effluent treated to advanced secondary standards via the proposed temporary outfall to Lake River.

8. Synopsis of Relevant Sections of the Facilities Plan:

- Chapter 5, page 11 of the City of Ridgefield General Sewer and Wastewater Facilities Plan describes the problems associated with the existing outfall to Lake River. Figure 5-2 illustrates the outfall and its location at +7.95 feet MLLW.
- Chapter 6, page 4 discusses contaminants of concern and the existing wastewater service population, flows and loading.
- Projected Wastewater Flows and Loadings are discussed Chapter 6, page 16.
- Projected Effluent NPDES Permit Limits are discussed in Chapter 6, page 19: there is concern regarding potential ammonia loadings and their impact on Lake River.
- Projected wastewater flows and WWTP loading are discussed on Page 6-16; the WWTP Service Area and population are projected to grow from 2,195 in 2004 to approximately 12,000 in 2024. Peak Day Flows are

projected to grow from 0.6 MGD in 2004 to 1.14 MGD in 2009 and 3.71 MGD in 2024.

- Receiving water issues are discussed on Page 6-20. Ecology's continued classification of Lake River as an estuary would allow continued discharge to Lake River through 2024. Re-classification of Lake River as a "River" would require relocation of the WWTP Outfall to the Columbia River in the next few years, given the projections for rapid growth in the area. The Plan recommends that the City acquire the necessary permits to relocate the outfall to the Columbia River. The majority of the alternative analysis presented in the Facilities Plan deals with WWTP components and processes.
- Analysis of the various routes for the new outfall to the Columbia River is on-going. The proposed route would involve installation of a 24-inch pipe across the bottom of Lake River to the Ridgefield Wildlife Refuge and extension of a new outfall into the Columbia about one half mile upstream of Bachelor Slough, which separates the southeastern portion of the Wildlife Refuge from Bachelor Island. In the event that the proposed Columbia River Outfall fails the Refuge's Compatibility Analysis, the most likely route for the outfall en route to the Columbia would be via the bottom of Lake River, as the shoreline areas along Lake River have a high probability for discovery and disturbance of materials of cultural, historic or archaeological significance. The City of Ridgefield has hired an environmental consulting firm to prepare a NEPA Environmental Assessment or Impact Statement regarding the various effluent pipeline routes and outfall options for the Columbia River as part of the Compatibility Analysis for crossing of the Ridgefield National Wildlife Refuge. This process is estimated to take two to three years.

9 Sediment quality issues:

According to David Templeton of Anchor Environmental, sediment sampling has occurred in the vicinity of the existing Ridgefield WWTP Outfall in the past few years. He will attempt to provide this background information for submittal to Ecology. Further, Anchor Environmental will be conducting a sediment characterization study for the Port of Ridgefield and the Union Pacific Railroad; the sampling area for this study will include the existing WWTP Outfall and the proposed temporary offshore outfall locations. Apparently, a wood products treatment facility (creosote plant) was operated on the Port property until the late 1970s and the potential for contamination of the offshore sediments exists. Additional sediment characterization may be required by Ecology.

Operations Contact Information:

Ridgefield WWTP phone number: 360-887-3897
Ridgefield WWTP operator: Fred Crippen

Ridgefield WWTP
West Cook Street
Ridgefield, Washington
Discharge Location: Lat 47•49'15", Long. 122•45'07"

Justin Clary, Public Works Director
Ridgefield Public Works Department:
127 Main Avenue
PO Box 608
Ridgefield, Washington 98642
360 857-5020, Fax 360 887-2507

Port of Ridgefield
PO Box 55
Ridgefield, Washington 98642
360 887-3875

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ Telephone Conversation

☐ Meeting

Location of Phone Conversation: GRAY & OSBORNE INC.	
Place of Meeting:	

Date:	2-9-6	**Time:**	1030 a.m.	p.m.
Discussion with:	Ted Benson			
Firm/City with:	Department of Ecology, Sediment Unit			
Phone Number:	360 407-6683			
Gray & Osborne Personnel:	Jim Dougherty			
Project:	Ridgefield WWTP Outfall Extension and the Sunnyside WWTP Outfall projects			
Subject:	Sediment sampling requirements			
G&O Job Number:	05616, 04741.0004			

REMARKS:

Ted Benson returned my call to Kathy de Jesus at Ecology regarding sediment sampling and testing requirements for the installation of the Ridgefield WWTP outfall extension to Lake River and the new outfall for the Lake Stevens Sewer District's Sunnyside WWTF. We briefly discussed the project at Ridgefield and he said that he would have to learn more about use of a vibratory head to drive a pipe into soft sediments to avoid excavation for temporary trenching and the associated short-term adverse impacts to water & sediment quality that could result from it. He said that any testing that would be required would be pretty simple and would likely involve using a small hand core to collect sediments upstream and downstream of the outfall installation before and after construction. There could be a fairly significant lab bill associated with the organics and metals analyses, if sampling is required.

We briefly discussed the Lake Stevens Sewer District's proposed outfall into Ebey Slough. He thought that the 40 cy would meet the Corps' definition of diminimis, and would not likely require sampling. It would require a JARPA form and a description of how the sediments would be disposed of. He didn't think that the Corps would be averse to stationing a trackhoe on top of the levee and putting the material (water and all) into dump trucks and hauling the stuff that stays in the truck to an approved disposal/application site. He recommended that I speak with Dave Kendall at the Corps, which I did last evening. Dave wanted to know what methods we were proposing, but he didn't seem too concerned otherwise. He requested that we let him know when we submit the JARPA to the Corps, so he could look for it.

STATE OF WASHINGTON
DEPARTMENT OF NATURAL RESOURCES
DOUG SUTHERLAND, **Commissioner of Public Lands**

APPLICATION FOR AUTHORIZATION TO USE STATE-OWNED AQUATIC LANDS

NO WORK CAN BE STARTED ON THE PROJECT AREA UNTIL A USE AUTHORIZATION HAS BEEN GRANTED BY THE DEPARTMENT OF NATURAL RESOURCES

I. SUBMISSION OF APPLICATION

Enclose a $25.00 non-refundable application processing fee with the application. **(this fee is not required for local, state, and other government agencies).** This application form will be reviewed by the Department of Natural Resources upon receipt at the address given below. Applicants will be notified in writing if the application will be accepted for further review. However, this application may be rejected at any time before signed execution of a use authorization.
Please send the completed application form to your region land manager at:

Lisa Faubion
Washington State Department of Natural Resources
Southwest Washington Office
PO Box 280, 601 Bond Road
Castle Rock, WA 98611
360 577-2025

II. APPLICANT INFORMATION

Date of Application: **December 6, 2005**
Authorization to be Issued To (how name is to appear in the lease document): **City of Ridgefield Public Works Department**

Applicant's Representative: **Mike Johnson, Gray & Osborne, Inc.**

Relationship to Applicant: Consulting Engineer

Address: **PO Box 608, 127 North Main Avenue**	City: **Ridgefield**	State: **WA**	Zip Code: **98642**
Telephone: **857-5020**	Fax: **360 887-2507**	E-Mail: **Justin.clary@ci.ridgefield.wa.us**	

FOR OFFICIAL USE ONLY *Support*: Application Fee Received ☐ Date:________
Land Manager: ☐ New Application; ☐ Renewal Application; Land Manager Initials________
Land Records: New Application Number________; Trust ________; County________; AQR Plate No.

II. APPLICANT INFORMATION cont'

Department of Revenue Tax *Registration Number (Unified Business Identifier) is **Required**: 940053-006

Which of the following applies to Applicant (**Check One and Attach written authority to sign** - bylaws, power of attorney, etc):

Corporation ☐ State of Registration:	Limited Partnership ☐ State of Registration:	General Partnership ☐ State of Registration:
Sole Proprietorship ☐	Marital Community ☐ Spouse:	Government Agency ☒

Other ☒ (Please Explain:) **City of Ridgefield**

Has the site use been authorized before or is it currently under lease? **Yes** ☒ Lease Number:
No ☐ **Don't Know** ☐

III. LOCATION

The Body of Water on which the state property is located: **Lake River**	County in which the state property is located: **Clark**	Government Lot:
	Section: **24**	Township: **4 North**
	Range: **1**	**E** ☐ or **W** ☒

Note: A legal property survey including the legal description and other information about the property is **required** to obtain a use authorization. WA DNR survey requirements are attached to this form. The survey plat will be attached to the lease/easement as Exhibit A. **DO NOT HAVE THIS SURVEY CONDUCTED UNTIL YOU HAVE BEEN NOTIFIED IN WRITING THAT THE APPLICATION HAS BEEN ACCEPTED FOR PROCESSING.**

Physical description of Project Area (For example, Marsh, Tideflat adjacent to the Chehalis River, etc.): **Intertidal and shallow subtidal waters of Lake River offshore of the northern limits of the Port of Ridgefield holdings. The new pipeline and outfall would extend from the end of the existing sewer outfall pipe to a point approximately 100 feet offshore in Lake River.**

Name of Owner(s) of Uplands, Shorelands, and/or Tidelands shoreward and adjacent to the Property: **Port of Ridgefield**

Address: **PO Box 55**	City: **Ridgefield**	State: **WA**	Zip Code: **98642**
Phone Number: **360 887-3875**	Fax Number		E-mail: **info@portofridgefield.org**

Note: Except for property located within established Harbor Areas, proof of ownership, or authorization to use the adjacent tideland, shoreland, or upland property may be required. If the applicant is the owner of the adjacent land, attach a copy of the deed.

County Parcel No(s). for adjacent properties, upland, and/or adjacent tideland properties: **68314000**

IV. USE OF PROPERTY

Describe, in detail, the proposed use of the Property:
The proposed Aquatic Lands Use Authorization is for extension of the existing 10-inch outfall from its present terminus at the +10 foot tide elevation approximately 100 feet offshore into Lake River to improve dilution and mixing of WWTP effluent.

Is or will the Property be subleased to another party? **Yes** ☐ **No** ☒
If yes, submit a copy of the sublease agreement.

What are the current and past uses of the site? **The in-shore end of the proposed pipeline will be connected to the existing outfall pipe at approximately the +10 foot tidal elevation. Waterward of this outfall, Lake River is used for recreational and commercial boating and fishing activities.**

Do you have any knowledge of contamination of the site by toxic or hazardous substances, or of past uses or practices that might have lead to contamination by such substances? Yes ☒ No ☐
If so, please explain: **A creosote plant was once operated on the Port property.**

Do you know if any fill material has been placed on the property in question? Yes ☐ No ☒
If yes, please explain:
It is likely that the shoreline area along Lake River has received dredge spoils from maintenance of the navigation channel in the past.

V. IMPROVEMENTS

Physical improvements are structures placed on the land that cannot be removed without damage to the land. Examples of such structures include: pilings, dolphins, piers, wharves, piling-supported buildings, structures built on fill or concrete foundations, buried pipelines and cables, and support structures for bridges.

What physical improvements currently exist on the site? (Photos may be required.)
The end of the existing 10-inch WWTP outfall to Lake River lies at approximately the +10 foot tide elevation MLLW.

If there are physical improvements currently on the site, who owns them? **The outfall is owned by the City of Ridgefield.**

If there are physical improvements currently on the site, describe their condition:
The existing 10-inch outfall pipeline is in serviceable condition; however, its location is not conducive to dilution of effluent at low tide.

Which, if any, of the existing physical improvements will be removed, remodeled, or reconstructed? **The end of the existing 10-inch outfall pipe may be modified to allow attachment of the new 100-foot HDPE extension. The new 10-inch HDPE pipe will be held in place on the benthic surface by concrete collars attached at 20-foot intervals.**

Describe any physical improvements that the applicant is proposing to construct on the site:
The City of Ridgefield Public Works Department proposes to attach a new 100-foot long, 10-inch HDPE outfall pipeline to the end of the existing effluent disposal outfall on the bank of Lake River. The subtidal portion of the pipe will rest on the benthic surface, held in place by concrete weights spaced approximately 20 feet apart.

Has any fill material been placed on the site? Yes ☒ No ☐
If Yes, please describe:
It is likely that the banks of Lake River have received fill excavated from the navigation channel at some point in the past.

VI. LOCAL, STATE, AND FEDERAL REGULATORY PERMITS

Copies of all Government Regulatory Permits, or Permit Waivers Are Required Before Issuance of a DNR Use Authorization. Your project may require all or some of the following.

Please include the following permit applications, permits, or waivers with the application:

JARPA (Joint Aquatic Resource Permit Application) - This one form is used to apply for all of the following individual permits:

1. Section 10 Permit (Required by the US Army Corps of Engineers for any work in or affecting navigable waters, e.g., floats, docks, piers, dredging, pilings, bridges, overhead power lines.) Applied for **NWP 7, December 2005.**
2. Shoreline Substantial Development, Conditional Use, Variance Permit or Exemption (Issued by Local Government, and is required for work or activity in the 100 year flood plain, or within 200 feet of the Ordinary

High Water mark of certain waters; and which included any one of the following: dumping, drilling, dredging, filing, placement or alteration of structures or any activity which substantially interferes with normal public use of the waters.) **Application to be submitted to the City of Ridgefield for a Shoreline Substantial Development Permit, December 2005**

3. Hydraulic Project Approval (Required by the Department of Fish and Wildlife if the project includes work that will use, divert, obstruct, or change the natural flow or bed of any fresh or salt water of the state.) **Submitted December 15, 2005.**
4. Section 404 Permit (Required by the US Army Corps of Engineers if your project will discharge or excavate any dredged or fill material waterward of the Ordinary High Water mark or the Mean Higher High Tide Line in tidal areas.) **Not applicable**
5. Section 401 Water Quality Certification (Required by the Department of Ecology if a Section 404 permit is required.)

NPDES (National Pollutant Discharge Elimination System Permit - Required by the Department of Ecology under delegated authority from the Federal Environmental Protection Agency for projects that include the discharge of fluid on or into surface water.

SEPA (State Environmental Policy Act) Checklist and Environmental Assessments - When you submit a permit application to any agency, if the project is not exempt, the lead agency will ask you to fill out an environmental checklist. Based on checklist answers and the reviewer's knowledge of the project site, agency personnel will determine the types of impacts the project may have on the environment. The agency assessments may be the following forms: Determination of Nonsignificance, Determination of Significance, scoping documents, draft or final Environmental Impact Statements (EIS) or others prepared for the purpose of compliance. **Determination of Non-Significance issued August 24, 2005.**

Describe any habitat mitigation required by any of the permitting agencies identified above and identify where such mitigation is proposed to occur:_**Conditions of the Hydraulic Project Approval and the Rivers & Harbors Act, Section 10 Permit will be observed during construction, which will occur during the in-water work window established in the Corps Permit. This window extends from November 1 to February 15 to protect juvenile salmonids.**

All answers and statements are true and correct to the best of my knowledge.

Applicant Name (please print):	Title:
Applicant or Authorized Signature:	Date:

STATE OF WASHINGTON DEPARTMENT OF NATURAL RESOURCES
REQUIREMENTS FOR RECORDS OF SURVEY FOR LEASES AND EASEMENTS

Records of Survey are required for easements and leases granted by the department for:

- $ County roads
- $ Highways
- $ Easements across high value lands
- $ Easements across transition lands
- $ Utilities
- $ Upland leases
- $ Communication sites
- $ Other grants as determined by the department based upon site specific considerations
- $ Drainage or irrigation easements
- $ Railroads
- $ Aquatic land uses: exemptions are provided for recreational docks and mooring buoys per RCW 79.90.105 and for those permits issued as a Right of Entry

MEMORANDUM FOR RECORD (MFR) **CENWS-OD-RG**

Re: Endangered Species Biological Evaluation Review
Reference Number: 200501410
Applicant's Name: Ridgefield Public Works
Project Manager: Ron Klump
Date: 19 January 2006

We have completed our review of the Biological Evaluation (BE) prepared by Gray & Osborne, Inc., dated 11 November 2005, for the proposed outfall extension in Lake River at the Ridgefield Wastewater Treatment Facility (WWTF), West Cook Street, Ridgefield, Clark County, Washington.

Following are comments or requested revisions to the BE. Because the present BE is poorly organized and omits key information (e.g., action area, environmental baseline, a complete effects analysis, etc.), we request that you submit a revised BE and not an addendum to the current BE.

The attached document *ESA Consultation Initiation Template* (TEMPLATE) was prepared by the U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) for complex ESA projects. The present project proposed by Ridgefield Public Works is not complex. However, the TEMPLATE provides guidelines on BE organization, types of information needed, and definitions of key ESA terms. We recommend that you include the following sections to your BE:

A. **Project Description/Construction Description.**
   1. Provide a detailed description of the specific construction techniques for this project, including methods, materials, and equipment. This information should not be interspersed throughout the BE, as it is in the current BE, but should be presented in clear detail in the Project Description section of the BE. Please refer to the attached TEMPLATE (Section II.C and II.D).
   2. Maps of project area and action area. At a minimum, the map provided in Appendix 1 must clearly identify the WWTF, existing outfall, proposed outfall extension, Lake River, and Columbia River. Also clarify whether the "Preferred Outfall Route" shows work that will occur as part of the proposed project, or if it is for future work. If work on the "Preferred Outfall Route" will occur as part of the proposed project, the work must be discussed in the present BE. Please refer to the attached TEMPLATE (Section II.F).

B. **Action Area.** Describe the action area for the project. Please refer to the attached TEMPLATE (Section II.D) for guidelines on the type and level of detail of information to be provided in this section of the BE.

C. **Conservation Measures.** Please refer to the attached TEMPLATE (Section II.C.iii. and II.C.iv) for guidelines on the type and level of detail of information to be provided in this section of the BE.
   1. Please submit a copy of the project's Hydraulic Project Approval, if one has been issued.
   2. Ensure consistency of the in water work window given in the BE: on page 25 a window of 1 November through 15 February is given; on pages 3, 10, and 14 a window of 1 November through 28 February is given.

D. **Species/Habitat Information.** The information contained in Section 4 and Appendix 3 of the present BE is adequate provided the following questions are addressed.
   1. The table in Section 4 of the BE should only include an entry for critical habitat if the critical habitat has been designated in the project's action area.
   2. The table in Section 4 of the BE states the status of lower Columbia River coho is "proposed threatened" when in fact this evolutionarily significant unit (ESU) was listed as a threatened species on 28 June 2005.

E. **Environmental Baseline.** The present BE lacks a description of the environmental baseline. Please refer to the attached TEMPLATE (Section IV) for guidelines on writing this section.

1. For fish species, the inwater habitat of Lake River in the action area would include a description of water quality, sediment type, sediment contaminant level, off channel habitat, structural complexity elements, pool complexity, etc.
2. For bald eagles,
   a. Describe habitat features of wintering bald eagles in the action area, such as roost and perch trees, including their abundance and proximity to the pipeline alignment.
   b. Describe bald eagle prey resources in the action area, such as waterfowl concentrations and carrion, including their abundance and proximity to the pipeline alignment.
   c. The BE describes several bald eagle nests and states that they are not in line of site of the project alignment. Describe the buffering (e.g., landform, vegetation, etc.) between the nests and the project alignment.
   d. Provide consistent information regarding the distance of the bald eagle nests to the project alignment: on page 7 of the BE you give distances of 1 and 1.5 miles, on page 15 you give a distance of 1.5 miles, and in Appendix 2 (telephone conversation with Eric Hoffman) the distance is 0.75 of a mile.
3. Please note that if requested by the National Marine Fisheries Service or U.S. Fish and Wildlife Service, you will be required to provide a copy of the WWTF's National Pollutant Discharge Elimination System permit.

F. **Effects Analysis.**

1. In general, this section of the BE lacks a description of the type and severity of effects to the species, their habitat, and prey resources. For each species, state the amount, if any, of mortality or other forms of take anticipated. Revise this section according to the attached TEMPLATE (Section V.A through V.G). Incorporate the critical habitat analysis into the Effects Analysis section of the BE, rather than in an appendix of the BE. Note that per the final rule for critical habitat for Columbia River bull trout, neither Lake River nor the mainstem Columbia River were designated.
2. Provide documents showing the modeling done by Gray & Osborne (as mentioned on page 10 of the BE) that shows the effects to water quality.
3. Regarding population growth, if wastewater resulting from population growth in the Ridgefield area will be treated at the WWTF, the Corps considers the population growth an interrelated action that needs to be discussed in the BE. For example, the BE should describe the anticipated effects to the species and their critical habitat from changes in road density, impervious surface, etc..

G. **Effects Determination.** Please refer to the attached TEMPLATE (Section V.H).

1. Given lower Columbia River coho is a listed species, the Corps does not agree with the BE's determinations of effect. Please revise this section.
2. For designated critical habitat, the appropriate determinations of effect are: no effect; may affect, not likely to adversely affect; may affect, likely to adversely affect.

H. **Essential Fish Habitat (EFH).** Please refer to the attached TEMPLATE (Section IX) for guidelines on preparing this section of the BE.

1/19/06
Date

Maryann Baird, BE/BA Reviewer

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ **Telephone Conversation**

☐ **Meeting**

Location of Phone Conversation: GRAY & OSBORNE INC.	
Place of Meeting:	

Date:	12-7-05	**Time:**	a.m.	1430 p.m.
Discussion with:	Mike Johnson			
Firm/City with:	G&O Olympia			
Phone Number:	360 754-4266			
Gray & Osborne Personnel:	Jim Dougherty			
Project:	Ridgefield WWTP outfall extension to Lake River			
Subject:	Previous leases			
G&O Job Number:	05616			

REMARKS:

Mike Johnson called to let me know that the City of Ridgefield has established a Lease/Aquatic Lands Use permit with DNR for the current outfall on the bank of Lake River. I will change this in the application form for the Aquatic Lands Use Authorization for the Lake River Outfall Extension.

Subject: City of Ridgefield (application #51-076024)
From: "LISA FAUBION" <lisa.faubion@wadnr.gov>
Date: Mon, 05 Dec 2005 13:28:10 -0800
To: <jdougherty@g-o.com>

Jim,

Thank you for contacting me regarding the City of Ridgefield's plans to extend their existing wastewater outfall on Lake River. Attached are the Specifications for Exhibits A (survey) and B (Plan of Operations & Maintenance). Once the survey has been completed, it will need to be reviewed by our survey team in Olympia to ensure that it meets DNR's requirements. I would like an electronic copy of the Exhibit B, so that I may edit and format it — the final Exhibit B will actually contain more information, but the Specifications lists the details that I need you/the City to provide.

As I mentioned on the phone, I will need copies of all regulatory permits and/or exemptions. DNR will require the City to provide general liability insurance (and list the State as additional insured); typically, this means providing documentation that a city is self-insured. Normally, a security bond is also required, but this requirement is waived for government entities.

If you have any questions, please feel free to call me.

Regards,

Lisa Faubion, Land Manager
Department of Natural Resources
Aquatics Region/Rivers District
PO Box 280
Castle Rock, WA 98611
Phone: (360) 740-6813
Fax: (360) 748-2387

SPECIFICATIONS FOR EXHIBIT B

Exhibit B is a requirement in the use authorization document. It is narrative, by the proponent, of the plans, practices, equipment and any other information indication the intentions for best management practices for the proposed project development, operation and maintenance.

Exhibit B is always required, although its scope and content may differ on a case-by-case basis. The proponent should note, that this may not be all that is required, if further analysis finds that more information is needed.

Exhibit B shall contain the following:

1. Site Description and Present Use
    a. Geographic location of outfall including physical characteristics (eelgrass beds, shellfish)
    b. Land ownership
    c. Existing uses at the site - A description of the structures and improvements on state-owned aquatic land, project design conditions
    d. Past uses and prior use authorizations on the site (if known)

2. Future Use and Condition
   A description of the future changes to the use or improvements on state-owned aquatic land, project design conditions and intended use (type of discharge).

3. A description of the scheduled plan of development and maintenance.
    a. A short synopsis of procedures for the inspection, routine maintenance, and emergency plans for the outfall based on the O&M Manual and/or Facilities Plan.
    b. Construction Schedule: Include in-water work restrictions issued by the Department of Fish and Wildlife due to migrating juvenile salmonids, eelgrass, and any other identified species of concern. Provide approximate start and end dates and an inspection schedule.
        i. Construction Plan/Profile/Methods/Sequence:
            1. Footprint (area ft^2) to be impacted
            2. Alignment (feet from shoreline etc)
            3. Connection location (MLLW) to existing outfall (for an extension) and type of connection
            4. Type of pipe material and diameter
            5. Length of outfall
            6. Diffuser details (number of ports, length of diffuser, spacing between ports)
            7. Type of anchoring (if any)
        ii. Construction Mitigation Methods per Regulatory Requirements
            1. Type of dredge used (dredging or excavation allowed?)
            2. Pipe joining procedure (joined prior to placement?)
            3. Type of anchoring used (Pipe anchored with pre-cured concrete?

Anchors cast off-site?)
4. Armoring blanket used instead of trenching or riprap to minimize habitat disturbance?)
5. Drilling used instead of trenching?
6. Construction swath to be disturbed (how has it been minimized?)
7. Sheeted trenching used?

iii. Mitigation for lost habitat.

4. A description of how the operation will be conducted at the site.

5. A list of all hazardous materials that may be used on-site, and how they will be handled; e.g. 1) flammable, 2) toxic, 3) reactive/explosive, 4) corrosive.

6. A description of types of equipment and equipment maintenance methods that will be used, etc.

7. A clear identification of any authorized waste discharges.

8. A brief synopsis of the relevant section in the Facilities Plan to show the applicant has utilized AKART to minimize the impact of the discharge and has conducted an alternatives analysis for the discharge that includes why the alternatives were rejected and the rationale behind the preferred alternative.

9. If applicant has previously conducted sediment sampling the data report must be submitted to State in a written report and to the Department of Ecology in electronic SEDQUAL format.

10. Operations contact information (headquarters/main office) to include name, title, address, phone, and email.

STATE OF WASHINGTON
DEPARTMENT OF NATURAL RESOURCES
DOUG SUTHERLAND, **Commissioner of Public Lands**

APPLICATION FOR AUTHORIZATION TO USE STATE-OWNED AQUATIC LANDS

NO WORK CAN BE STARTED ON THE PROJECT AREA UNTIL A USE AUTHORIZATION HAS BEEN GRANTED BY THE DEPARTMENT OF NATURAL RESOURCES

I. SUBMISSION OF APPLICATION

Enclose a $25.00 non-refundable application processing fee with the application. **(this fee is not required for local, state, and other government agencies).** This application form will be reviewed by the Department of Natural Resources upon receipt at the address given below. Applicants will be notified in writing if the application will be accepted for further review. However, this application may be rejected at any time before signed execution of a use authorization.
Please send the completed application form to your region land manager at:

Department of Natural Resources
[Region/District Address]

II. APPLICANT INFORMATION

Date of Application:
Authorization to be Issued To (how name is to appear in the lease document):

Applicant's Representative:			
Relationship to Applicant:			
Address:	City:	State:	Zip Code:
Telephone:	Fax:	E-Mail:	

FOR OFFICIAL USE ONLY *Support:* Application Fee Received ☐ Date:__________
Land Manager: ☐ New Application; ☐ Renewal Application; Land Manager Initials__________
Land Records: New Application Number__________; Trust__________; County__________; AQR Plate No.

II. APPLICANT INFORMATION cont'		
Department of Revenue Tax *Registration Number (Unified Business Identifier) is **Required:**		
Which of the following applies to Applicant (**Check One and Attach written authority to sign** - bylaws, power of attorney, etc):		
Corporation ☐ State of Registration:	Limited Partnership ☐ State of Registration:	General Partnership ☐ State of Registration:
Sole Proprietorship ☐	Marital Community ☐ Spouse:	Government Agency ☐
Other ☐ (Please Explain:)		
Has the site use been authorized before or is it currently under lease? **Yes** ☐ Lease Number: **No** ☐ **Don't Know** ☐		

III. LOCATION		
The Body of Water on which the state property is located:	County in which the state property is located:	Government Lot:
	Section:	Township:
	Range:	**E** ☐ or **W** ☐
Note: A legal property survey including the legal description and other information about the property is **required** to obtain a use authorization. WA DNR survey requirements are attached to this form. The survey plat will be attached to the lease/easement as Exhibit A. **DO NOT HAVE THIS SURVEY CONDUCTED UNTIL YOU HAVE BEEN NOTIFIED IN WRITING THAT THE APPLICATION HAS BEEN ACCEPTED FOR PROCESSING.**		
Physical description of Project Area (For example, Marsh, Tideflat adjacent to the Chehalis River, etc.):		
Name of Owner(s) of Uplands, Shorelands, and/or Tidelands shoreward and adjacent to the Property:		
Address:	City: State:	Zip Code:
Phone Number:	Fax Number	E-mail:
Note: Except for property located within established Harbor Areas, proof of ownership, or authorization to use the adjacent tideland, shoreland, or upland property may be required. If the applicant is the owner of the adjacent land, attach a copy of the deed.		
County Parcel No(s). for adjacent properties, upland, and/or adjacent tideland properties:		

IV. USE OF PROPERTY
Describe, in detail, the proposed use of the Property:
Is or will the Property be subleased to another party? **Yes** ☐ **No** ☐ If yes, submit a copy of the sublease agreement.
What are the current and past uses of the site?
Do you have any knowledge of contamination of the site by toxic or hazardous substances, or of past uses or practices that might have lead to contamination by such substances? **Yes** ☐ **No** ☐ If so, please explain:
Do you know if any fill material has been placed on the property in question? **Yes** ☐ **No** ☐ If yes, please explain:

V. IMPROVEMENTS

Physical improvements are structures placed on the land that cannot be removed without damage to the land. Examples of such structures include: pilings, dolphins, piers, wharves, piling-supported buildings, structures built on fill or concrete foundations, buried pipelines and cables, and support structures for bridges.

What physical improvements currently exist on the site? (Photos may be required.)

If there are physical improvements currently on the site, who owns them?

If there are physical improvements currently on the site, describe their condition:

Which, if any, of the existing physical improvements will be removed, remodeled, or reconstructed?

Describe any physical improvements that the applicant is proposing to construct on the site:

Has any fill material been placed on the site? Yes ☐ No ☐
If Yes, please describe:

VI. LOCAL, STATE, AND FEDERAL REGULATORY PERMITS

Copies of all Government Regulatory Permits, or Permit Waivers Are Required Before Issuance of a DNR Use Authorization. Your project may require all or some of the following.

Please include the following permit applications, permits, or waivers with the application:

JARPA (Joint Aquatic Resource Permit Application) - This one form is used to apply for all of the following individual permits:

1. Section 10 Permit (Required by the US Army Corps of Engineers for any work in or affecting navigable waters, e.g., floats, docks, piers, dredging, pilings, bridges, overhead power lines.)
2. Shoreline Substantial Development, Conditional Use, Variance Permit or Exemption (Issued by Local Government, and is required for work or activity in the 100 year flood plain, or within 200 feet of the Ordinary High Water mark of certain waters; and which included any one of the following: dumping, drilling, dredging, filing, placement or alteration of structures or any activity which substantially interferes with normal public use of the waters.)
3. Hydraulic Project Approval (Required by the Department of Fish and Wildlife if the project includes work that will use, divert, obstruct, or change the natural flow or bed of any fresh or salt water of the state.)
4. Section 404 Permit (Required by the US Army Corps of Engineers if your project will discharge or excavate any dredged or fill material waterward of the Ordinary High Water mark or the Mean Higher High Tide Line in tidal areas.)
5. Section 401 Water Quality Certification (Required by the Department of Ecology if a Section 404 permit is required.)

NPDES (National Pollutant Discharge Elimination System Permit - Required by the Department of Ecology under delegated authority from the Federal Environmental Protection Agency for projects that include the discharge of fluid on or into surface water.

SEPA (State Environmental Policy Act) Checklist and Environmental Assessments - When you submit a permit application to any agency, if the project is not exempt, the lead agency will ask you to fill out an environmental checklist. Based on checklist answers and the reviewers knowledge of the project site, agency personnel will determine the types of impacts the project may have on the environment. The agency assessments may be the following forms: Determination of Nonsignificance, Determination of Significance, scoping documents, draft or final Environmental Impact Statements (EIS) or others prepared for the purpose of compliance.

Describe any habitat mitigation required by any of the permitting agencies identified above and identify where such

mitigation is proposed to occur:

All answers and statements are true and correct to the best of my knowledge.

Applicant Name (please print):	Title:
Applicant or Authorized Signature:	Date:

TATE OF WASHINGTON DEPARTMENT OF NATURAL RESOURCES
EQUIREMENTS FOR RECORDS OF SURVEY FOR LEASES AND ASEMENTS

Records of Survey are required for easements and leases granted by the department for:

- $ County roads
- $ Highways
- $ Easements across high value lands
- $ Easements across transition lands
- $ Utilities
- $ Upland leases
- $ Communication sites
- $ Other grants as determined by the department based upon site specific considerations
- $ Drainage or irrigation easements
- $ Railroads
- $ Aquatic land uses: exemptions are provided for recreational docks and mooring buoys per RCW 79.90.105 and for those permits issued as a Right of Entry

The applicant is responsible for:

- $ All costs and work associated with creating, submitting, revising and recording the Record of Survey
- $ Submitting a preliminary Record of Survey for review and approval by the department prior to approval of the agreement.
- $ Recording the final Record of Survey with the county auditor's office.
- $ Submitting a digital copy in AutoCAD.DWG or DXF (drawing exchange format) of the final survey.
- $ Submitting two full size copies and one 8 ½ X 11" copy and of the recorded survey including the auditor's recording information to the department.

A Record of Survey must:

1. **Be produced by a licensed surveyor.**
2. **Meet the requirements of Title 58 RCW and Chapter 332-130 WAC.**
3. Include the name of the applicant, the purpose of the easement or lease and the DNR easement or lease number.
4. Clearly show easement or lease boundaries with distances and directions of all boundary lines.
5. Show the easement or lease area to an accuracy of (±) 0.5% of the total area or (±) 10 square feet, whichever is greater.
6. **(Not required for aquatic lands lease across the bed of Puget Sound or the Pacific Ocean)** Indicate the

acreage encompassed by the lease or easement within each quarter-quarter section or government lot.

7. Show distances and directions from two or more controlling corners of a recorded subdivision, recorded survey or government survey (GLO) corners.

8. Be related by meridian and coordinate to the Washington Coordinate System NAD'83(1991) by closed ties to NGS Control monuments, or the extension thereof. The designation of the control stations used shall appear on the plat.

9. Include a narrative legal description describing the servient estate (grantor's parcel) on the Record of Survey.

10. Show a detailed plan of improvements to be constructed or already existing on the easement or lease area. All improvements must be shown in sufficient detail to determine what they are used for and to ensure they are entirely within the easement area.

11. Show the location of any proposed utility.

12. **(linear lease or easement)** Show the lineal footage along the centerline.

13. **(linear lease or easement)** Show the complete alignment information and width including any necessary curve data.

A Record of Survey must (cont.):

14. **(Easements or leases crossing a section line or state ownership boundary, not required for aquatic lands lease across the bed of Puget Sound or the Pacific Ocean)** Provide ties to the centerline of an easement along the section or subdivision line from the nearest appropriate Public Land Survey System (PLSS) section corner, quarter section or subdivision corner, where the easement enters and leaves the section or state ownership.

15. **(Easements or leases falling entirely within one section and not crossing a section line or state ownership boundary)** Provide ties from both end points of the linear easement to PLSS corners or other subdivision corners shall be provided.

16. **(A lease which encroaches on a previously leased site)** Show the boundary for the senior lease in the vicinity of the proposed lease shall also be shown, together with ties between the two leases sufficient to determine the full extent of the encroachments.

Additional Requirements for Communication Site Leases

17. Show ties to the corners of previously monumented communication sites adjacent to, or in the immediate vicinity of the proposed communication site.

18. Show access to the site.

19. Mark the corners of the communication site, as described and granted, with substantial permanent magnetically locatable monuments. The monuments shall be in place and obviously marked on the ground after the construction of installations and improvements.

20. Show the center of any communication site tower by Washington Plane Coordinates, NAD83 (1991), or latitude and longitude having an accuracy of and showing 3 decimals of a second.

21. On all communication sites where towers or beam paths are shown, an elevation is required at the base of the tower.

22. Show the tower height, and the height of the antenna or microwave dish and any beam path used shall have the diameter and tilt thereof shown.

23. The elevation shall be derived from an established benchmark in the vicinity of the site, or an elevation designated by the Department of Natural Resources.

Additional Requirements for Aquatic Land Uses

24. The lease of aquatic lands is often subject to preference rights. Applicants and surveyors should carefully determine the direction, and show details of the proration of coves and irregular shoreline.

25. **(lease sites which contain existing or proposed structures and improvements that are classified as a non water-dependent or a water oriented use as described within RCW 79.90.465 and WAC 332-30-106)** Provide the square footage of each structure and improvement.

26. Where applicable, the survey of aquatic lands must show the location of the following lines for:

    a. Tidal areas –Government meander line, the original and current locations of line of mean high tide, line of mean low tide, and line of extreme low tide. The survey must include the name of tidal bench mark(s) used or describe the alternate method employed for determining a Tidal Datum. **Lease areas which contain tidelands and bedlands** at a minimum must show the location of the line of extreme low tide crossing the lease area. **Lease areas containing bedlands exclusively** may be required to show the relationship to the line of extreme low tide and the -18 foot contour line only.

Additional Requirements for Aquatic Land Uses (cont.):

b. Lakes – Government meander line, line of ordinary high water (original ordinary high water if the lake has experienced artificial raising or lowering of the water level), and line of ordinary low water (include source of data) and line of navigability if established.

c. Rivers - Line of ordinary high water and line of ordinary low water (include source of data) and line of navigability if established.

d. Lots and blocks of platted tide lands or shore lands, inner and outer harbor lines, waterway lines, street boundaries, any local construction limit lines, any dredge or fill areas, and easements of record within the lease site.

e. All lines must be shown in sufficient detail to compute and show the area of each area of State-owned bedlands, tidelands, shore lands, harbor area, or waterways included within the proposed lease site.

Include any other data necessary for the complete understanding of the information shown on the survey. If, in the opinion of the department, such information is lacking, the survey may be rejected.

Record of Survey Revisions:

27. Any differences between the as-built road and the regulation plat must be reflected in a revised Record of Survey and recorded with the county by the applicant.

28. When any portion of the completed improvements are located outside of the granted lease site, the as-built locations must be reflected in a revised Record of Survey and legal description. In this instance, a new application for an amended lease site may be required if the as-built location creates adverse impacts. In the case of linear leases across the bed lands of the sound or the ocean, an as-built Record of Survey and a revised legal description of the linear lease must be provided.

Survey Information updated July 2002.
For additional information contact one of the following region offices:

Central Region
1405 Rush Rd
Chehalis, WA 98532-8763
360-748-2383
TTY: 360-740-6841

Northeast Region
P.O. Box 190
225 S Silke Rd
Colville, WA 99114-0190
360-684-7474
TTY: 509-684-7474

Southeast Region
713 Bowers Rd
Ellensburg, WA 98926-9341
509-925-8510
TTY: 509-925-8527

Olympic Region
411 Tillicum Ln
Forks, WA 98331-9797
360-374-6131
TTY: 360-374-2819

Southwest Region
P.O. Box 280
601 Bond Rd
Castle Rock, WA 98611-0280
360-577-2025
TTY: 360-577-2025

Scott Robinson -
Lisa -

Northwest Region
919 N Township St
Sedro-Woolley, WA 98284-9333
360-856-3500
TTY: 360-856-1371

South Puget Sound Region
950 Farman Ave N
Enumclaw, WA 98022-9282
360-825-1631
TTY: 360-825-6381

WASHINGTON STATE DEPARTMENT OF
Natural Resources

DOUG SUTHERLAND
Commissioner of Public Lands

November 4, 2005

GRAY & OSBORNE, INC.
REC'D - SEATTLE
NOV 15 2005
JOB #

Jim Dougherty
Gray & Osborne Inc
701 Dexter Ave N – Ste 200
Seattle WA 98109

SUBJECT: City of Ridgefield, Outfall Extension into Lake River – G&O No. 05616 (T04N R01W S24)

We've searched the Natural Heritage Information System for information on rare plants and high quality native wetland and terrestrial ecosystems in the vicinity of your project. A summary of this information is enclosed. In your planning, please consider protection of these significant natural features. Please contact us for consultation on projects that may have an effect on these rare species or high quality ecosystems.

In addition, water howellia (*Howellia aquatilis)*, a state threatened and federally listed threatened plant species, occurs within 2 miles of your project area. Bradshaw's lomatium (*Lomatium bradshawii*), a state endangered and federally listed endangered plant species, occurs in Clark County but is not known to occur in the vicinity of your project.

The information provided by the Washington Natural Heritage Program is based solely on existing information in the database. There may be significant natural features in your study area of which we are not aware. These data are being provided to you for informational and planning purposes only - the Natural Heritage Program has no regulatory authority. This information is for your use only for environmental assessment and is not to be redistributed. Others interested in this information should be directed to contact the Natural Heritage Program.

The Washington Natural Heritage Program is responsible for information on the state's rare plants as well as high quality ecosystems. For information on animal species of concern, please contact Priority Habitats and Species, Washington Department of Fish and Wildlife, 600 Capitol Way N, Olympia WA 98501-1091, or by phone (360) 902-2543.

Please visit our internet website at http://www.dnr.wa.gov/nhp for more information. Please call me at (360) 902-1667 if you have any questions.

Sincerely,

Sandy Swope Moody

Sandy Swope Moody, Environmental Review Coordinator
Washington Natural Heritage Program

Enclosures

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ **Telephone Conversation**

☐ **Meeting**

Location of Phone Conversation: GRAY & OSBORNE INC.	
Place of Meeting:	

Date:	11-7-05	**Time:**	a.m.	1645 p.m.
Discussion with:	Eric Holman			
Firm/City with:	WDFW Vancouver Office			
Phone Number:	360 906-6702			
Gray & Osborne Personnel:	Jim Dougherty			
Project:	Ridgefield Outfall Projects, eagles			
Subject:	Proximity of both the Lake River outfall and the Columbia River outfall routes to bald eagle nests			
G&O Job Number:	05616			

REMARKS:

Eric Holman, Eagle Biologist for WDFW Region 5 in Vancouver returned my call regarding the proximity of bald eagle nests to the proposed outfall and pipeline alignments. We discussed the outfall to Lake River first. He said that the nearest bald eagle nest is approximately .75 mile to the northeast of the proposed outfall alignment, and that two chicks were successfully fledged from this nest last year. Mr. Holman didn't think that the proposed outfall installation project would cause any problems for these eagles, as the nest is far enough away and out of line of sight.

We briefly discussed the potential routing of the proposed outfall pipeline across Lake River and the River-S Unit to the Columbia River. He said that this route is going to be close enough to active nests that timing restrictions would be required for construction. Depending upon the type of work to be performed and the proximity to active nests, timing restrictions could extend from mid February to mid August. Timing restrictions to avoid impacts to bald eagles foraging in the winter would extend from November 1 to about the middle of February, if USFWS chose to impose this work restriction also.

MEMORANDUM

TO: John Wilson
FROM: Jim Dougherty
DATE: September 13, 2005
SUBJECT: Permitting estimate for Ridgefield WWTP Outfall Extension to the Columbia River

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The purpose of this memo is to discuss and estimate the cost of permitting for the proposed relocation of the Ridgefield WWTP outfall from the shoreline of Lake River (or the bottom of Lake River proper, once the proposed temporary outfall is in place). Relocation of the outfall along the route proposed across the US Fish & Wildlife's River S Unit of the Ridgefield Wildlife Refuge will require the following permits/processes:

1. State Environmental Policy Act: SEPA Checklist & Mitigated DNS, or Environmental Impact Statement. City of Ridgefield.
2. Shoreline Substantial Development Permit(s). City of Ridgefield & Clark County for work within 200 feet of a Shoreline of the State; (a Variance may be required).
3. Hydraulic Project Approval from the Washington Department of Fish & Wildlife for the outfall and other work in or beneath the waters of the State of Washington.
4. Aquatic Lands Use Permit, Washington Department of Natural Resources, for all work beneath the surface of Lake River and the Columbia River.
5. NPDES permitting, Individual, Wastewater Discharge Permit, CWA Section 401 permitting for projects permitted by the Corps of Engineers.
6. Air Quality, Notice of Construction from SW Clean Air Authority.
7. Rivers & Harbors Act, Section 10 permit (Nationwide 7) for installation of the outfall and crossing of Lake River. Clean Water Act, Section 7 (Nationwide Permit 7) from the US Army Corps of Engineers.
8. Flood Hazard Permit, through City of Ridgefield/Clark County for work within the 100-year floodplain.
9. National Historic Preservation Act (NHPA) Section 106 review for potential impacts to materials or structures of historic, cultural or archaeological significance, for federally funded or permitted projects.
10. Endangered Species Act consultation with US Fish & Wildlife Service and National Marine Fisheries Service/NOAA Fisheries.
11. US Fish & Wildlife Service Refuge Compatibility Analysis for the use of the Refuge's property during construction of the proposed effluent pipeline and outfall across the refuge.

12. Planning documentation consistent with the intent of the National Environmental Policy Act: either an Environmental Assessment and Finding of No Significant Impact, or an EIS and Record of Decision.

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ Telephone Conversation

☐ Meeting

Location of Phone Conversation: GRAY & OSBORNE INC.	
Place of Meeting:	

Date:	9-11-05	Time:	1100 a.m.	p.m.
Discussion with:	Dan Guy			
Firm/City with:	NOAA Fisheries, Olympia			
Phone Number:	360 534-9342			
Gray & Osborne Personnel:	Jim Dougherty			
Project:	'Ridgefield WWTF & outfall extension project			
Subject:	ESA concerns for outfall extensions and WWTF upgrade			
G&O Job Number:	05616			

REMARKS:

On Ron Klump's advice, I put a call in to Dan Guy at NMFS/NOAA Fisheries in Olympia to discuss the Ridgefield WWTP Upgrade and Outfall Extension Project. I told Dan that Ecology is requiring the City to first extend their existing outfall approximately 100 feet into Lake River, and eventually run a larger outfall pipe out to the Columbia River to cope with anticipated growth. Dan said that Rivers & Harbors Act, Section 10 permits would be required for both projects, so ESA consultation would be triggered. I explained that the City has discussed the possibility of running an effluent pipeline across the Refuge with the USFWS Managers, but that they were not particularly interested in having an outfall pipeline running across the Refuge. They cited a 1997 Congressional Guidance Memorandum that explicitly limits activities on Refuges to those most compatible with wildlife habitat enhancement, viewing, etc. Mr. Guy wondered why we weren't looking at running the pipeline along the shore. I explained that there are archaeological and historic resources on both sides of Lake River in this area.

I asked Mr. Guy about placing a 24 to 36-inch pipeline on the bottom of Lake River, extending approximately 2.5 miles from the Ridgefield WWTP to the Columbia River. I told him that it would probably be welded HDPE pipe, which could be weighted and dropped into place on the bottom of Lake River. He was wondering how deep the channel was and whether the channel is dredged (and to what depth, if it is). I guessed at 20 to 30 feet...(We need to get the chart). I'll check with the Corps in Portland to see if they dredge Lake River & to what depth.

Mr. Guy wondered what level of treatment the Ridgefield WWTP provides & I told him it was between secondary & tertiary treatment, which would be maintained or improved through the planning period and through the expansion to approximately 3 to 5 MGD. He said that he didn't think that the pipeline and outfall installation would be the biggest issue for NMFS in the Biological Assessment. He seemed more concerned about the stormwater impacts associated with new development slated to occur over the next few years, whether the new houses proposed are in the Ridgefield UGA and whether the City has done enough to "control growth." These are all issues that will have to be addressed in the biological assessment. He was wondering about the source of funding for the project and was particularly interested to know whether EPA was helping to fund it. I told him I thought the funding was primarily from the various state programs. He was thinking that the Corps would likely be glad to have some other federal agency step forward to drive the NEPA and ESA processes.

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ **Telephone Conversation**

☐ **Meeting**

Location of Phone Conversation: GRAY & OSBORNE INC.	
Place of Meeting:	

Date:	August 30, 2005	Time:	1020 a.m.	p.m.
Discussion with:	Sam Crummett			
Firm/City with:	City of Ridgefield			
Phone Number:	360 857-5013			
Gray & Osborne Personnel:	Jim Dougherty			
Project:	Lake River outfall extension			
Subject:	Permitting requirements, pre-application meeting			
G&O Job Number:	05338			

REMARKS:

I put a call in to Sam Crummett to see how things were proceeding with the SEPA Determination for the SEPA Checklist submitted with the Facilities Plan. I'm thinking that the SEPA for the Facilities Plan would probably be adequate for the outfall extension project. I told Sam we'd probably have to put together another SEPA Checklist and Determination for the Columbia River outfall, once a route, technique and design are determined. Sam said that Kevin is working on the SEPA determination, but he's not too sure how far along Kevin has gotten at this point. We'll need the SEPA determination to move the Hydraulic Project Approval process along and to get things started with the Shoreline Permit.

Sam said that the first thing he needed to do was establish the City of Ridgefield as Lead Agency for the project. Once that is done, he'll start working on setting up a pre-application meeting with folks from the Corps of Engineers, WDFW, USFWS and the County. I suppose we could discuss the situation with the National Marine Fisheries Service as well, but I'm not so sure they have time to send anyone. Sam was thinking of setting up the meeting for September 21, but that he could reschedule it earlier, if he can get everyone to attend. I suggested he invite Lisa Faubion from DNR in Castle Rock and Dave Knight from Ecology to the Pre-Application meeting as well. Sam said that the City would prefer to have as much control over the process as possible, so if there is a way to reduce/eliminate the County's participation with pipeline and outfall location modifications, they wanted to attempt it.

Sam said that he would need a map or aerial of the project area and the potential outfall location(s) and routes. I'll check with Mike Seidel to see what he has.

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ **Telephone Conversation**	**Location of Phone Conversation:** GRAY & OSBORNE INC.
☐ **Meeting**	**Place of Meeting:**

Date:	8-25-05	**Time:**	a.m.	1450 p.m.
Discussion with:	Jerry Gompers			
Firm/City with:	USACOE Portland District			
Phone Number:	503 808-5440			
Gray & Osborne Personnel:	Jim Dougherty			
Project:	Ridgefield WWTP Outfall Extension			
Subject:	Corps dredging			
G&O Job Number:	20053.58			

REMARKS:

Jerry Gompers is one of the Corps of Engineers dredge operators on the Columbia River. He returned my call to discuss dredging operations on the Columbia River. He said that his group is only authorized to dredge in the Federal Channel, and that they are occassionally tasked to dredg up to 100 feet beyond the federally maintained channel, so they would have no dredging operations in the Lake River Channel.

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ **Telephone Conversation**

☐ **Meeting**

Location of Phone Conversation: GRAY & OSBORNE INC.	
Place of Meeting:	

Date:	8-23-05	**Time:**	1115 a.m.	p.m.
Discussion with:	Ron Klump			
Firm/City with:	ACOE Vancouver Office			
Phone Number:	360 750-9046			
Gray & Osborne Personnel:	Jim Dougherty			
Project:	Ridgefield outfall alternative analysis/permitting			
Subject:	Dredging requirements, status of Camas Archaeological Study			
G&O Job Number:	20053.58			

REMARKS:

I put a call in to Ron Klump to learn what I could about sediment chemical analyses that would be required for extension of the outfall to the Columbia and for extension of the outfall 110 feet into Lake River. Ron said that the muddier the sediment, the more likely the need for sediment quality analyses. A sediment grain analysis would be required in any case. Corps guidelines call for sediment chemical analyses when the percentage of fine sediments reaches a certain portion of the sediment mixture. Thus, it is likely that a sediment chemical analysis would be required for the Lake River Extension and the portions of the pipeline to the Columbia River that lie closest to the Port of Ridgefield, but less likely farther out Lake River toward the Columbia where sediments should be sandier.

MEMORANDUM

TO: John Wilson, Mike Johnson
FROM: Jim Dougherty
DATE: 8-16-05
SUBJECT:Reconnaissance of Bachelor Slough & outfall pipeline alternative analysis

---

After meeting with the folks from USFWS in the morning on August 9, 2005, I launched my kayak a the Ridgefield boat ramp and paddled out Bachelor Slough to look at the potential routes for the effluent pipeline and outfall to the Columbia River from the Ridgefield WWTP. The Lake River channel appears to be consistently deep and navigable its entire length. Motor boats were observed going in and out even at low tide. Bachelor Slough, however is quite shallow to nearly dry toward its confluence with the Columbia River south of the bridge from the USFWS Unit to the south. The south side of the Bachelor Slough channel (mainland) is heavily vegetated with cottonwoods and other large woody riparian vegetation its entire length. On the north side of the channel (Bachelor Island), vegetation is mostly grasses and shrubs with a few trees, which would likely be better for pipeline installation. There is a row of telephone poles that extends from near the NE end of the island about 100 feet inland from the shoreline. I'm thinking these poles were probably placed along a service road. There is a concrete bridge across the channel of Bachelor Slough approximately 2/3 of the way to the Columbia River. Between this bridge and the Columbia River the Slough shallows significantly and almost goes dry near the River (I was there at a +1-foot tide). I took a few photos of the SE corner of Bachelor Island, the Columbia River and the DNR dredge spoils site. It appears that the beach and shallow subtidal benthic slope is fairly gradual at this location. There is a series of pilings (that appears to be similar to the structure supporting the Kalama WWTP outfall) extending south into the River from the south/eastern shore of Bachelor Slough.

Alternative Analysis:

Alternative 1: Lake River crossing to mainland and outfall extending into the Columbia River on the south side of Bachelor Slough.

Boring beneath Lake River to the Wildlife Refuge appears to be feasible. Running a pipeline along the south side of Bachelor Slough would require disturbance of a significant number of large cottonwood, alder trees, willows and other riparian vegetation along the route. It is possible that the outfall pipeline could be installed along the alignment of a series of existing pilings that extend about 150 feet into the Columbia

River. These pilings might provide some protection to the outfall pipeline. It should be noted that Bachelor Slough becomes quite shallow upstream of the bridge into the Refuge. This alternative would require an analysis of compatibility with the activities and mission of the Refuge, which would be time consuming and may not be successful. Other permits required include:

- Hydraulic Project Approval from the Washington Department of Fish & Wildlife;
- Aquatic Lands Use Authorization from the Department of Natural Resources;
- Rivers & Harbors Act, Section 10 permit from the Corps of Engineers;
- Endangered Species Act consultation with USFWS & NMFS;
- Shoreline and Sensitive/Critical Area permits from the City of Ridgefield and possibly Clark County.

It should be noted that the southwest end of Bachelor Slough near the Columbia River is very shallow and almost drys up at low tide, so running a pipeline along the bottom of the Bachelor Slough to the Columbia is probably not the most desirable route.

Alternative 2: Lake River Crossing, Bachelor Slough Crossing & outfall on the north side of Bachelor Slough.

The permitting and compatibility analysis requirements for this alternative would be the same as those discussed under Alternative 1. Installation of the effluent pipeline along the south side of Bachelor Island adjacent the north side of Bachelor Slough would involve disturbance of less significant riparian vegetation. A portion of the pipeline could be installed in existing road rights-of-way on the Island. As with Alternative 1, construction of an outfall to the Columbia River would involve installation of a fairly long outfall pipeline to reach depths that provide acceptable mixing & dilution. Costs associated with this alternative are estimated at ___.

Alternative 3: Lake River crossing to Bachelor Island with pipe in Duck Club Easement & outfall on the northwest side of the Island.

Crossing Lake River farther to the northwest and running the effluent pipeline to the NW corner of Bachelor Island would require the same permits as Alternatives 2 & 3. However, it is not clear whether a "Refuge Compatibility Analysis" would be required at this point (Refuge representatives seemed to think that a Compatibility Analysis would be necessary). This alternative would require coordination and possibly an easement from the Duck Club. Construction of the outfall to the Columbia River may be easier at the NW corner of Bachelor Island, depending upon bathymetry (i.e. a steeper slope would allow use of a shorter outfall). Costs for this alternative are estimated at ___.

Alternative 4: Underwater outfall route beyond the mouth of Lake River.

Construction of an outfall to the Columbia River along an underwater alignment in Lake River would require the following permits:

- Hydraulic Project Approval from WDFW,
- Shoreline Substantial Development Permitting from the City of Ridgefield and Clark County
- Aquatic Lands Use Authorization from the DNR
- Rivers & Harbors Act, Section 10 permit from the Corps of Engineers
- ESA consultation.

It would ***not*** require a USFWS Wildlife Refuge Compatibility Analysis, because the construction activity would occur over Washington State lands, which are managed by the Department of Natural Resources, therefore the USFWS Refuge would not have jurisdiction. They would still have input to the SEPA, Shoreline and Section 10 permitting processes.

Construction of the new outfall/diffuser offshore of the mouth of Lake River would minimize the potential for contamination of Lake River or adjacent nearshore areas on the mainland and Bachelor Island in the event of a WWTP failure. Costs for construction of this Alternative are estimated at ___.

Alternative 5: Upland disposal.
Treatment of effluent to tertiary standards with upland disposal would require expansion of the existing WWTF beyond the confines of the existing site footprint. It is possible that clean up of contaminated soils on the site would be necessary. Implementation of this alternative would also require acquisition of __ acres of forested property for land application activities.

Wastewater Treatment Plant expansion would require a Shoreline Substantial Development Permit for activities within 200 feet of the Shoreline (if any), and a City of Ridgefield and/or Clark County Sensitive Areas review. Washington State Department of Ecology Biosolids Management Permits and SEPA analysis would be required. A Clean Water Act, Section 404 permit would be required for any disturbance of wetlands associated with this project. Any federal funding or federal permitting would require National Environmental Policy Act (NEPA) compliance and Endangered Species Act consultation. No Wildlife Refuge Compatibility Analysis would be required for this alternative, because the Refuge would not be directly affected. Costs for this alternative are estimated at __.

Alternative 6: Jack and Bore Effluent Pipeline and Sewer Main to the Columbia River: Jacking and boring the effluent pipeline directly west from the Ridgefield WWTP to the Columbia River would require installation of a boring pit near the shore in Ridgefield and a similar structure at the other end of the bore on the west side of Bachelor Island. If the extraction point were located on the sandy area along the River administered by the Department of Natural Resources, most construction activity would occur outside of their jurisdiction. It is not clear whether a Refuge Compatibility Analysis would be required for this Alternative. Permits required would include:

- Shoreline permits and sensitive areas permitting from the City of Ridgefield and Clark County;
- SEPA Analysis;
- Hydraulic Project Approval from WDFW for the outfall to the Columbia River;
- Rivers & Harbors Act, Section 10 permitting from the US Army Corps of Engineers;
- Aquatic Lands Use Authorization from DNR.

John Wilson estimated the cost for this Alternative at about $6 million.

RIDGEFIELD COMMUNITY DEVELOPMENT DEPARTMENT
127 North Main Avenue
PO Box 608
Ridgefield, Washington 98642

DETERMINATION OF NONSIGNIFICANCE (DNS)

FILE NAME: City of Ridgefield General Sewer Plan/Facilities Plan

DESCRIPTION OF PROPOSAL: The General Sewer Plan/Facilities Plan prepared for the Ridgefield WWTP and collection system reviews the infrastructure improvements required to provide service to the City of Ridgefield and the surrounding UGA for the next 20 years (2025). Approximately $20 million of collection system expansion projects are also identified. Three construction phases were identified as necessary to serve projected growth. The Plan proposes multiple phases consisting of: Phase 1 that proposes the extension of the outfall diffuser pipe discharging to Lake River to ensure dilution at low tide and expansion of the existing Activated Sludge WWTP capacity to 0.7 MGD; Phase 2 that proposes expansion of the WWTP to 1.83 MGD to serve portion of the UGA, extension of the outfall to the Columbia River to facilitate dilution, acquisition of property for future expansion and Class A biosolids handling; and Phase 3 that proposes the expansion of the WWTP capacity to 2.68 MGD.

APPLICANT: City of Ridgefield Public Works Department, PO Box 608, 127 North Main Avenue, Ridgefield, WA 98642, (360) 887-8251.

PROPERTY OWNER: City of Ridgefield, PO Box 608, 230 Pioneer Street, Ridgefield, WA 98642, (360) 887-3557.

LOCATION OF PROPOSAL: Citywide

LEAD AGENCY: City of Ridgefield Community Development Department

DETERMINATION: The lead agency has determined that this proposal does not have a probable significant adverse impact on the environment. The lead agency will not act on this proposal for fourteen (14) calendar days from the issuance date of August 24, 2005. **The Ridgefield Community Development Department must receive written comments on the DNS no later than 5:00 p.m. on September 6, 2005.** An Environmental Impact Statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency.

RESPONSIBLE OFFICIAL / STAFF CONTACT: Kevin H. Snyder, AICP, Community Development Director, Ridgefield Community Development Department, 127 North Main Avenue, PO Box 608, Ridgefield, WA 98642, PH: (360) 887-3908 / FX: (360) 887-2507, kevin.snyder@ci.ridgefield.wa.us.

DATE ISSUED: August 24, 2005 **SIGNATURE:**________________________________

APPEAL: An appeal of this determination must be submitted to the Community Development Department within fourteen (14) calendar days from the date issued. This appeal must be written and make specific factual objections to the City's threshold determination. Appeals shall be conducted in conformance with RDC 18.810.205 (Appeals) of the City's Environmental Ordinance, and any required fees pursuant to RDC 18.810.205.F shall be paid at time of appeal submittal.

NOTICE OF SEPA THRESHOLD DETERMINATION
DETERMINATION OF NON-SIGNIFICANCE (DNS)
CITY OF RIDGEFIELD COMMUNITY DEVELOPMENT DEPARTMENT

Public Comment Period Ends: **September 6, 2005 at 5:00 p.m.**
Application: General Sewer Facilities Plan for the City of Ridgefield Wastewater Treatment Plant and Collection System Improvements
Description of Proposal: The General Sewer Plan/Facilities Plan prepared for the Ridgefield WWTP and collection system reviews the infrastructure improvements required to provide service to the City of Ridgefield and the surrounding UGA for the next 20 years (2025). Approximately $20 million of collection system expansion projects are also identified. Three construction phases were identified as necessary to serve projected growth. The Plan proposes multiple phases consisting of: Phase 1 that proposes the extension of the outfall diffuser pipe discharging to Lake River to ensure dilution at low tide and expansion of the existing Activated Sludge WWTP capacity to 0.7 MGD; Phase 2 that proposes expansion of the WWTP to 1.83 MGD to serve portion of the UGA, extension of the outfall to the Columbia River to facilitate dilution, acquisition of property for future expansion and Class A biosolids handling; and Phase 3 that proposes the expansion of the WWTP capacity to 2.68 MGD.
Property Owner: City of Ridgefield, PO Box 608, 230 Pioneer Street, Ridgefield, WA 98642, (360) 887-3557.
Applicant: City of Ridgefield Public Works Department, PO Box 608, 127 North Main Avenue, Ridgefield, WA 98642, (360) 887-8251.
Location of Proposal: Citywide
Lead Agency: City of Ridgefield Community Development Department
SEPA Threshold Determination: The lead agency has determined that this proposal does not have a probable significant adverse impact on the environment. The lead agency will not act on this proposal for fourteen (14) calendar days from the issuance date of August 24, 2005. **The Ridgefield Community Development Department must receive written comments on the DNS no later than 5:00 p.m. on September 6, 2005.** An Environmental Impact Statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency.
Responsible Official / Staff Contact: Kevin H. Snyder, AICP, Community Development Director, Ridgefield Community Development Department, PO Box 608, 230 Pioneer Street, Ridgefield, WA 98642, PH: (360) 857-5011 / FX: (360) 887-2507, kevin.snyder@ci.ridgefield.wa.us
Kevin Snyder, AICP, Community Development Director
Aug24

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ **Telephone Conversation**	**Location of Phone Conversation:** GRAY & OSBORNE INC.
☐ **Meeting**	**Place of Meeting:**

Date:	8-12-05	**Time:**	0900 a.m.	p.m.
Discussion with:	Nancy Brennan-Dubbs			
Firm/City with:	US Fish & Wildlife Service, Olympia			
Phone Number:	360 753-5835			
Gray & Osborne Personnel:	Jim Dougherty			
Project:	Ridgefield WWTP Upgrade & Outfall Extension			
Subject:	ESA concerns, BA organization and timing			
G&O Job Number:	05616			

REMARKS:

I returned Nancy's call to discuss USFWS ESA issues associated with the Ridgefield WWTP Upgrade and the two outfall extension projects. We discussed the reasons for dividing the project up into the 0.7 MGD upgrade and the rest of the upgrades to serve the larger UGA in the future. We agreed that it would be ok to deal with the initial upgrade to 0.7 MGD and outfall extension into Lake River as one project, and then deal with the larger upgrades in a second document. She said that they would be looking closely at water quality impacts more closely than they have in the past, and that she would send me an article which describes and lists the endocrine disrupting chemicals they are concerned about.

USFWS will be most concerned with potential impacts to bull trout and bald eagles associated with construction and operation of the plant. We discussed running the pipeline out to the Columbia River via the bottom of Lake River. She was concerned about potential impacts to tribal fishing (we should probably contact the Chinook Tribe on this project & possibly the Cowlitz Tribe). Nancy was also interested in why we weren't looking at running the pipe along the north side of Lake River. I mentioned archaeological issues, and she was wondering about laying the pipe on the surface, rather than burying it. I mentioned impacts to riparian vegetation, historical properties & materials, etc. Nancy also mentioned that USFWS is supposed to be publishing their latest critical habitat determinations for bull trout in late August or early September, though she admitted she didn't think there would be a lot of bull trout activity in Lake River.

We will have to explain whether the growth in the service area population is driving the WWTP expansion, or whether the plant expansion will cause the growth to happen.... So we may be able to deal with several stages of the future WWTP expansion in the second Biological Assessment. It may take a little longer to process, but it would probably be worthwhile in the long run. Nancy said that USFWS is currently pretty backed up on project review, so it would be prudent to get the BA(s) in as soon as possible.

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ **Telephone Conversation**

☐ **Meeting**

Location of Phone Conversation: GRAY & OSBORNE INC.	
Place of Meeting:	

Date:	8-12-5	**Time:**	10:30 a.m.	p.m.
Discussion with:	Carl Dugger			
Firm/City with:	WDFW Vancouver Office			
Phone Number:	360 906-6729			
Gray & Osborne Personnel:	Jim Dougherty			
Project:	Ridgefield WWTP Upgrade & Outfall Extensions			
Subject:	Outfall routing, construction techniques, timing			
G&O Job Number:	05016			

REMARKS:

I called Carl Dugger to discuss the proposed WWTP Upgrade and outfall extensions for the City of Ridgefield. He didn't have much concern about the extension of the existing outfall pipe by 110 feet into Lake River. He did recommend covering the pipe with crushed rock to prevent movement and protect it from boat anchors etc.

Carl was aware that a lot of development is going to be occurring between Ridgefield and I-5 in the next few years, and that the WWTP would have to be expanded significantly. He was not surprised that Ecology was asking the City to relocate the WWTP outfall to the Columbia River, as a similar project has been completed in an adjacent sewer system with a pipe running out the bottom of the Lewis River to the Columbia.

We discussed the options available to the City for getting the pipe to the Columbia. Carl recommended that the pipe be placed in the bottom of Lake River and extended about 2.5 miles into the Columbia. He figured it would be best to avoid the USFWS Refuge altogether, and it would be better to avoid riparian impacts associated with construction of a pipeline along the NE shore by putting the pipe in Lake River. He recommended that the Lake River bed is excavated approximately 3 feet and the sediment stored in a barge until the pipe is placed. Once the pipe is in place, he recommended placement of crushed rock or quarry spalls to protect the pipe from boat anchors etc. Carl will be writing the HPA for this project and his recommendations seem prudent. The dredging will add to the concerns from the agencies and will require silt fences to control water quality impacts. Work would occur during the Columbia River in-water work window extending from November 30 to February 28 to protect outmigrating juvenile salmonids. Work would be limited to daylight hours to allow returning adult steelhead etc. to move through the area.

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ **Telephone Conversation**

Location of Phone Conversation: GRAY & OSBORNE INC.	

☐ **Meeting**

Place of Meeting:	

Date:	8-11-05	Time:	a.m.	1415	p.m.
Discussion with:	Robert Whitlam				
Firm/City with:	Office of Archaeology & Historic Preservation				
Phone Number:	360-586-3065 ext. 2				
Gray & Osborne Personnel:	Jim Dougherty				
Project:	Ridgefield WWTP Upgrade & Outfall Extension				
Subject:	Archaeological requirements for outfall extensions				
G&O Job Number:	05616				

REMARKS:

I put a call in to Dr. Whitlam to determine what protocols, if any, would be required for installation of the proposed Ridgefield WWTP Upgrade, wastewater conveyance line and outfall installation. We discussed the proposed project and Dr. Whitlam recommended that we have an Archaeologist look at the route of the land excavation from the WWTP to the intertidal area. We should then discuss laying the pipeline on the bottom of Lake River and the Columbia with the Archaeologist and determine whether any additional surveys would be required. Dr. Whitlam confirmed that there are archaeological and historic sites along both sides of Lake River, and that running the pipeline along the bottom of Lake River would be likely to minimize potential for disturbance of archaeological and historic artifacts.

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ Telephone Conversation

☐ Meeting

Location of Phone Conversation: GRAY & OSBORNE INC.	
Place of Meeting:	

Date:	8-11-05	**Time:**	0930 a.m.		p.m.
Discussion with:	Ron Klump				
Firm/City with:	Army Corps of Engineers, Vancouver Regulatory				
Phone Number:	360 750-9046				
Gray & Osborne Personnel:	Jim Dougherty				
Project:	Ridgefield WWTF outfall extension				
Subject:	Permitting requirements for Lake River in-water option				
G&O Job Number:	05616				

REMARKS:

I put a call in to Ron Klump to check the status of the Camas Water Main Loop Project, and to discuss permitting requirements for an in-water effluent pipeline for the Ridgefield WWTP outfall extension to the Columbia River. Ron said that the permit application for the Camas Water Main Loop Project is ready except for the Corps and SHPO review and coordination of the archaeological portion of the (Corps' in-house) NEPA documentation for the project.

We discussed the two effluent pipeline and outfall extension projects for the Ridgefield WWTF. He said that the 100-foot extension of the existing outfall would require a Nationwide Permit #7, ESA consultation and Hydraulic Project Approval from WDFW, along with a Shoreline Substantial Development Permit. We discussed installation of a pipeline from Ridgefield to the Columbia River, and the fact that the USFWS has essentially said that running a sewer main across the Bachelor Island Refuge is incompatible with the 1997 Congressional Guidance. Ron thought that it might be possible to run a pipe along the shoreline, but admitted that there would be archaeological concerns with any excavation in that area. We discussed laying the sewer line along the bottom of Lake River for approximately 2.5 miles northwest from Ridgefield. He said that it would likely involve an Individual Corps Permit and could require formal ESA consultation. He recommended that I speak with Carl Dugger or Lisa Renan at WDFW and to get in touch with the ESA folks at USFWS and NMFS to see what sorts of issues they would have with the proposed action. I will attempt to contact these agencies by the end of the week.

Ron was wondering what the depth of Lake River is between Ridgefield and the Columbia. He recommended speaking with the Portland Office of the Corps to see whether this area is dredged, and to what depth, if it is.

GRAY & OSBORNE, INC.
TELEPHONE/MEETING CONVERSATION RECORD

☒ **Telephone Conversation**

☐ **Meeting**

Location of Phone Conversation: GRAY & OSBORNE INC.	
Place of Meeting:	

Date:	8-8-05	**Time:**	0900 a.m.	p.m.
Discussion with:	Message from Sharon R. Brown			
Firm/City with:	Ecology Sediment Program			
Phone Number:	360 407-6919			
Gray & Osborne Personnel:	Jim Dougherty			
Project:	Ridgefield WWTP Outfall Extension			
Subject:	Sediment monitoring requirement			
G&O Job Number:	20053.58			

REMARKS:

Ms. Brown called to leave a message regarding sediment-monitoring requirements for the Ridgefield Outfall Extension Project. She said that we would need to monitor the sediments at the existing outfall site to see what has been deposited over the years. We would also need to monitor at the site of the new outfall for baseline conditions. She didn't discuss what monitoring would be required for excavation along any pipeline route associated with pipe burial. I will call her back to discuss this and to get the contacts for the Sediment Group in Ecology's Vancouver Office.

CITY OF RIDGEFIELD

Gladys Doriot, Mayor
Gary Adkins, Council Member
Gary Holmberg, Council Member
David Standal, Council Member
Scott Hanson, Council Member

GRAY & OSBORNE, INC.
REC'D - SEATTLE
JUL 25 2005
JOB #

Friday, July 22, 2005

Jim Dorty
Gray & Osborne, Inc.
701 Dexter Avenue North, Suite 200
Seattle, Washington 98109

RE: Local Permitting required for the City Wastewater Treatment Plant Expansion- Outfall to Lake River

Dear Jim:

The proposal to bring wastewater outfall to Lake River will require three applications with the City of Ridgefield: 1) submit and environmental checklist which will initiate the SEPA process. To assist in the SEPA process, an archeological pre-determination report should also be included; 2) address the applicable criteria for a Sensitive Lands review. For the Sensitive Lands Review I will be looking for essentially two things: a) what types of sensitive lands are included within the project area and b) measures to mitigate impacts to the sensitive lands; 3) a Shorelines permit will be required for this proposal since Lake River is a designated shoreline in this area. This permit will also require a public hearing and approval from the City Hearing Examiner. I am sending you the Shorelines Master Plan for this area and have tagged the appropriate sections that you should address in your analysis.

As we discussed over the phone, a pre-application meeting would be appropriate for this project along with a representative from the Stat Department of Ecology and the Army Corps of Engineers who could assist in the state and federal permitting requirements and procedures. Since we do not have formal applications for these processes, don't hesitate to contact me if you have any questions at 360-857-5013 or sam.crummett@ci.ridgefield.wa.us.

Sincerely,

Sam Crummett
Associate Planner

C: Justin Clary, P.E., City of Ridgefield Public Works Director
Steve Wall, P.E., City of Ridgefield City Engineer
Kevin Snyder, A.I.C.P., City of Ridgefield Community Development Director

Attachments: Shorelines Master Plan
Shorelines Development Code criteria
Sensitive Lands Development Code criteria
Pre-Application form

George Fox, City Manager
P.O. Box 608 • 230 Pioneer Street • Ridgefield, WA • 98642
360.887.3557 • Fax 360.887.0861 • cityofridgefield@ci.ridgefield.wa.us

Gray & Osborne, Inc.
CONSULTING ENGINEERS

FAX COVER SHEET

DATE: 7-25-05

TO: Lori Guggenmos

WDFW Priority Habitats + Species Group

FAX NO: *Local:* ( )

or

Long Distance: 1-(360) 902-2946

FROM: Jim Dougherty

Telephone No: (206) 284-0860

Fax No: (206) 283-3206

We are transmitting 3 pages, including this cover sheet. If you do not receive all of the pages, please call us as soon as possible.

Also sent original document via U.S. Mail this date: ☐
Also sent original document via U.P.S. this date: ☐
Also sent original document via Federal Express this date: ☐

Client: Ø City of Ridgefield **G&O No:** 05338

Project: WWTP Upgrade and Outfall Extension

MESSAGES/COMMENTS:

Hi Lori!

We'll need the typical fish + wildlife information necessary for preparation of biological assessments, shoreline permits and critical areas studies for a proposed WWTP upgrade and outfall extension project.

Thanks,
Jim Dougherty

Washington Department of Fish and Wildlife
Mailing Address: 600 Capitol Way N • Olympia, WA ,501-1091 Main Office Location: Natural Resources E ing • 1111 Washington Street SE •Olympia, WA

Washington Department of FISH and WILDLIFE

FISH AND WILDLIFE ORDER FORM

HABITATS AND SPECIES INFORMATION

INSTRUCTIONS

Please complete this order form to request maps and/or digital data on locations of species and habitats. For descriptions of standard products and prices see the *Ordering Habitats and Species Information* sheet which accompanies this form or visit our web site at wdfw.wa.gov/hab/release.htm. **Mail completed form to: Washington Department of Fish and Wildlife, Priority Habitats and Species, 600 Capitol Way N., Olympia WA 98501-1091 or fax to (360) 902-2946.** You will receive an invoice itemizing the costs for your request and instructions for submitting payment. ***Sorry, we do not accept payments by credit card.*** For questions call (360) 902-2543. For information on state listed plants contact the Washington Department of Natural Resources at dnr.wa.gov/nhp.

Name: Jim Dougherty

Agency/Organization: Gray + Osborne, Inc.

Address: 701 Dexter Ave North, Suite 200

City: Seattle, ~~WA~~ State: WA Zip Code: 98109

Phone Number: 206-406-3929 Date of Request: 7-23-05

Does your agency/organization have a Release Agreement, which includes you as a contact, on file with the Washington Department of Fish and Wildlife regarding the confidentiality of sensitive information? ☑ Yes ☐ No ☐ Don't Know

Identify yourself as one of the following:

☐ Owner of land covered by this request ☐ Government agency ☐ Tribe ☐ Utility ☐ Conservation organization

☑ Consultant representing (please circle one:) Landowner Government agency Tribe Utility Conservation organization

☐ Researcher with a university ☑ Other (please specify) Consultant to City of Ridgefield

REQUESTER READ AND SIGN

By receiving fish and wildlife information from the Washington Department of Fish and Wildlife (WDFW), you incur an obligation to use it in a way that does not cause undue harm to our public fish and wildlife resources.

All fish and wildlife species are vulnerable to harm from human activities. Harm can occur directly (e.g., an animal is harassed or injured) or indirectly (e.g., a nest tree is felled or a wetland is drained). Harm can occur unintentionally, even by those who value the fish and wildlife resources (e.g., repeated visits to a heron rookery which flushes birds from the nest and exposes eggs to cold weather and predators). The most serious threats to fish and wildlife, rather than being direct and malicious acts, are indirect human actions where harm to fish and wildlife was unintentional.

The Washington State constitution confers fish and wildlife ownership to all citizens of the state. WDFW is mandated to safeguard this ownership by preserving, protecting and perpetuating fish and wildlife resources. The public has a crucial role in fulfilling this mandate, for two reasons. First, the statewide distribution of fish and wildlife species and habitat is beyond the monitoring capability of any single agency. Second, the state's constitution gives to the people ownership of fish and wildlife but not of the habitat on which fish and wildlife's survival ultimately depends. Property owners are also habitat owners and their collective actions have a profound effect on the state's fish and wildlife.

WDFW provides information on the location of many of Washington's most sensitive and vulnerable fish and wildlife resources. Use of this information must be commensurate with the vulnerability of fish and wildlife resources and with the conditions outlined in WDFW Releasing Sensitive Fish and Wildlife Information Policy 5210.

Fish and wildlife species are protected through specific legislation. Regulations most applicable to users of WDFW information include RCW 77.16.120 (taking of protected fish and wildlife), WAC 232-12-292 (Bald Eagle protection rules), WAC 232-12-064 (live fish and wildlife) and RCW 42.17.310 (exempting of sensitive fish and wildlife information from public inspection and copying).

I have read and understand the information above and certify that this form is filled out accurately and completely to the best of my knowledge. I understand that I will receive an invoice itemizing the costs for this request and instructions for submitting payment.

REQUESTER'S SIGNATURE X James D. Dougherty

Project Name/Number: Ridgefield WWTP Upgrade + Outfall Extension Project

Project Description/Use of Requested Information: Preparation of Biological Assessment, Shoreline + Sensitive Areas Documentation for a Wastewater Treatment Plant Upgrade and Outfall Extension.

Washington Department of Fish and Wildlife
Mailing Address: 600 Capitol Way N • Olympia, WA 985[illegible]-1091 Main Office Location: Natural Resources Building • 1111 Washington Street SE •Olympia, WA

Washington Department of FISH and WILDLIFE

FISH AND WILDLIFE ORDER FORM

HABITATS AND SPECIES INFORMATION

Project Location of Request [If you are requesting a detailed map or digital data, please specify by township, range and section and include a project vicinity map; format options for other maps include US Geological Survey (USGS) 7.5-minute quadrangle map name, USGS 1:100,000 map name, or county name]. List here or attach listing:
The City of Ridgefield WWTP + outfall are located in Section 24, Township 4 North, Range 1 West in Clark County.

Special Requests: We'll need info dealing with fish + wildlife species protected under the Federal ESA. Information on state listed species would also be useful.

STANDARD PRODUCTS

Indicate desired products by checking appropriate blank box:
(For descriptions of standard products and prices see the *Ordering Habitats and Species Information* sheet which accompanies this form or visit our web site at wdfw.wa.gov/hab/release.htm.)

MAP PRODUCTS		
1.	Detailed 1:24,000 Scale Habitats and Species Map (Detailed information on known locations of important fish, wildlife and habitats; a report accompanies this map.)	✓
2.	Single Species or Habitat Distribution Map (Please specify desired single species or single habitat type in the special requests section of this form; map displays one species per map or one habitat type per map.)	
3.	Habitats and Species Summary Map by County (Summary information of habitat and species sites and areas.)	✓
4.	Marine Resource Map (Generalized information of marine fish and shellfish; if you are requesting the detailed Habitat and Species map this information is included.)	
5.	Old Growth Map (Information from 1988/1989; available for Western Washington only.)	✓
DIGITAL DATA PRODUCTS		
6.	Priority Habitats and Species Polygon, Wildlife Heritage, Spotted Owl, and Marbled Murrelet Points Databases (Information in these databases are updated on a regular basis.)	
7.	Washington Lakes and Rivers Information System (WLRIS) Fish Distribution Database (Selected fish species information are updated on a regular basis.)	
8.	Marine Resources, Seabird Colonies and Seal/Sea Lion Haulout Databases (Information in these databases are rarely updated.)	
9.	Old Growth Database (Information from 1988/1989; no anticipated updates.)	
10.	National Wetlands Inventory Database (Information from US Fish and Wildlife Service; no anticipated updates.)	

Standard Map Options (check relevant options)

☑ Provide map(s) on paper
☐ Provide map(s) on mylar film

Include documentation for map(s)
☑ Yes ☐ No

Standard Digital Data Options (check relevant options)
Digital data is for use with Geographic Information Software (GIS); it is not an image of a map.

☐ Provide as ESRI export file format
☐ Provide as ESRI shape file format

Include printed digital documentation
☑ Yes ☐ No

☐ Provide on Compact Disk (CD)
☐ Provide on Iomega Zip Disk

Provide as State Plane South Projection:
☐ NAD 1927 or ☐ NAD 1983 (1991 adjustment)

☐ Transfer data via ftp
Please provide the following for your site:
address: ______
login: ______
password: ______
directory path: ______

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN IN WESTERN WASHINGTON AS PREPARED BY THE U.S. FISH AND WILDLIFE SERVICE WESTERN WASHINGTON FISH AND WILDLIFE OFFICE

(Revised October 8, 2004)

CLARK COUNTY

LISTED

Wintering bald eagles (*Haliaeetus leucocephalus*) occur in the county from about October 31 through March 31.

There are four bald eagle communal winter night roosts located in the county.

There are five bald eagle nesting territories located in the county. Nesting activities occur from about January 1 through August 15.

Bull trout (*Salvelinus confluentus*) occur in the county.

Northern spotted owls (*Strix occidentalis caurina*) occur in the county throughout the year.

Gray wolves (*Canis lupus*) may occur in the county.

Major concerns that should be addressed in your Biological Assessment of project impacts to listed species include:

1. Level of use of the project area by listed species.

2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.

3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

Castilleja levisecta (golden paintbrush) may occur in the county.

Howellia aquatilis (water howellia) occurs in the county.

Lomatium bradshawii (Bradshaw's lomatium) occurs in the county.
Major concerns that should be addressed in a biological assessment of this listed plant species include:

1. Distribution of taxon in project vicinity.

2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.

3. Changes in hydrology where taxon is found.

DESIGNATED

Critical habitat for the bull trout (Columbia River distinct population segment) has been designated in Clark County.

PROPOSED

None.

CANDIDATE

Oregon spotted frog (*Rana pretiosa*)

SPECIES OF CONCERN

California wolverine (*Gulo gulo luteus*)
Cascades frog (*Rana ascadae*)
Coastal cutthroat trout (*Oncorhynchus clarki clarki*)
Larch Mountain salamander (*Plethodon larselli*)
Long-eared myotis (*Myotis evotis*)
Long-legged myotis (*Myotis volans*)
Northern goshawk (*Accipiter gentilis*)
Northwestern pond turtle (*Emys (= Clemmys) marmorata marmorata*)
Olive-sided flycatcher (*Contopus cooperi*)
Pacific lamprey (*Lampetra tridentata*)
Pacific Townsend's big-eared bat (Corynorhinus townsendii townsendii)
Peregrine falcon (*Falco peregrinus*)
River lamprey (*Lampetra ayresi*)
Slender-billed white-breasted nuthatch (*Sitta carolinensis aculeata*)
Tailed frog (*Ascaphus truei*)
Van Dyke's salamander (*Plethodon vandykei*)
Western gray squirrel (*Sciurus griseus griseus*)
Western toad (*Bufo boreas*)
Cimicifuga elata (tall bugbane)
Lathyrus torreyi (Torrey's peavine)

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN IN CLARK COUNTY AS PREPARED BY THE U.S. FISH AND WILDLIFE SERVICE WESTERN WASHINGTON FISH AND WILDLIFE OFFICE

(Revised November 1, 2007)

LISTED

Bull trout (*Salvelinus confluentus*)

Gray wolf (*Canis lupus*)

Northern spotted owl (*Strix occidentalis caurina*)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

Castilleja levisecta (golden paintbrush) [historic]

Howellia aquatilis (water howellia)

Lomatium bradshawii (Bradshaw's lomatium)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in project vicinity.
2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.
3. Changes in hydrology where taxon is found.

DESIGNATED

Critical habitat for bull trout

PROPOSED

None

CANDIDATE

(Brush Prairie) Mazama pocket gopher (*Thomomys mazama* ssp. *oregonus*)
Oregon spotted frog (*Rana pretiosa*)

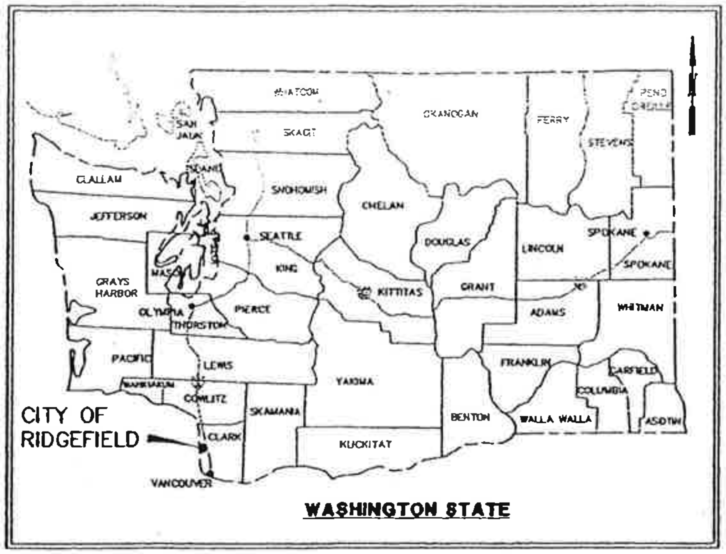
SPECIES OF CONCERN

Aleutian Canada goose (*Branta canadensis leucopareia*)
Bald eagle (*Haliaeetus leucocephalus*)
California wolverine (*Gulo gulo luteus*)
Cascades frog (*Rana ascadae*)
Coastal cutthroat trout (*Oncorhynchus clarki clarki*) [southwest Washington DPS]
Larch Mountain salamander (*Plethodon larselli*)
Long-eared myotis (*Myotis evotis*)
Long-legged myotis (*Myotis volans*)
Northern goshawk (*Accipiter gentilis*)
Northwestern pond turtle (*Emys (= Clemmys) marmorata marmorata*)
Olive-sided flycatcher (*Contopus cooperi*)
Pacific lamprey (*Lampetra tridentata*)
Pacific Townsend=s big-eared bat (Corynorhinus townsendii townsendii)
Peregrine falcon (*Falco peregrinus*)
River lamprey (*Lampetra ayresi*)
Slender-billed white-breasted nuthatch (*Sitta carolinensis aculeata*)
Tailed frog (*Ascaphus truei*)
Van Dyke=s salamander (*Plethodon vandykei*)
Western gray squirrel (*Sciurus griseus griseus*)

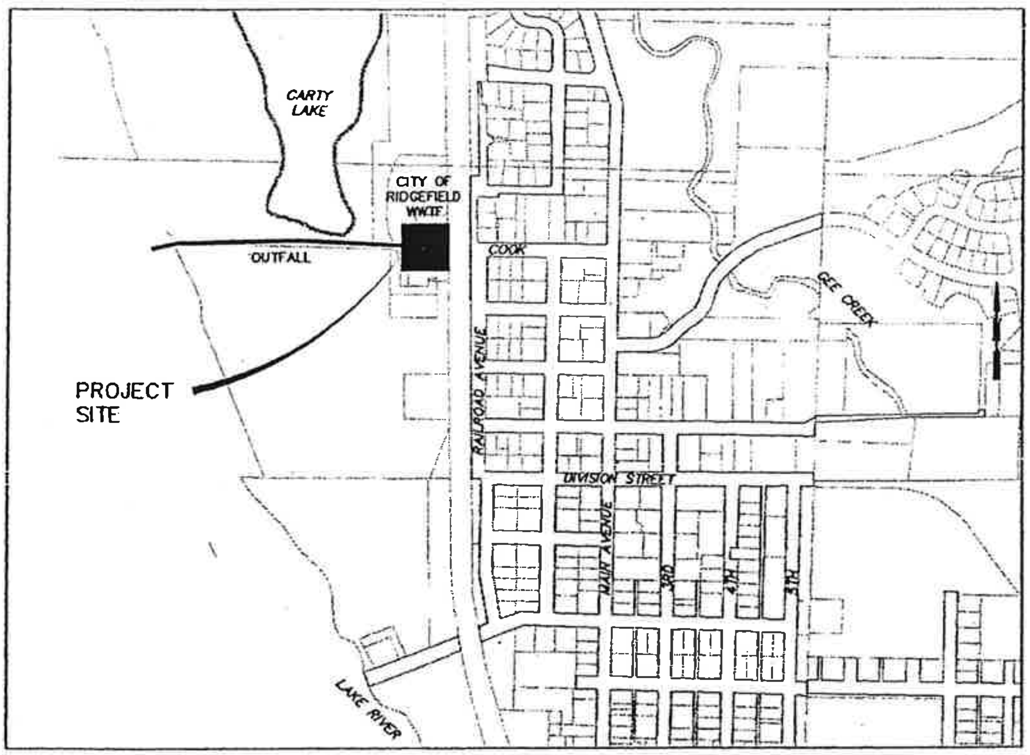
Western toad (*Bufo boreas*)
Cimicifuga elata (tall bugbane)
Corydalis aquae-gelidae (Clackamas corydalis)
Lathyrus torreyi (Torrey's peavine) [historic]

CHAPTER 6

EXHIBITS



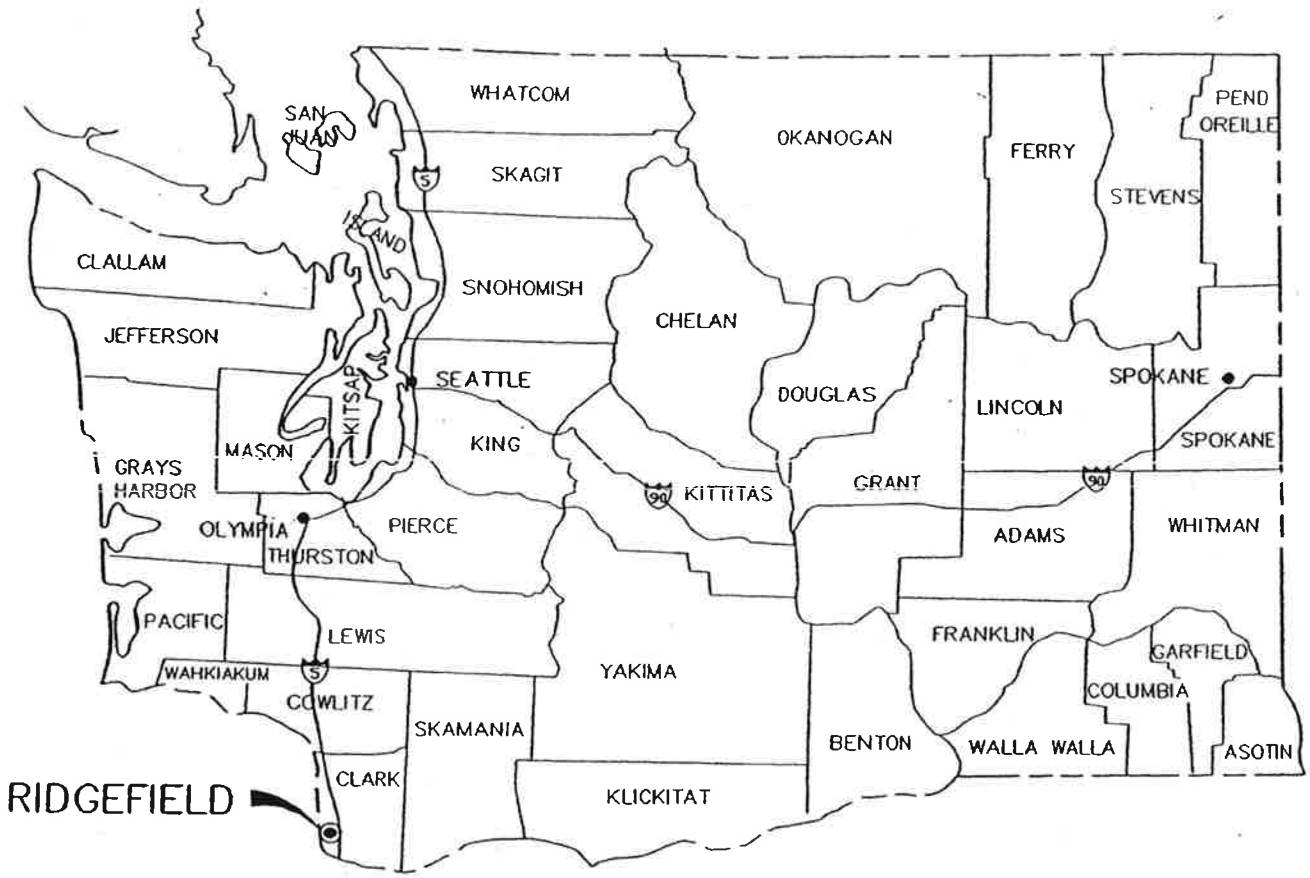
VICINITY MAP
NOT TO SCALE



LOCATION MAP
SCALE: 1"=800'

CITY OF RIDGEFIELD
WWTF IMPROVEMENTS
BIOLOGICAL EVALUATION
LOCATION MAP AND VICINITY MAP

Gray & Osborne, Inc.
CONSULTING ENGINEERS



VICINITY MAP

NOT TO SCALE

CITY OF RIDGEFIELD

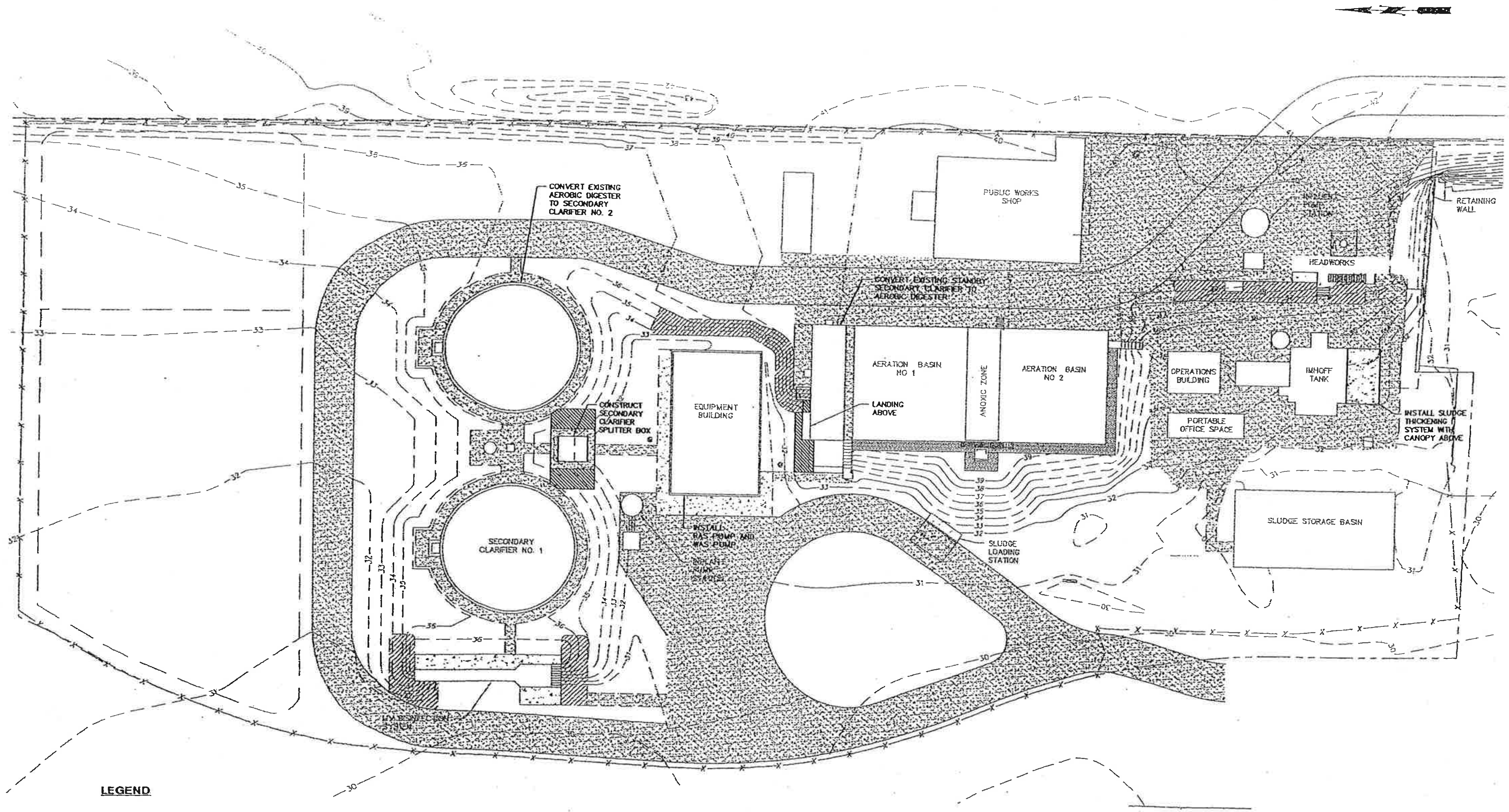
GENERAL SEWER COMPREHENSIVE PLAN/FACILITY PLAN

FIGURE 1-1

VICINITY MAP

Gray & Osborne, Inc.

CONSULTING ENGINEERS



LEGEND

EXISTING	PROPOSED
GRAVEL SURFACING	GRAVEL SURFACING
CEMENT CONCRETE	CEMENT CONCRETE
GRASS	HYDROSEED
LANDSCAPE MULCH	
AREA INLET	

CITY OF RIDGEFIELD
WWTF IMPROVEMENTS
BIOLOGICAL EVALUATION
SITE GRADING AND PAVING PLAN

Gray & Osborne, Inc.
CONSULTING ENGINEERS

CITY OF RIDGEFIELD

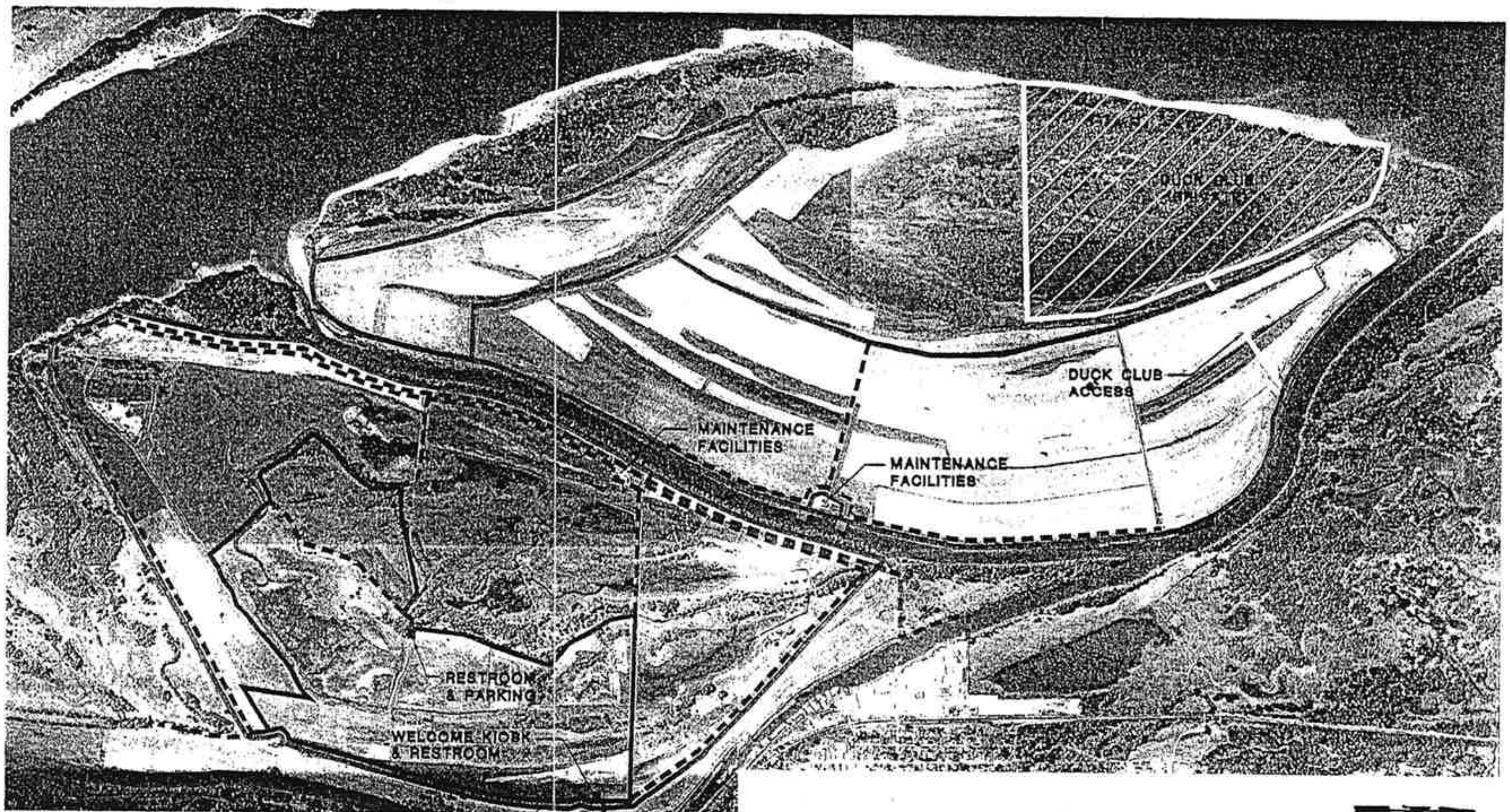
GENERAL SEWER COMPREHENSIVE PLAN / FACILITY PLAN

FIGURE 7-2

FUTURE SEWER EXTENSIONS

Gray & Osborne, Inc.

CONSULTING ENGINEERS

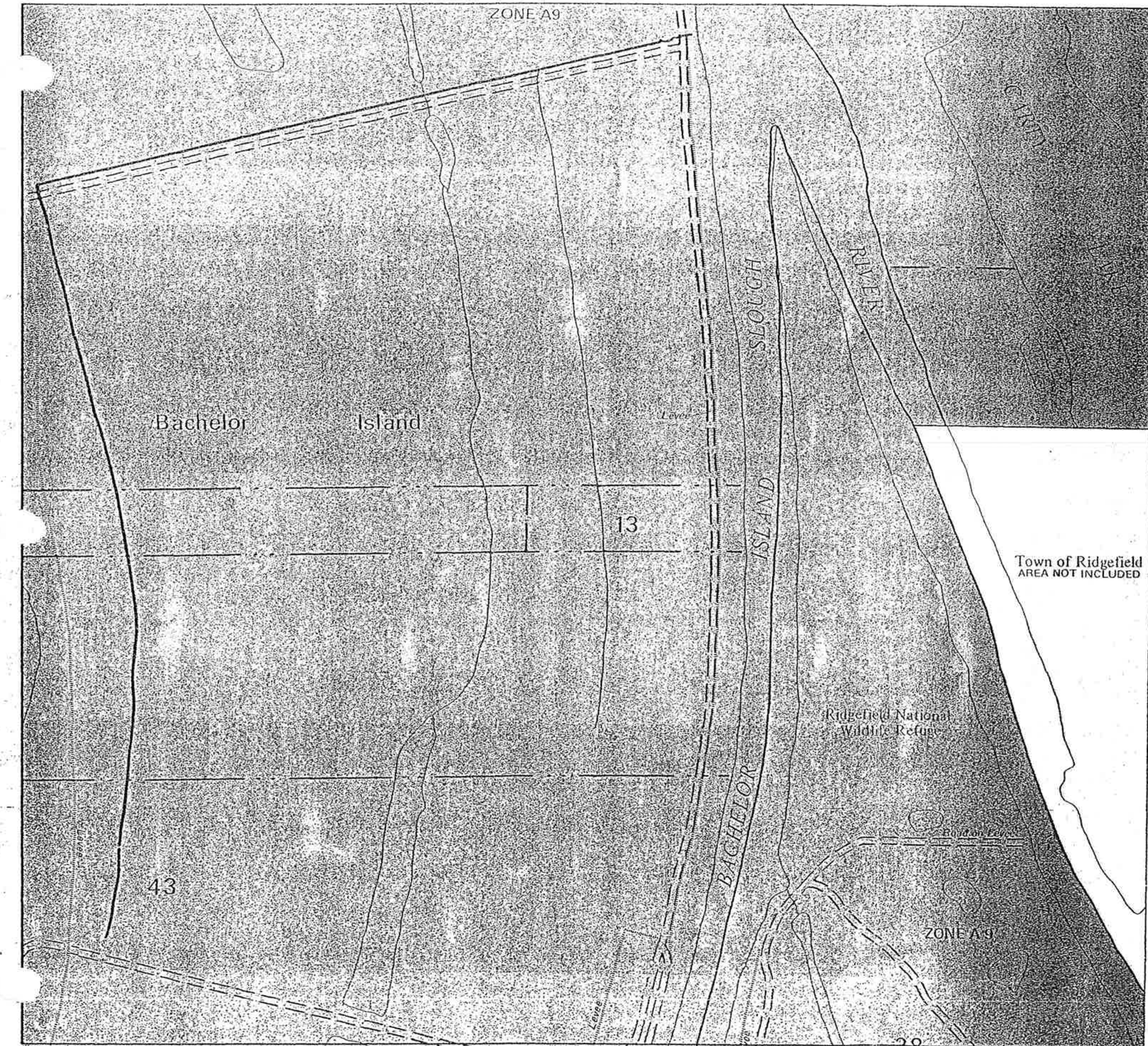


LEGEND

- PREFERRED OUTFALL ROUTE (≈14,000 LF OF 24" DIA. PIPE)
- ROADS ACCESSIBLE TO PUBLIC
- OTHER ACCESS ROADS
- DIKES
- FACILITIES
- PIPES
- PUMPS

TOTAL AREA REFUGE AREA= 5,150 ACRES
TOTAL AREA DISTURBED BY PROJECT=6 ACRES

CITY OF RIDGEFIELD
COLUMBIA RIVER OUTFALL



Map rev
zone de
cultural

To dete
contact
Program

APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY,
WASHINGTON
(UNINCORPORATED AREAS)

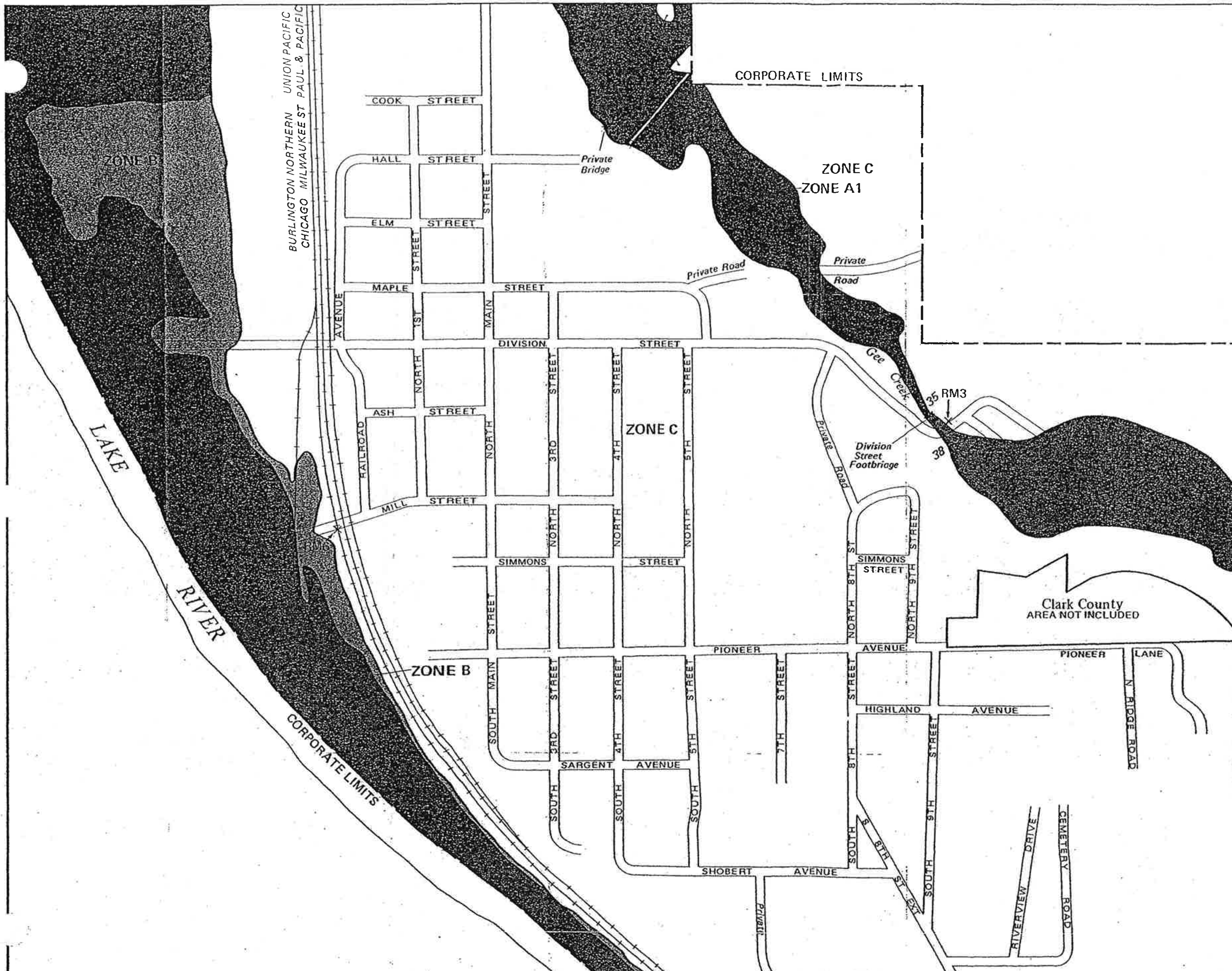
PANEL 134 OF 475

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
530024 0134 C

MAP REVISED:
AUGUST 19, 1986

Federal Emergency Management Agency



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

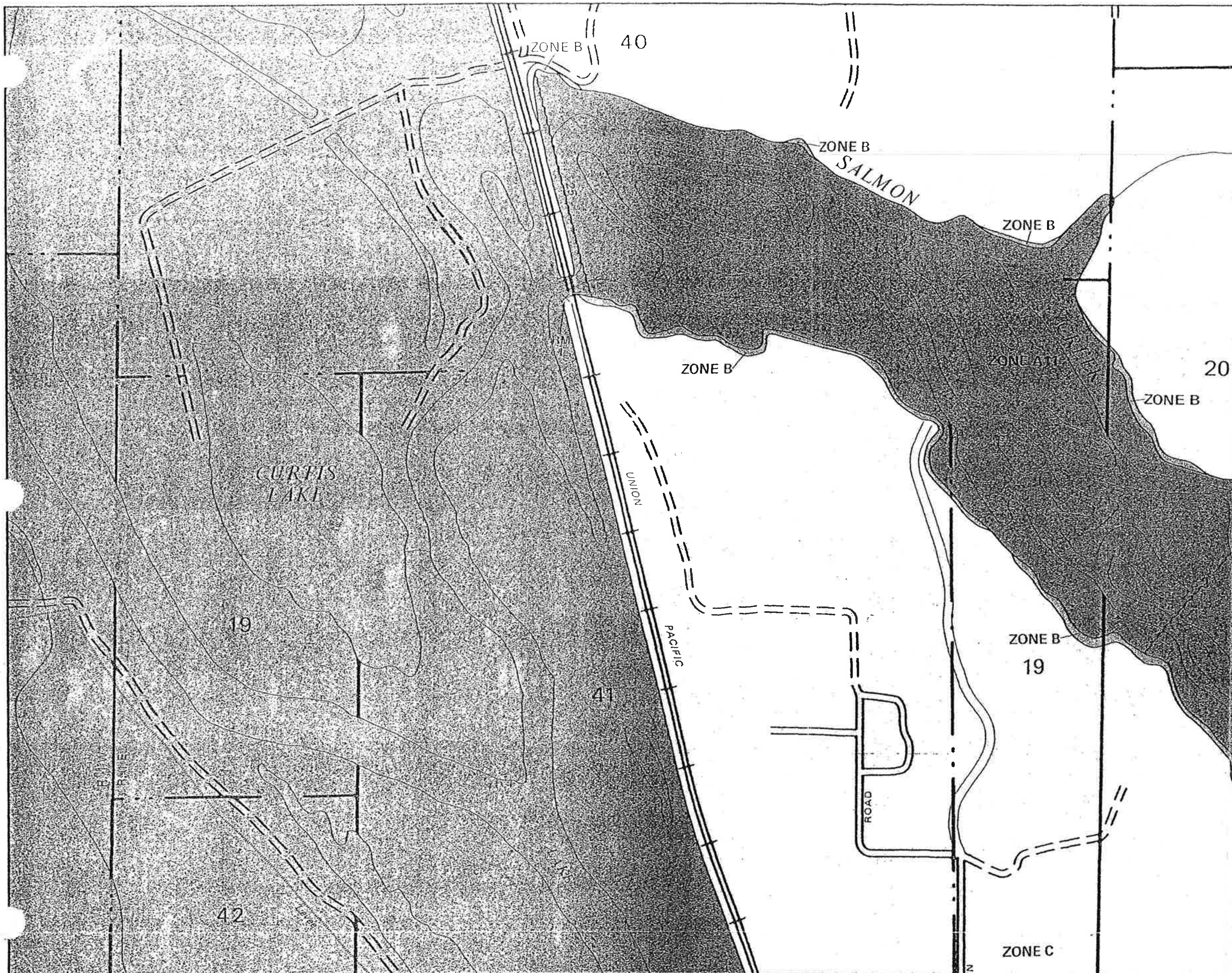
TOWN OF
RIDGEFIELD, WASHINGTON
CLARK COUNTY

ONLY PANEL PRINTED

COMMUNITY-PANEL NUMBER
530298 0001 B

EFFECTIVE DATE:
MAY 19, 1981

federal emergency management agency
federal insurance administration



APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

CLARK COUNTY, WASHINGTON

(UNINCORPORATED AREAS)

PANEL 276 OF 475

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
530024 0276 C

MAP REVISED:
AUGUST 19, 1986

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

U.S. Census Bureau
American FactFinder

FACT SHEET

Ridgefield city, Washington

View a Fact Sheet for a race, ethnic, or ancestry group

Census 2000 Demographic Profile Highlights:

General Characteristics - show more >>	Number	Percent	U.S.		
Total population	2,147			map	brief
Male	1,063	49.5	49.1%	map	brief
Female	1,084	50.5	50.9%	map	brief
Median age (years)	35.5	(X)	35.3	map	brief
Under 5 years	144	6.7	6.8%	map	
18 years and over	1,508	70.2	74.3%		
65 years and over	229	10.7	12.4%	map	brief
One race	2,094	97.5	97.6%		
White	2,043	95.2	75.1%	map	brief
Black or African American	6	0.3	12.3%	map	brief
American Indian and Alaska Native	24	1.1	0.9%	map	brief
Asian	15	0.7	3.6%	map	brief
Native Hawaiian and Other Pacific Islander	1	0.0	0.1%	map	brief
Some other race	5	0.2	5.5%	map	
Two or more races	53	2.5	2.4%	map	brief
Hispanic or Latino (of any race)	38	1.8	12.5%	map	brief
Household population	2,086	97.2	97.2%	map	brief
Group quarters population	61	2.8	2.8%	map	
Average household size	2.82	(X)	2.59	map	brief
Average family size	3.18	(X)	3.14	map	
Total housing units	777			map	
Occupied housing units	739	95.1	91.0%		brief
Owner-occupied housing units	522	70.6	66.2%	map	
Renter-occupied housing units	217	29.4	33.8%	map	brief
Vacant housing units	38	4.9	9.0%	map	

Social Characteristics - show more >>	Number	Percent	U.S.		
Population 25 years and over	1,393				
High school graduate or higher	1,278	91.7	80.4%	map	brief
Bachelor's degree or higher	286	20.5	24.4%	map	
Civilian veterans (civilian population 18 years and over)	188	12.2	12.7%	map	brief
Disability status (population 5 years and over)	475	23.5	19.3%	map	brief
Foreign born	52	2.4	11.1%	map	brief
Male, Now married, except separated (population 15 years and over)	503	62.2	56.7%		brief
Female, Now married, except separated (population 15 years and over)	515	60.0	52.1%		brief
Speak a language other than English at home (population 5 years and over)	86	4.1	17.9%	map	brief

Economic Characteristics - show more >>	Number	Percent	U.S.		
In labor force (population 16 years and over)	1,020	63.3	63.9%		brief
Mean travel time to work in minutes (workers 16 years and over)	25.8	(X)	25.5	map	brief
Median household income in 1999 (dollars)	46,012	(X)	41,994	map	
Median family income in 1999 (dollars)	51,121	(X)	50,046	map	
Per capita income in 1999 (dollars)	21,696	(X)	21,587	map	
Families below poverty level	27	4.4	9.2%	map	brief
Individuals below poverty level	134	6.3	12.4%	map	

Housing Characteristics - show more >>	Number	Percent	U.S.

Gray & Osborne, Inc.
CONSULTING ENGINEERS

DATE: December 5, 2005

TO: City of Ridgefield
Public Works Departmente
PO box 608
Ridgefield WA 98642

ATTN: Justin Cleary
Public Works Director

FROM: Jim Dougherty

PROJECT #: 05616

SUBJECT: Rivers & Harbors Act, Section 10 Permit Application for the Wastewater Treatment Plant Outfall Improvement Project for the City of Ridgefield

WE ARE TRANSMITTING:

- [x] Herewith
- [ ] Under Separate Cover

Number of Copies: 5

THE FOLLOWING:

- [ ] Prints
- [ ] Construction Drawings
- [ ] Specifications
- [ ] Shop Drawings
- [ ] Change Order
- [ ] Legal Description
- [ ] Letters
- [x] JARPA, Biological Assessment

FOR:

- [ ] Review & Comment
- [ ] Approval
- [x] Signature
- [x] Your Use & Files
- [ ] As Requested
- [x] Action Noted Below
- [ ]
- [ ]

COMMENTS:

Mr. Clary:

The application package for the Rivers & Harbors Act, Section 10 Permit, for the Ridgefield Wastewater Treatment Plant Outfall Extension to Lake River is enclosed. Please sign the JARPA form and send it and three copies of the Biological Assessment to:

US Army Corps of Engineers
Seattle District
Regulatory Branch
PO Box 3755
Seattle, WA 98124-2255

Send one copy of this application package to:
Mr. Ron Klump
US Army Corps of Engineers
SW Washington Field Office
2108 Grand Boulevard
Vancouver, WA 98661-4621

Keep the other package for your records. I am working on the application for the Aquatic Lands Use Authorization from DNR, but I'm thinking we can hold off on this submittal until we have more information regarding the final location of the outfall, which might change slightly as a result of the Corps permitting process and review of the Biological Assessment.

Please call if you have questions.

Jim Dougherty

Jim Dougherty

Gray & Osborne, Inc.
CONSULTING ENGINEERS

DATE: December 2, 2005

TO: Washington Department of Fish & Wildlife
Region 5 Office
2108 Grand Avenue
Vancouver, WA 98661-4624

ATTN: Lisa Renan

FROM: Jim Dougherty

PROJECT #: 05616

SUBJECT: Hydraulic Project Application for the Wastewater Treatment Plant Improvement Project for the City of Ridgefield

WE ARE TRANSMITTING:	*THE FOLLOWING:*	*FOR:*
☒ Herewith	☐ Prints	☒ Review & Comment
☐ Under Separate Cover	☐ Construction Drawings	☒ Approval
	☐ Specifications	☐ Signature
Number of Copies: 3	☐ Shop Drawings	☐ Your Use & Files
	☐ Change Order	☐ As Requested
	☐ Legal Description	☐ Action Noted Below
	☐ Letters	☐ ________
	☒ JARPA	☐ ________

COMMENTS:

Hi Lisa!

The Joint Aquatic Resources Permit Application Package for the proposed improvements to City of Ridgefield's Wastewater Treatment Plant Outfall is attached. The package includes:

- Three (3) copies of the JARPA form
- Aerial photos of the City, WWTP etc.
- Cross section and plan view drawings of the proposed outfall, pipe etc.
- Map of the City of Ridgefield and WWTP

Please note that this application is for the outfall extension to Lake River. The application for the Columbia River outfall route will be forthcoming in the next year, or so.

Let me know if you need anything else.

Jim Dougherty

Jim Dougherty

Agency Reference #:	AGENCY USE ONLY
Circulated by:	Date Received: (local govt. or agency)

JOINT AQUATIC RESOURCES PERMIT APPLICATION FORM (JARPA)

(for use in Washington State)

PLEASE TYPE OR PRINT IN BLACK INK.

TO FILL IN ELECTRONICALLY, USE F11 TO MOVE THROUGH THE FORM

☐ Application for a Fish Habitat Enhancement Project per requirements of RCW 77.55.290. You must submit a copy of this completed JARPA application form and the (Fish Habitat Enhancement JARPA Addition) to your local Government Planning Department and Washington Department of Fish & Wildlife Area Habitat Biologist on the same day.

NOTE: LOCAL GOVERNMENTS – You must submit any comments on these projects to WDFW within 15 working days.

Based on the instructions provided, I am sending copies of this application to the following: *(check all that apply)*

[X] Local Government for shoreline: [X] Substantial Development ☐ Conditional Use ☐ Variance ☐ Exemption ☐ Revision
[X] Floodplain Management [X] Critical Areas Ordinance

[X] Washington Department of Fish and Wildlife for HPA (Submit 3 copies to WDFW Region)
[X] Washington Department of Ecology for 401 Water Quality Certification (to Regional Office-Federal Permit Unit)
[X] Washington Department of Natural Resources for Aquatic Resources Use Authorization Notification
[X] Corps of Engineers for: [] Section 404 [X] Section 10 permit
☐ Coast Guard for: ☐ General Bridge Act Permit ☐ Private Aids to Navigation (for non-bridge projects)
☐ For Department of Transportation projects only: This project will be designed to meet conditions of the most current Ecology/Department of Transportation Water Quality Implementing Agreement

SECTION A - Use for all permits covered by this application. Be sure to ALSO complete Section C (Signature Block) for all permit applications.

1. APPLICANT
City of Ridgefield Public Works, Attn: Justin Clary, Public Works Director

MAILING ADDRESS
PO Box 608, 230 Pioneer Street, Ridgefield, WA 98642

WORK PHONE	E-MAIL ADDRESS	HOME PHONE	FAX #
360 887-5020	**Justin.clary@ci.ridgefield.wa.u**		**360 887-2507**

If an agent is acting for the applicant during the permit process, complete #2. Be sure agent signs Section C (Signature Block) for all permit applications

2. AUTHORIZED AGENT
Michael Johnson, P.E., Gray & Osborne, Inc.

MAILING ADDRESS
2401 Bristol Court SW, Building A, Olympia, WA 98502

WORK PHONE	E-MAIL ADDRESS	HOME PHONE	FAX #
360 754-4266	**mjohnson@g-o.com**		**360 754-2135**

3. Relationship of applicant to property: [] OWNER ☐ PURCHASER [X] LESSEE ☐

4. Name, address and phone number of property owner(s) if other than applicant: **Port of Ridgefield, PO Box 55, Ridgefield, WA 98642**
Washington Dept. of Natural Resources, PO Box 47001, Olympia, WA 98504

5. Location (street address, including city, county and zip code, where proposed activity exists or will occur)
Ridgefield WWTP, West Cook Street, Ridgefield, WA 98642

Local government with jurisdiction (city or county)

Waterbody you are working in Lake River Is this waterbody on the 303(d) List** YES [X] NO [] If YES, what parameter(s)? **temp., fecal coliform,** **For 303d List, http://www.ecy.wa.gov/programs/wq/303d/index.html	Tributary of **Columbia River**	WRIA # **28 Salmon-Washougal**
	Shoreline designation **Urban (outfall)**	
	Zoning designation **Public Facility at the WWTP site**	

¼ Section	Section	Township	Range	Government Lot	DNR stream type if known **Type 2**
	24	**4 North**	**1West**		

Latitude and Longitude: **Lat 45°49'18", Long:122°45'09"** | Tax Parcel Numbers: **68314000**

6. Describe the current use of the property, and structures existing on the property. Have you completed any portion of the proposed activity on this property? ☐ YES ☒ NO

The existing Ridgefield WWTP and 10-inch outfall to the shoreline of Lake River is currently on the site. The Port of Ridgefield is currently completing a hazardous materials cleanup on a portion of the property.

None of the proposed WWTP or outfall improvements have been undertaken to date, December 2005. The proposed project involves the attachment of approximatey 110 feet of 10-inch HDPE pipe with a single-port outfall to the end of the existing outfall pipeline, which is located near the high tide level on the beach. The HDPE pipe will be welded on-shore and towed into Lake River with a workboat. Approximately nine concrete collars will be bolted to the outfall pipe to provide negative buoyancy. The effluent pipeline and outfall will be towed off-shore and dropped into place. Signs will be posted in the Ridgefield Marina and adjacent to the outfall route to warn boaters to avoid anchoring near the outfall pipeline and diffuser. The outfall pipeline and diffuser will be removed from the bottom of Lake River once the new outfall to the Columbia River is completed (approximately 2009-2010).

Is the property agricultural land? ☐ YES ☒ NO* Are you a USDA program participant? ☐ YES ☒ NO

7a. Describe the proposed work that needs aquatic permits: Complete plans and specifications should be provided for all work waterward of the ordinary high water mark or line, including types of equipment to be used. If applying for a shoreline permit, describe all work within and beyond 200 feet of the ordinary high water mark. If you have provided attached materials to describe your project, you still must summarize the proposed work here. Attach a separate sheet if additional space is needed.

Proposed improvements on the site of the Ridgefield WWTP do not require aquatic permits, as the facility is more than 200 feet from Lake River. The Washington Department of Ecology is requiring the City of Ridgefield to extend its existing 10-inch diameter outfall (which currently discharges on the bank of Lake River) by approximately 110 feet so that the outfall is continuously covered by at least seven feet of water.

PREPARATION OF DRAWINGS: See sample drawings and guidance for completing the drawings. *ONE SET OF ORIGINAL OR GOOD QUALITY REPRODUCIBLE DRAWINGS MUST BE ATTACHED.* NOTE: Applicants are encouraged to submit photographs of the project site, but these DO NOT substitute for drawings. *THE CORPS OF ENGINEERS AND COAST GUARD REQUIRE DRAWINGS ON 8-1/2 X 11 INCH SHEETS. LARGER DRAWINGS MAY BE REQUIRED BY OTHER AGENCIES.*

7b. Describe the purpose of the proposed work and why you want or need to perform it at the site. Please explain any specific needs that have influenced the design.

The purpose of the proposed outfall extension into Lake River is to assure proper dilution and mixing of effluent from the Ridgefield WWTP, and to comply with Ecology Standards for wastewater treatment plant outfalls.

7c. Describe the potential impacts to characteristic uses of the water body. These uses may include fish and aquatic life, water quality, water supply, recreation and aesthetics. Identify proposed actions to avoid, minimize, and mitigate detrimental impacts and provide proper protection of fish and aquatic life. Identify which guidance documents you have used. Attach a separate sheet if additional space is needed.

The Ridgefield WWTP currently discharges effluent treated to secondary standards to the shoreline of Lake River via a 10-inch pipeline where the outfall is only covered at high tide. Implementation of the proposed outfall extension project will improve dilution of effluent in Lake River (per Ecology requirements) by ensuring at least seven feet of cover at low tide. More complete dilution/dispersal of effluent in Lake River will improve water quality along the shoreline where juvenile salmonids are likely to rear. Improved dilution of effluent in Lake River will also enhance migratory habitat for returning adult salmonids. Extending the outfall 110 feet offshore may allow Ecology and the Department of Health to reduce the shoreline use restrictions currently in place because of the existing outfall. Construction of the new outfall pipeline would occur over the course of approximately one week to one month and would not interfere with navigation, once the work is complete. Wildlife not accustomed to the presence of humans and heavy machinery in the project area would be likely to return to the area, once construction activity is completed. This outfall extension project would provide adequate effluent dilution until discharge from the WWTP exceeds 0.7 MGD in approximately 2009. Water quality outside of the mixing zone will meet or exceed the requirements of the new facility's National Pollutant Discharge Elimination Permit through the planning period. Water quality in Lake River will be improved both by removal of effluent discharge from the shoreline and dilution afforded by the depth of the new outfall.

7d. For in water construction work, will your project be in compliance with the State of Washington water quality standards for turbidity WAC 173.201A-110? ☒ YES ☐ NO (See USEFUL DEFINITIONS AND INSTRUCTIONS)

8. Will the project be constructed in stage YES [ ] NO [X]

Proposed starting date: Fall 2006

Estimated duration of activity: 1 month

9. Check if any temporary or permanent structures will be placed:

[X] Waterward of the ordinary high water mark or line for fresh or tidal waters AND/OR

[X] Waterward of the mean higher high water for tidal waters?

10. Will fill material (rock, fill, bulkhead, or other material) be placed:

[ ] Waterward of the ordinary high water mark or line for fresh waters?

If **YES**, VOLUME (cubic yards) / AREA (acres)

[X] Waterward of the mean higher high water for tidal waters?

If **YES**, VOLUME approximately 100 linear feet of ten inch diameter HDPE pipe with a volume of approximately 5 cubic yards will be placed into the submarine waters of Lake River.

11. Will material be placed in wetlands? [ ] YES [X] NO

If **YES**:

A. Impacted area in acres:

B. Has a delineation been completed? **If YES**, please submit with application. [ ] YES [ ] NO

C. Has a wetland report been prepared? **If YES**, please submit with application [ ] YES [ ] NO

D. Type and composition of fill material (e.g., sand, etc.)

E. Material source:

List all soil series (type of soil) located at the project site, and indicate if they are on the county's list of hydric soils. Soils information can be obtained from the natural Resources Conservation Service (NRCS).

G. WILL PROPOSED ACTIVITY CAUSE FLOODING OR DRAINING OF WETLANDS? [ ] YES [X] NO

If **YES**, IMPACTED AREA IS ______ ACRES OF DRAINED WETLANDS.

NOTE: If your project will impact greater than ½ of an acre of wetland, submit a mitigation plan to the Corps and Ecology for approval along with the JARPA form.

NOTE: A 401 water quality certification will be required from Ecology in addition to an approved mitigation plan if your project impacts wetlands that are: a) greater than ½ acre in size, or b) tidal wetlands or wetlands adjacent to tidal water. Please submit the JARPA form and mitigation plan to Ecology for an individual 401 certification if a) or b) applies.

12. Stormwater Compliance for Nationwide Permits Only: This project is (or will be) designed to meet Ecology's most current stormwater manual, or an Ecology approved local stormwater manual. [X] YES [ ] NO

If **YES** – Which manual will your project be designed to meet? Stormwater Manual for Western Washington (2005) or Equivàlent.

If **NO** – For clean water act Section 401 and 404 permits only – Please submit to Ecology for approval, along with this JARPA application, documentation that demonstrates the stormwater runoff from your project or activity will comply with the water quality standards, WAC 173.201(A)

13. Will excavation or dredging be required in water or wetlands? [ ] YES [X] NO

If **YES**:

A. Volume: __ (cubic yards) /area

B. Composition of material to be removed:

C. Disposal site for excavated material:

D. Method of dredging:

14. Has the State Environmental Policy Act (SEPA) been completed [X] YES [X] NO

SEPA Lead Agency: City of Ridgefield

SEPA Decision: DNS, MDNS, EIS, Adoption, Exemption September 6, 2005 Decision Date (end of comment period)

SUBMIT A **COPY OF YOUR SEPA DECISION LETTER** TO WDFW AS REQUIRED FOR A COMPLETE APPLICATION

15. List other Applications, approvals or certifications from other federal, state or local agencies for any structures, construction discharges or other activities described in the application (i.e. preliminary plat approval, health district approval, building permit, SEPA review, federal energy regulatory commission license (FERC), Forest practices application, etc.). Also, indicate whether work has been completed and indicate all existing work on drawings. NOTE: For use with Corps Nationwide Permits, identify whether your project has or will need an NPDES permit for discharging wastewater and/or stormwater.

TYPE OF APPROVAL	ISSUING AGENCY	IDENTIFICATION NO.	DATE OF APPLICATION	DATE APPROVED	COMPLETED?
Shoreline Substantial Development	Ridgefield				
Rivers & Harbors Act, Section 10	Army Corps of Eng.				
Hydraulic Project Approval	WDFW				

Water Right-of-Entry Permit/Lease	WDNR				

16. Has any agency denied approval for the activity you're applying for or for any activity directly related to the activity described herein?
☐ YES ☒ NO
If **YES**, explain:

ECY 070-15 (Rev. 11/04) JARPA Contact the State of Washington Office of Regulatory Assistance for latest version or call 360/407-7037 or 800/917-0043

SECTION B - Use for Shoreline and Corps of Engineers permits only:

17a. Total cost of project. This means the fair market value of the project, including materials, labor, machine rentals, etc.
$600,000.00

17b. If a project or any portion of a project receives funding from a federal agency, that agency is responsible for ESA consultation. Please indicate if you will receive federal funds and what federal agency is providing those funds. See instructions for information on ESA.*
FEDERAL FUNDING ☐ YES ☒ NO If **YES**, please list the federal agency

18. Local government with jurisdiction: **City of Ridgefield**

19. For Corps, Coast Guard and DNR permits, provide names, addresses and telephone numbers of adjoining property owners, lessees, etc. - *Please note: Shoreline Management Compliance may require additional notice – consult your local government.*

NAME	ADDRESS	PHONE NUMBER
Port of Ridgefield	PO Box 55, Ridgefield, WA 98642	360 887-3875
Washington Dept of Natural Resources	PO Box 47001, Olympia, WA 9854	360 902-1004

SECTION C - This section MUST be completed for any permit covered by this application

20. Application is hereby made for a permit or permits to authorize the activities described herein. I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief, such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities. I hereby grant to the agencies to which this application is made, the right to enter the above-described location to inspect the proposed, in-progress or completed work. I agree to start work **ONLY** after all necessary permits have been received.

SIGNATURE OF APPLICANT DATE

SIGNATURE OF AUTHORIZED AGENT DATE

I HEREBY DESIGNATE______________________TO ACT AS MY AGENT IN MATTERS RELATED TO THIS APPLICATION FOR PERMIT(S). I UNDERSTAND THAT IF A FEDERAL PERMIT IS ISSUED, I MUST SIGN THE PERMIT.

SIGNATURE OF APPLICANT DATE

SIGNATURE OF LANDOWNER (EXCEPT PUBLIC ENTITY LANDOWNERS, E.G. DNR)

THIS APPLICATION MUST BE SIGNED BY THE APPLICANT AND THE AGENT, IF AN AUTHORIZED AGENT IS DESIGNATED.

18 U.S.C §1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious, or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious, or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than 5 years or both.

COMPLETED BY LOCAL OFFICIAL

A. Nature of the existing shoreline. (Describe type of shoreline, such as marine, stream, lake, lagoon, marsh, bog, swamp, flood plain, floodway, delta; type of beach, such as accretion, erosion, high bank, low bank, or dike; material such as sand, gravel, mud, clay, rock, riprap; and extent and type of bulkheading, if any)

Low bank along Lake River and estuarine floodplain along outfall route to mid channel of Lake River.

B. In the event that any of the proposed buildings or structures will exceed a height of thirty-five feet above the average grade level, indicate the approximate location of and number of residential units, existing and potential, that will have an obstructed view: **Not applicable**

C. If the application involves a conditional use or variance, set forth in full that portion of the master program which provides that the proposed use may be a conditional use, or, in the case of a variance, from which the variance is being sought: **Not applicable**

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE - PRIORITY HABITAT AND SPECIES POLYGON REPORT
FOR TOWNSHIP T04R01W
Report Date: October 12, 2005

Information About Priority Habitats and Species Polygons

Priority Habitats and Species (PHS) polygons are labeled, on the map, with a unique number and "+" symbol, roughly in the center of the polygon. This PHS Poly number refers to a list of form numbers and species and habitat codes contained in the PHS Polygon Cross Reference Report (listed below). The form numbers refer to the attached PHS Polygon report. This report details each species or habitat depicted as a polygon on the map. For a complete description of the codes used in this report please refer to the Fish and Wildlife Map Products document. This document may be viewed on our web site at http://www.wdfw.wa.gov/hab/release.htm.

Form number 900000 indicates presence of PHS is unknown or the area was not mapped. Form numbers 909998, 909997 or 909996 indicate compilation errors.

Priority Habitats and Species Polygon Cross Reference Report:

PHS Poly#	Form#	PHS Code*Species Use
2	900000	*-
3	902157	HALE*RC-
4	900000	*-
5	902156	WAFO*RLC-
6	902132	CANED*B-
7	902156	WAFO*RLC-
8	902156	WAFO*RLC-
9	900000	*-
10	904408	WAFO*RC-
11	902153-904408	WET*-WAFO*RC-
12	902153-904408-905333	WET*-WAFO*RC-HALE*RC-
13	912981	OAK*-
14	902153-904408-912981	WET*-WAFO*RC-OAK*-
15	904408-905333	WAFO*RC-HALE*RC-
16	904408-905333-912981	WAFO*RC-HALE*RC-OAK*-
17	902153-904408-905333-905910	WET*-WAFO*RC-HALE*RC-OAK*-
18	904408-905333	WAFO*RC-HALE*RC-
19	902153-904408-905333-905910-912981	WET*-WAFO*RC-HALE*RC-OAK*-OAK*-
20	902153-904408-905333-912981	WET*-WAFO*RC-HALE*RC-OAK*-
21	902153-904408-905333-905910	WET*-WAFO*RC-HALE*RC-OAK*-
22	904408-905333-912981	WAFO*RC-HALE*RC-OAK*-
23	902153-904408-905333-912981	WET*-WAFO*RC-HALE*RC-OAK*-
24	913037	HALE*CR-
25	902153-904408-905333-905910-912981	WET*-WAFO*RC-HALE*RC-OAK*-OAK*-
26	902153-904408-905333-912981	WET*-WAFO*RC-HALE*RC-OAK*-
27	904408-905333-912981	WAFO*RC-HALE*RC-OAK*-
28	902153-904408-905333-905910-912981	WET*-WAFO*RC-HALE*RC-OAK*-OAK*-
29	902153-904408-905333-905910-912981	WET*-WAFO*RC-HALE*RC-OAK*-OAK*-
30	904408-905333-912981	WAFO*RC-HALE*RC-OAK*-
31	902153-904408-905333-912981	WET*-WAFO*RC-HALE*RC-OAK*-
32	902153-904408-905333-905910	WET*-WAFO*RC-HALE*RC-OAK*-
33	902153-904408-905333-912981	WET*-WAFO*RC-HALE*RC-OAK*-
34	904408-912981	WAFO*RC-OAK*-
35	902153-904408-905333-912981	WET*-WAFO*RC-HALE*RC-OAK*-
36	904408-912981	WAFO*RC-OAK*-
37	904408-912981	WAFO*RC-OAK*-
38	904408-912981	WAFO*RC-OAK*-
39	902154-904408	WAFO*RLC-WAFO*RC-
40	904408-912981	WAFO*RC-OAK*-
41	904408-912981	WAFO*RC-OAK*-

42	904408-912981	WAFO*RC-OAK*-
43	904408-912981	WAFO*RC-OAK*-
44	904408-912981	WAFO*RC-OAK*-
45	904408-912981	WAFO*RC-OAK*-
46	912981	OAK*-
47	904408-912981	WAFO*RC-OAK*-
48	904408-912981	WAFO*RC-OAK*-
49	904408-917330	WAFO*RC-PRSU*RC-
50	912981	OAK*-
51	912981	OAK*-
52	904408-912981	WAFO*RC-OAK*-
53	912981	OAK*-
54	912981	OAK*-
55	912981	OAK*-
56	904408-917330	WAFO*RC-PRSU*RC-
57	904408-917328	WAFO*RC-ARHE*RC-
58	904408-917330	WAFO*RC-PRSU*RC- PURPLE MARTIN, WATERFOWL
59	912981	OAK*-
60	700013-904408	ARHE*B-WAFO*RC-
61	700013-904408-917328	ARHE*B-WAFO*RC-ARHE*RC-
62	700013-904408-917330	ARHE*B-WAFO*RC-PRSU*RC-
63	912981	OAK*-
64	912981	OAK*-
65	902115-912981	UNOS*-OAK*-
66	902115	UNOS*-
67	904408-917440	WAFO*RC-CYCO*RLC-
68	902115-904408	UNOS*-WAFO*RC-
69	900000	*-
70	902115-912981	UNOS*-OAK*-
71	900000	*-
72	902115-904408	UNOS*-WAFO*RC-
73	900000	*-
74	900000	*-
75	904408-917441	WAFO*RC-GRCA*RLC-
76	912981	OAK*-

Form#: 700013 PHS Code: ARHE Species Use: B Common Name: GREAT BLUE HERON
Season: SU Definition: 5 Accuracy: 1 Scientific Name: ARDEA HERODIAS
State Status: SM Federal Status: Priority: YES Site Name: BACHELOR ISLAND
General Description: GREAT BLUE HERON ROOKERY. 200 + NESTS IN COTTONWOOD-WILLOW STAND ON W END OF BACHELOR IS. ON COLUMBIA RI. 370 AC NESTS-81:546-83:261 NESTS:249 AC-85: 369 AC NESTS-91.

Source: ZIMMERMAN, T., J. LANGTON AND D. ANDERSON Source Date: 040491 Source Code: PROF
Synopsis: GBH 1991 SURVEY.

Form#: 902115 PHS Code: UNOS Species Use: Common Name: URBAN NATURAL OPEN SPACE
Season: Definition: 5 Accuracy: 1 Scientific Name:
State Status: Federal Status: Priority: YES Site Name: LAKE RIVER URBAN NATURAL OPEN SPACE
General Description: FORESTED RIPARIAN CORRIDOR AND ADJOINING UPLANDS ASSOCIATED WITH LAKE RIVER TRIB UTARIES PROVIDES OPEN SPACE AND RIPARIAN HABITAT WITHIN URBANIZING AREA ADJACENT TO RIDGEFIELD NATIONAL WILDLIFE REFUGE.

Source: DUGGER, CARL WDW HABITAT BIOLOGIST Source Date: 042691 Source Code: PROF
Synopsis: FIELD OBSERVATIONS SINCE 1983

Source: ZIMMERMAN, TARA WDW Source Date: 042691 Source Code: PROF
Synopsis: FIELD OBSERVATIONS FOR PERIOD OF 15 YEARS

Form#: 902132 PHS Code: CANED Species Use: B Common Name: CAVITY-NESTING DUCKS
Season: S Definition: 5 Accuracy: 1 Scientific Name:
State Status: Federal Status: Priority: YES Site Name: WOODLAND CAVITY NESTING HABITAT
General Description: SLOUGHS, WETLANDS AND RIPARIAN AREAS WHICH SUPPORT CAVITY NESTING DUCKS

Source: THOMAS, ALAN WDW HABITAT BIOLOGIST Source Date: 041891 Source Code: PROF
Synopsis: FIELD OBSERVATIONS FROM 1985 TO PRESENT

Form#: 902153 PHS Code: WET Species Use: Common Name: WETLANDS
Season: Definition: 5 Accuracy: 1 Scientific Name:
State Status: Federal Status: Priority: YES Site Name: MORGAN PROPERTY
General Description: WETLANDS SOUTH OF LOWER LEWIS RIVER. ASSOCIATED WITH GEE CREEK AND LANCASTER LAK
E SUPPORTS WINTERING AND BREEDING CANADA GEESE, MALLARDS, DUSKY CANADA GEESE, RE
DTAIL HAWK NESTING. CAVITY NESTING DUCKS.

Source: CORNELY, J.E. M.B. NAUGHTON, M.R. HILLS, AND K.M. RAFTERY, 1988 USFWS Source Date: 88 Source Code: LIT
Synopsis: USFWS PUBLICATION DOCUMENTING DISTRIBUTION OF WINTERING DUSKY AND CACKLING CANAD
A GEESE IN WESTERN OREGON AND WESTERN WASHINGTON, 1985-1988

Source: HART, MARK WDW AND MILLER, PAT WDW Source Date: 12 91 Source Code: HUNT
Synopsis: ANNUAL HUNTER CHECK STATIONS AND FIELD CHECKS

Source: HILLS, MARGUERITE USFWS AND MILLER, PAT WDW Source Date: 03 91 Source Code: WTRAN
Synopsis: MONTHLY AERIAL WATERFOWL SURVEYS SINCE 1975, FROM OCTOBER TO MARCH

Form#: 902154 PHS Code: WAFO Species Use: RLC Common Name: WATERFOWL CONCENTRATIONS
Season:W F Definition: 5 Accuracy: 1 Scientific Name:
State Status: Federal Status: Priority: YES Site Name: CANVAS BACK LAKE
General Description: CONVASBACK LAKE AND ASSOCIATED FORESTED WETLANDS, SUPPORTS WINTERING WATERFOWL C
ONCENTRATIONS, USE BY TUNDRA SWANS

Source: HART, MARK WDW AND MILLER, PAT WDW Source Date: 12 91 Source Code: HUNT
Synopsis: ANNUAL HUNTER CHECK STATIONS AND FIELD CHECKS

Source: MILLER, PAT WDW AND HILLS, MARGUERITE USFWS Source Date: 03 91 Source Code: PROF
Synopsis: FIELD OBSERVATIONS BY MILLER SINCE 1978 AND MILLS SINCE 1986

Source: MILLER, PAT WDW AND HILLS, MARGUERITE USFWS Source Date: 03 91 Source Code: WTRAN
Synopsis: MONTHLY AERIAL WATERFOWL SURVEYS FROM OCTOBER TO MARCH, SINCE 1975, BY WDW AND U
SFWS STAFF.

Form#: 902156 PHS Code: WAFO Species Use: RLC Common Name: WATERFOWL CONCENTRATIONS
Season:W F Definition: 5 Accuracy: 1 Scientific Name:
State Status: Federal Status: Priority: YES Site Name: WOODLAND BOTTOMLANDS
General Description: REGULAR LARGE CONCENTRATIONS OF WINTERING WATERFOWL, INCLUDING DUSKY AND CACKLIN
G CANADA GEESE AND TUNDRA SWANS. THIS AREA ALSO SUPPORTS SANDHILL CRANES DURING
THEIR MIGRATION, SUPPORTS LARGE RESIDENT POPULATIONS OF GEESE

Source: CORNELY, J.E., M.B. NAUGHTON, M.R. HILLS, AND K.M. RAFTERY, 1988 USFWS Source Date: 88 Source Code: LIT
Synopsis: USFWS PUBLICATION DOCUMENTING DISTRIBUTION OF WINTERING DUSKY AND CACKLING CANAD
A GEESE IN WESTERN OREGON AND WASHINGTON, 1985-1988

Source: MILLER, PAT WDW AND HILLS, MARGUERITE USFWS Source Date: 032991 Source Code: PROF
Synopsis: FIELD OBSERVATIONS BY MILLER SINCE 1978 AND HILLS SINCE 1986 DURING ROUTINE WORK
DUTIES

Source: MILLER, PAT WDW AND HILLS, MARGUERITE USFWS Source Date: 03 91 Source Code: DRIVE
Synopsis: SUBSPECIES COMPOSITION COUNTS, COLLAR OBSERVATION SURVEYS SINCE 1980

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Form#: 902157             PHS Code: HALE          Species Use: RC      Common Name: BALD EAGLE
       Season:W           Definition: 5           Accuracy: 1          Scientific Name: HALIAEETUS LEUCOCEPHALUS
       State Status: ST   Federal Status: FT      Priority: YES        Site Name: AUSTIN POINT COTTONWOODS
       General Description: RIPARIAN HABITAT ASSOCIATED WITH AUSTIN POINT AND ADJOINING SLOUGH, USED BY WINT
                            ERING BALD EAGLES-REGULAR SMALL CONCENTRATIONS, SUPPORTS NESTING GREAT HORNED OW
                            LS, REGULAR USE BY GREAT BLUE HERONS AND WATERFOWL

       Source: MILLER, PAT WDW AND THOMAS, ALAN WDW                                  Source Date: 032991  Source Code: DRIVE
       Synopsis: FIELD AND DRIVE-BY OBSERVATIONS BY WDW PERSONNEL WHILE CONDUCTING WATERFOWL SURV
                 EYS AND FIELD CHECKS

       Source: THOMAS, ALAN WDW WILDLIFE AGENT                                       Source Date: 041891  Source Code: PROF
       Synopsis: PROFESSIONAL OBSERVATIONS FROM 1985 TO PRESENT


Form#: 904408             PHS Code: WAFO          Species Use: RC      Common Name: WATERFOWL CONCENTRATIONS
       Season:WS F        Definition: 5           Accuracy: 1          Scientific Name:
       State Status:      Federal Status:         Priority: YES        Site Name: RIDGEFIELD LOWLANDS
       General Description: RIDGEFIELD LOWLANDS, SUPPORT WINTERING CONCENTRATIONS OF CANADA GEESE, SANDHILL
                            CRANES, TUNDRA SWANS, WHITE FRONTED GEESE, AND DABBLING DUCKS, ALSO SUPPORTS NES
                            TING DUCKS.

       Source: HILLS, MARGUERITE USFWS                                               Source Date:         Source Code: WTRAN
       Synopsis: MIDWINTER AERIAL WATERFOWL SURVEYS CONDUCTED OVER 20 YEARS

       Source: MILLER, PAT WDW                                                       Source Date: 032792  Source Code: PROF
       Synopsis: PROFESSIONAL OBSERVATIONS OF WATERFOWL UTILIZATION FOR OVER 15 YEARS

       Source: MILLER, PAT WDW; HART, MARK WDW; MERCER, MIKE WDW; JUNDT, KEN WDW     Source Date: 03  92  Source Code: HUNT
       Synopsis: INFORMATION COLLECTED DURING HUNTER BAG CHECKS, GENERAL OBSERVATIONS DURING FIEL
                 D CHECKS

Form#: 905333             PHS Code: HALE          Species Use: RC      Common Name: BALD EAGLE
       Season:WS          Definition: 5           Accuracy: 1          Scientific Name: HALIAEETUS LEUCOCEPHALUS
       State Status: ST   Federal Status: FT      Priority: YES        Site Name: MORGAN EAGLE AREA
       General Description: BALD EAGLE WINTER CONCENTRATIONS - HIGHEST USE DURING SMELT RUN IN LEWIS RIVER


       Source: HART, MARK WDW AGENT DIRECT OBSERVATIONS ON ROUTINE PATROL            Source Date: 03  90  Source Code: PROF
       Synopsis:
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Form#: 905910 PHS Code: OAK Species Use: Common Name: OAK WOODLAND
Season: Definition: 5 Accuracy: 1 Scientific Name:
State Status: Federal Status: Priority: YES Site Name: MORGAN OAK WOODLANDS
General Description: OAK WOODLAND SOUTH OF MAIN LEWIS RIVER

Source: MERCER, MIKE WDW Source Date: 01 90 Source Code: PROF
Synopsis: FIRST HAND OBSERVATION ROUTINE PATROL

Form#: 912981 PHS Code: OAK Species Use: Common Name: OAK WOODLAND
Season: Definition: 5 Accuracy: 1 Scientific Name:
State Status: Federal Status: Priority: YES Site Name: CLARK COUNTY OAK WOODLANDS
General Description: OAK WOODLANDS

Source: CHAPPELL, CHRISTOPHER B ET AL WA DEPT OF NATURAL RESOURCES Source Date: 102999 Source Code: LIT
Synopsis: A GEOGRAPHIC INFORMATION SYSTEM MAP OF EXISTING GRASSLANDS AND OAK WOODLANDS IN THE PUGET LOWLAND AND WILLAMETTE VALLEY ECOREGIONS, WASHINGTON.

Source: MANLOW, STEVE AND ERIC HOLMAN WDFW, DAVE HOWE AND BRENT DAVIS CLARK CO Source Date: 11 00 Source Code: PROF
Synopsis: OBSERVATIONS OF OAK WOODLANDS DURING FIELD REVIEWS AND SITE INSPECTIONS.

Form#: 913037 PHS Code: HALE Species Use: CR Common Name: BALD EAGLE
Season:W Definition: 5 Accuracy: 1 Scientific Name: HALIAEETUS LEUCOCEPHALUS
State Status: ST Federal Status: FT Priority: YES Site Name: OUTSTANDING COMMUNAL ROOST
General Description: BALD EAGLE COMMUNAL ROOST. REGULAR USE BY APPROX. 7 BIRDS.

Source: KOLD, SAM AND DAVID ANDERSON WDFW BIOLOGISTS Source Date: 99 Source Code: PROF
Synopsis: BALD EAGLE OCMMUNAL ROOST FOUND DURING REVIEW OF DNR OUTSTANDING TIMBER SALE. SITE MONITORED AND SURVEYED DURING WINTER.

Form#: 917328
Season:WSU
State Status: SM
General Description: GREAT BLUE HERON ROOKERY

PHS Code: ARHE
Definition: 5
Federal Status:

Species Use: RC
Accuracy: 1
Priority: YES

Common Name: GREAT BLUE HERON
Scientific Name: ARDEA HERODIAS
Site Name:

Source: WISEMAN, BRUCE USFWS RIDGEFIELD NWR
Synopsis: GREAT BLUE HERON ROOKERY OBSERVED IN COURSE OF PROFESSIONAL DUTIES

Source Date: 081994 Source Code: PROF

Form#: 917330
Season: SU
State Status: SC
General Description: PURPLE MARTIN CONCENTRATION

PHS Code: PRSU
Definition: 5
Federal Status:

Species Use: RC
Accuracy: 1
Priority: YES

Common Name: PURPLE MARTIN
Scientific Name: PROGNE SUBIS
Site Name:

Source: WISEMAN, BRUCE USFWS RIDGEFIELD NWR
Synopsis: PURPLE MARTIN NEST BOXES PLACED BY USFWS

Source Date: 081094 Source Code: PROF

Form#: 917440
Season:WS
State Status:
General Description: TUNDRA SWANS - WINTERING

PHS Code: CYCO
Definition: 5
Federal Status:

Species Use: RLC
Accuracy: 1
Priority: YES

Common Name: TUNDRA SWAN
Scientific Name: CYGNUS COLUMBIANUS
Site Name:

Source: WISEMAN, BRUCE USFWS RIDGEFIELD NWR
Synopsis: REFUGE IS ANNUAL MIGRATORY & WINTERING AREA FOR UP TO 3000 SWANS. POPULATION STA
BLIZED & OBSERVED OVER LAST 10 YEARS.

Source Date: 081994 Source Code: PROF

Form#: 917441 | PHS Code: GRCA | Species Use: RLC | Common Name: SANDHILL CRANE
Season:WS F | Definition: 5 | Accuracy: 1 | Scientific Name: GRUS CANADENSIS
State Status: SE | Federal Status: | Priority: YES | Site Name:
General Description: SANDHILL CRANES - SPRING & FALL MIGRATION

Source: WISEMAN, BRUCE USFWS RIDGEFIELD NWR Source Date: 050194 Source Code: PROF
Synopsis: REFUGE IS FALL & SPRING MIGRATORY STOP ALONG WITH ALL OF VANCOUVER LAKE LOWLANDS . CAMPBELL LAKE IS HISTORIC ROOST AREA FOR UP TO 1000-1200 CRANES.

Source: CALKINS, BRIAN WDFW WILDLIFE AREA MANAGER Source Date: 10 02 Source Code: PROF
Synopsis: EXPANDING CRANE POLYGON TO WHOLE LAKE.

Codes Used In Priority Habitat and Species Polygon Report

Form# : Unique number that links the information in the reports to features on the map.

PHS Code : This contains a code that identifies the fish and wildlife species found in the area or the habitat that occurs there. This field is not used if a habitat is described. List of codes are available in the documentation.

Species Use : Criteria that identifies how the area is used by the indicated species. This field is not used if a hatitat is described. List of codes are available in the documentation.

Common Name : Common name of the species or habitat.

Season : Season of species use. Use is indicated by the presence of a non-blank character in one or more positions or sub-strings of the field position.
Position 1: W = Winter use. Position 2: S = Spring use.
Position 3: U = Summer use. Position 4: F = Fall use.
Position 5: S = Severe winter use.

Definition : Identifies the definitions or criteria used to classify the area as a priority. List of codes are available in the documentation.

Accuracy : Mapping accuracy of the line delineation as determined by the mapper.
1 = Accurate within a 1/4 mile. 3 = Location known to within one mile.
2 = Accurate within a 1/2 mile. 4 = Location known to general locality only.

Scientific Name : Scientific name of the species.

State Status : State listing status of the species.
SE = State endangered. SC = State candidate.
ST = State threatened. SM = State monitor.
SS = State sensitive.

Federal Status : Federal listing status of species.
FE = Federal endangered. FC = Federal candidate.
FT = Federal threatened. FCo = Federal concern.

Priority : Species and habitats that are considered to be priorities for conservation and management by Washington Department of Fish and Wildlife (WDFW). For a copy of the most current Priority Habitats and Species List, contact WDFW PHS Section at (360)902-2543, or it is available on our web site at http://www.wdfw.wa.gov/hab/phspage.htm.
YES = Indicates that the species is considered a WDFW priority and is on the Priority Habitat and Species List and/or Species of Concern List.
NO = Indicates that the species is not a WDFW priority.

Site Name : Name assigned to the area based generally on a local place name.

General Description : Description about the area, including how it is used and why it is important.

Source : Identifies and describes the source responsible for the information described on the form or drawn on the map. Single or multiple sources may be cited.

Source Date : Date of source of information.

Source Code : Code identifying the source of information.

Synopsis : Brief narrative describing content of source of information.

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE - WILDLIFE HERITAGE POINT REPORT
FOR TOWNSHIP T04R01W
Report Date: October 12, 2005

Information About Wildlife Heritage Point Report

Wildlife Heritage points on the map can be referenced to this report by noting the quadpt number where the point occurs on the map, and then looking up the information listed below. This report is sorted by the quadpt number and provides details on each species depicted on the map. For a complete description of the codes used is this report, please refer to the Fish and Wildlife Map Product document. This document may be viewed on our web site at http://www.wdfw.wa.gov/hab/release.htm.

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Quadpt#: 4512276017          Species Code: GRCA          Species Use: RLC        Common Name: SANDHILL CRANE
         Year: 1990          Class: SA                   Accuracy: C             Scientific Name: GRUS CANADENSIS
         State Status: SE    Federal Status:             Priority: YES           WDFW Region: 5
         Township - Range - Section: T04N R01W S36 SEOFSE Occurrence#:  27       Sequence#: 4     Verified: V
         General Description: SANDHILL CRANE FEEDING AREA.

Quadpt#: 4512276018          Species Code: GRCA          Species Use: RLC        Common Name: SANDHILL CRANE
         Year: 1990          Class: SA                   Accuracy: C             Scientific Name: GRUS CANADENSIS
         State Status: SE    Federal Status:             Priority: YES           WDFW Region: 5
         Township - Range - Section: T04N R01W S46   OFSW Occurrence#:  28       Sequence#: 1     Verified: V
         General Description: SANDHILL CRANE FEEDING AREA.

Quadpt#: 4512276019          Species Code: GRCA          Species Use: RLC        Common Name: SANDHILL CRANE
         Year: 1990          Class: SA                   Accuracy: C             Scientific Name: GRUS CANADENSIS
         State Status: SE    Federal Status:             Priority: YES           WDFW Region: 5
         Township - Range - Section: T04N R01W S25 NEOFNE Occurrence#:  28       Sequence#: 2     Verified: V
         General Description: SANDHILL CRANE FEEDING AREA.

Quadpt#: 4512276023          Species Code: ARHE          Species Use: B          Common Name: GREAT BLUE HERON
         Year: 2001          Class: SA                   Accuracy: C             Scientific Name: ARDEA HERODIAS
         State Status: SM    Federal Status:             Priority: YES           WDFW Region: 5
         Township - Range - Section: T04N R01W S36 SWOFNE Occurrence#: 402       Sequence#: 1     Verified: V
         General Description: GREAT BLUE HERON COLONY ON RIDGEFIELD'S ROTH UNIT.

Quadpt#: 4512276029          Species Code: HALE          Species Use: B          Common Name: BALD EAGLE
         Year: 2004          Class: SA                   Accuracy: C             Scientific Name: HALIAEETUS LEUCOCEPHALUS
         State Status: ST    Federal Status: FT          Priority: YES           WDFW Region: 5
         Township - Range - Section: T04N R01W S13 NEOFNW Occurrence#:1409       Sequence#: 1     Verified: V
         General Description: BALD EAGLE NEST IN LIVE DOUGLAS FIR. AIR GPS (WGS 84) 45 50.132 N 122 44.783 W.

Quadpt#: 4512276030          Species Code: HALE          Species Use: B          Common Name: BALD EAGLE
         Year: 2002          Class: SA                   Accuracy: C             Scientific Name: HALIAEETUS LEUCOCEPHALUS
         State Status: ST    Federal Status: FT          Priority: YES           WDFW Region: 5
         Township - Range - Section: T04N R01W S13 NEOFNW Occurrence#:1409       Sequence#: 2     Verified: V
         General Description: BALD EAGLE NEST IN LIVE DOUGLAS FIR. APPROX 150' NE OF NEST 1409-1. NEST SMALL
                              AND FALLING APART IN 2002.
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Quadpt#: 4512276033 Species Code: HALE Species Use: B Common Name: BALD EAGLE
Year: 2005 Class: SA Accuracy: C Scientific Name: HALIAEETUS LEUCOCEPHALUS
State Status: ST Federal Status: FT Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S13 NEOFNW Occurrence#:1409 Sequence#: 3 Verified: V
General Description: BALD EAGLE NEST. AIR GPS (WGS 84) 45 50.102 N 122 44.796 W

Quadpt#: 4512277016 Species Code: HALE Species Use: B Common Name: BALD EAGLE
Year: 2003 Class: SA Accuracy: C Scientific Name: HALIAEETUS LEUCOCEPHALUS
State Status: ST Federal Status: FT Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S02 SEOFSE Occurrence#: 784 Sequence#: 2 Verified: V
General Description: BALD EAGLE NEST, LOCATED IN DYING, 20FT DBH FIR, 75FT FROM ORIGINAL NEST. NEST IS ON ONE OF TWO REMAINING LIVE BRANCHES.

Quadpt#: 4512277016 Species Code: HALE Species Use: B Common Name: BALD EAGLE
Year: 1990 Class: SA Accuracy: C Scientific Name: HALIAEETUS LEUCOCEPHALUS
State Status: ST Federal Status: FT Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S02 SEOFSE Occurrence#: 784 Sequence#: 1 Verified: V
General Description: MORGAN FARM TERR, NEST ON TOP OF A BROKEN-TOP FIR, APPROXIMATELY 20 INCH DBH.

Quadpt#: 4512277017 Species Code: PAHA Species Use: B Common Name: OSPREY
Year: 1989 Class: SA Accuracy: C Scientific Name: PANDION HALIAETUS
State Status: SM Federal Status: Priority: NO WDFW Region: 5
Township - Range - Section: T04N R01W S01 NWOFNE Occurrence#: 607 Sequence#: 1 Verified: V
General Description: LEWIS RIVER MOUTH TERR, OSPREY NEST ATOP BOOM WEST OF RAILROAD BRIDGE. ACCESS SITE BY DRIVING NW 71ST AVE NORTH OF RIDGEFIELD UNTIL RD STOPOS AT RIVER.

Quadpt#: 4512277018 Species Code: GRCA Species Use: RLC Common Name: SANDHILL CRANE
Year: 1989 Class: SA Accuracy: C Scientific Name: GRUS CANADENSIS
State Status: SE Federal Status: Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S36 SE Occurrence#: 16 Sequence#: 1 Verified: V
General Description: SANDHILL CRANE: RIDGEFIELD MIGRANT ROOST. SHALLOW WATERS AT N END OF CAMPBELL LAKE. PEAK NUMBERS 700-800 INDIVIDUALS OCT. 89, 300-400 APRIL 89;

Quadpt#: 4512277019 Species Code: HALE Species Use: B Common Name: BALD EAGLE
Year: 1990 Class: SA Accuracy: C Scientific Name: HALIAEETUS LEUCOCEPHALUS
State Status: ST Federal Status: FT Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S45 Occurrence#: 271 Sequence#: 1 Verified: V
General Description: BALD EAGLE NEST ALONG COLUMBIA RIVER W OF N END OF CAMPBELL LAKE.

Quadpt#: 4512277019 Species Code: HALE Species Use: B Common Name: BALD EAGLE
Year: 1994 Class: SA Accuracy: C Scientific Name: HALIAEETUS LEUCOCEPHALUS
State Status: ST Federal Status: FT Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S45 SEOFSE Occurrence#: 271 Sequence#: 2 Verified: V
General Description: BALD EAGLE NEST 50FT S OF NEST #1 ALONG COLUMBIA RIVER W OF N END OF CAMPBELL LAKE.

Quadpt#: 4512277020 Species Code: PETR Species Use: IO Common Name: SAND ROLLER
Year: 1989 Class: SA Accuracy: C Scientific Name: PERCOPSIS TRANSMONTANA
State Status: SM Federal Status: Priority: NO WDFW Region: 5
Township - Range - Section: T04N R01W S15 SWOFNE Occurrence#: 322 Sequence#: 1 Verified: V

General Description: SAND ROLLER(S): COLLECTED FROM (MBIA RIVER AT RM 88.5 BETWEEN MIDRIVER AND
OREGON BANK

Quadpt#: 4512277025 Species Code: GRCA Species Use: RLC Common Name: SANDHILL CRANE
Year: 1990 Class: SA Accuracy: C Scientific Name: GRUS CANADENSIS
State Status: SE Federal Status: Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S45 OFNE Occurrence#: 25 Sequence#: 1 Verified: V
General Description: SANDHILL CRANE FEEDING AREA.

Quadpt#: 4512277026 Species Code: GRCA Species Use: RLC Common Name: SANDHILL CRANE
Year: 1990 Class: SA Accuracy: C Scientific Name: GRUS CANADENSIS
State Status: SE Federal Status: Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S25 SEOFSW Occurrence#: 25 Sequence#: 2 Verified: V
General Description: SANDHILL CRANE FEEDING AREA.

Quadpt#: 4512277027 Species Code: GRCA Species Use: RLC Common Name: SANDHILL CRANE
Year: 1990 Class: SA Accuracy: C Scientific Name: GRUS CANADENSIS
State Status: SE Federal Status: Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S26 SEOFSE Occurrence#: 25 Sequence#: 3 Verified: V
General Description: SANDHILL CRANE FEEDING AREA.

Quadpt#: 4512277028 Species Code: GRCA Species Use: RLC Common Name: SANDHILL CRANE
Year: 1990 Class: SA Accuracy: C Scientific Name: GRUS CANADENSIS
State Status: SE Federal Status: Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S25 NWOFNW Occurrence#: 25 Sequence#: 4 Verified: V
General Description: SANDHILL CRANE FEEDING AREA.

Quadpt#: 4512277029 Species Code: GRCA Species Use: RLC Common Name: SANDHILL CRANE
Year: 1990 Class: SA Accuracy: C Scientific Name: GRUS CANADENSIS
State Status: SE Federal Status: Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S23 SWOFSE Occurrence#: 26 Sequence#: 1 Verified: V
General Description: SANDHILL CRANE FEEDING AREA.

Quadpt#: 4512277030 Species Code: GRCA Species Use: RLC Common Name: SANDHILL CRANE
Year: 1990 Class: SA Accuracy: C Scientific Name: GRUS CANADENSIS
State Status: SE Federal Status: Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S26 NEOFSW Occurrence#: 26 Sequence#: 2 Verified: V
General Description: SANDHILL CRANE FEEDING AREA.

Quadpt#: 4512277031 Species Code: GRCA Species Use: RLC Common Name: SANDHILL CRANE
Year: 1990 Class: SA Accuracy: C Scientific Name: GRUS CANADENSIS
State Status: SE Federal Status: Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S40 OFNE Occurrence#: 26 Sequence#: 3 Verified: V
General Description: SANDHILL CRANE FEEDING AREA.

Quadpt#: 4512277033 Species Code: MEGASI Species Use: IO Common Name: EASTERN WILD TURKEY

Year: 1991 Class: GA Accuracy: C Scientific Name: MELEAGRIS GALLOPAVO SILVESTRIS
State Status: Federal Status: Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S01 SW Occurrence#: 87 Sequence#: 1 Verified: V
General Description: 1 BIRD

Quadpt#: 4512277035 Species Code: HALE Species Use: B Common Name: BALD EAGLE
Year: 1999 Class: SA Accuracy: C Scientific Name: HALIAEETUS LEUCOCEPHALUS
State Status: ST Federal Status: FT Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S02 SEOFSE Occurrence#: 784 Sequence#: 3 Verified: V
General Description: BALD EAGLE NEST ON NORTH EDGE OF MIDDLE LANDS.

Quadpt#: 4512277037 Species Code: HALE Species Use: B Common Name: BALD EAGLE
Year: 2005 Class: SA Accuracy: C Scientific Name: HALIAEETUS LEUCOCEPHALUS
State Status: ST Federal Status: FT Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S45 SEOFSE Occurrence#: 271 Sequence#: 3 Verified: V
General Description: BALD EAGLE NEST.

Quadpt#: 4512277039 Species Code: HALE Species Use: B Common Name: BALD EAGLE
Year: 1999 Class: SA Accuracy: C Scientific Name: HALIAEETUS LEUCOCEPHALUS
State Status: ST Federal Status: FT Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S26 NWOFNW Occurrence#:1008 Sequence#: 1 Verified: V
General Description: BALD EAGLE NEST IN COTTONWOOD BETWEEN TURTLE ISLAND AND THE COLUMBIA RI.

Quadpt#: 4512277043 Species Code: HALE Species Use: B Common Name: BALD EAGLE
Year: 1998 Class: SA Accuracy: C Scientific Name: HALIAEETUS LEUCOCEPHALUS
State Status: ST Federal Status: FT Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S26 SWOFNW Occurrence#:1008 Sequence#: 2 Verified: V
General Description: BALD EAGLE NEST

Quadpt#: 4512277045 Species Code: HALE Species Use: B Common Name: BALD EAGLE
Year: 1997 Class: SA Accuracy: C Scientific Name: HALIAEETUS LEUCOCEPHALUS
State Status: ST Federal Status: FT Priority: YES WDFW Region: 5
Township - Range - Section: T03N R01W S47 NWOFNW Occurrence#: 271 Sequence#: 4 Verified: V
General Description: BALD EAGLE NEST.

Quadpt#: 4512277049 Species Code: HALE Species Use: B Common Name: BALD EAGLE
Year: 1998 Class: SA Accuracy: C Scientific Name: HALIAEETUS LEUCOCEPHALUS
State Status: ST Federal Status: FT Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S45 SEOFNE Occurrence#:1207 Sequence#: 1 Verified: V
General Description: BALD EAGLE NEST IN COTTONWOOD TREE, 40 FT OFF GROUND. TREE IS IN SMALL
STAND OF TREES IN MIDDLE OF FIELD.

Quadpt#: 4512277051 Species Code: HALE Species Use: B Common Name: BALD EAGLE
Year: 2003 Class: SA Accuracy: C Scientific Name: HALIAEETUS LEUCOCEPHALUS
State Status: ST Federal Status: FT Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S45 NEOFSE Occurrence#:1207 Sequence#: 2 Verified: V
General Description: BALD EAGLE NEST IN COTTONWOOD ON WEST SIDE OF "BORROW LAKE".

Quadpt#: 4512277053 Species Code: HALE Species Use: B Common Name: BALD EAGLE
Year: 2004 Class: SA Accuracy: C Scientific Name: HALIAEETUS LEUCOCEPHALUS
State Status: ST Federal Status: FT Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S45 SEOFSE Occurrence#: 271 Sequence#: 5 Verified: V
General Description: BALD EAGLE NEST IN COTTONWOOD.

Quadpt#: 4512277057 Species Code: HALE Species Use: B Common Name: BALD EAGLE
Year: 2005 Class: SA Accuracy: C Scientific Name: HALIAEETUS LEUCOCEPHALUS
State Status: ST Federal Status: FT Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S11 SEOFSW Occurrence#:1260 Sequence#: 1 Verified: V
General Description: BALD EAGLE NEST IN LARGE COTTONWOOD ON SHORE OF RIVER, 200-300 UPSTREAM OF MOUTH OF LAKE RIVER.

Quadpt#: 4512277059 Species Code: HALE Species Use: B Common Name: BALD EAGLE
Year: 2004 Class: SA Accuracy: C Scientific Name: HALIAEETUS LEUCOCEPHALUS
State Status: ST Federal Status: FT Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S57 NWOFNW Occurrence#: 784 Sequence#: 4 Verified: V
General Description: BALD EAGLE NEST IN COTTONWOOD RIGHT BY WATER.

Quadpt#: 4512277061 Species Code: HALE Species Use: B Common Name: BALD EAGLE
Year: 2002 Class: SA Accuracy: C Scientific Name: HALIAEETUS LEUCOCEPHALUS
State Status: ST Federal Status: FT Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S26 NWOFNW Occurrence#:1008 Sequence#: 3 Verified: V
General Description: BALD EAGLE NEST IN COTONWOOD.

Quadpt#: 4512277063 Species Code: HALE Species Use: B Common Name: BALD EAGLE
Year: 2000 Class: SA Accuracy: C Scientific Name: HALIAEETUS LEUCOCEPHALUS
State Status: ST Federal Status: FT Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S26 SWOFNW Occurrence#:1008 Sequence#: 4 Verified: V
General Description: BALD EAGLE NEST IN COTONWOOD

Quadpt#: 4512277065 Species Code: PAHA Species Use: B Common Name: OSPREY
Year: 2000 Class: SA Accuracy: C Scientific Name: PANDION HALIAETUS
State Status: SM Federal Status: Priority: NO WDFW Region: 5
Township - Range - Section: T04N R01W S45 NWOFNW Occurrence#:1107 Sequence#: 1 Verified: V
General Description: OSPREY NEST ON MARKER 13, NEAR BACHELOR POINT. 45 47 34 122 46 41.

Quadpt#: 4512277069 Species Code: ARHE Species Use: B Common Name: GREAT BLUE HERON
Year: 1994 Class: SA Accuracy: C Scientific Name: ARDEA HERODIAS
State Status: SM Federal Status: Priority: YES WDFW Region: 5
Township - Range - Section: T04N R01W S40 SWOFSW Occurrence#: 324 Sequence#: 1 Verified: V
General Description: GREAT BLUE HERON ROOKERY. ACTIVE PRIOR TO 1971. INFO FOR ARHE 29-1 MAY BELONG TO THIS LOCATION. UTM 10T 516846 5073423.

Quadpt#: 4512277070 Species Code: HALE Species Use: B Common Name: BALD EAGLE
Year: 2005 Class: SA Accuracy: C Scientific Name: HALIAEETUS LEUCOCEPHALUS
State Status: ST Federal Status: FT Priority: YES WDFW Region: 5

Township - Range - Section: T04N R01W S57 SWOFNW Occurrence#:1489 Sequence#: 1 Verified: V
General Description: BALD EAGLE NEST.

Quadpt#: 4512277071
Year: 2005
State Status: ST
Species Code: HALE
Class: SA
Federal Status: FT
Species Use: B
Accuracy: C
Priority: YES
Common Name: BALD EAGLE
Scientific Name: HALIAEETUS LEUCOCEPHALUS
WDFW Region: 5
Township - Range - Section: T04N R01W S26 NEOFSW Occurrence#:1008 Sequence#: 5 Verified: V
General Description: BALD EAGLE NEST IN BLACK COTTONWOOD, INSIDE ROW. GPS WGS84 N 45 47.905 W 122 46.729.

Quadpt#: 4512277072
Year: 2005
State Status: ST
Species Code: HALE
Class: SA
Federal Status: FT
Species Use: B
Accuracy: C
Priority: YES
Common Name: BALD EAGLE
Scientific Name: HALIAEETUS LEUCOCEPHALUS
WDFW Region: 5
Township - Range - Section: T04N R01W S02 NEOFSE Occurrence#: 784 Sequence#: 5 Verified: V
General Description: BALD EAGLE NEST IN DOUG-FIR STAND PROPOSED FOR HARVEST. GPS 45 51.336' 122 45.975'. 400 FT NO-CUT ZONE AROUND NEST TREE RECOMMENDED BY WDFW.

Quadpt#: 4512277073
Year: 2005
State Status: ST
Species Code: HALE
Class: SA
Federal Status: FT
Species Use: B
Accuracy: C
Priority: YES
Common Name: BALD EAGLE
Scientific Name: HALIAEETUS LEUCOCEPHALUS
WDFW Region: 5
Township - Range - Section: T04N R01W S45 NEOFSE Occurrence#:1207 Sequence#: 3 Verified: V
General Description: BALD EAGLE NEST. AIR GPS (WGS 84) 45 47.240 N 122 46.028 W

Codes Used In Wildlife Heritage Point Report

Quadpt# : A sequential number for a point based on a US Geological 7.5-minute quadrangle.

Species Code : Alphanumeric code which identifies the species. List of codes are available in the documentation.

Species Use : Criteria that identifies how the area is used by the indicated species. Lists of codes are available in the documentation.

Common Name : Common name of the species.

Year : Year of the observation.

Class : Code that separates animals into general groups.
AA = Artifical animal (e.g., nest platforms not used yet).
EA = Exotic animal.
GA = Game animal.
NA = No animal found after target specific survey completed.
SA = Special animal (e.g., state listed and monitor species).
ST = Split territory.
ZA = Zapped animal. Site no longer supports original occurrence.

Accuracy : Mapping accuracy of the site as determined by the individual doing the mapping.
C = Accurate to within 1/4 mile radius and confirmed by a reliable source.
G = Location known only to a general locality.
N = Accurate to within one mile radius.
U = Accurate to within 1/4 mile radius and unconfirmed by a reliable source.

Scientific Name : Scientific name of the species.

State Status : State listing status of species.
SE = State endangered. SC = State candidate.
ST = State threatened. SM = State monitor.
SS = State sensitive.

Federal Status : Federal listing status of species.
FE = Federal endangered. FC = Federal candidate.
FT = Federal threatened. FCo = Federal concern.

Priority : Species and habitats that are considered to be priorities for conservation and management by Washington Department of Fish and Wildlife (WDFW). For a copy of the most current Priority Habitats and Species List, contact WDFW PHS Section at (360)902-2543, or it is available on our web site at http://www.wdfw.wa.gov/hab/phspage.htm.
YES = Indicates that the species is considered a WDFW priority and is on the Priority Habitat and Species List and/or Species of Concern List.
NO = Indicates that the species is not a WDFW priority.

WDFW Region : This contains the WDFW administrative region number 1 through 6.

Township - Range - Section : The legal description of the species occurrence.

Occurrence# : An ascension catalog number that combined with sequence number identifies a unique record within a species.

Sequence# : Occurrences with multiple locations of a species.

Verified : Verification code for an observation.
V = Verified by a reliable source, generally WDFW or other agency biologist.
U = Not verified by a reliable source or identification of the species is uncertain.
1 = Confirmed grizzly bear of wolf observation.
2 = Probable grizzly bear of wolf observation.

General Description : Description of location of a species.

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
PRIORITY FISH REPORT FROM THE WASHINGTON LAKES AND RIVERS INFORMATION SYSTEM (WLRIS) DATABASE
FOR TOWNSHIP : T04R01W
Report Date: October 12, 2005

Information About The Fish Presence Report

The fish information in this report only includes information that Washington Department of Fish and Wildlife (WDFW) maintains in a central computer database. This information only documents the location of important fish resources to the best of our knowledge. It is not a complete inventory of the fish species in the state. Fish are identified as priority by WDFW if they meet one of three criterion as listed in the Priority Habitats and Species List. The list is available by contacting WDFW Priority Habitats and Species section at (360)902-2543, or it is available on our web site at http://www.wdfw.wa.gov/hab/phspage.htm. To insure appropriate use of this information, users are encouraged to consult with WDFW biologists.

Streams with priority anadromous and resident fish species from the WLRIS database are highlighted on the accompanying map. Due to the complexity of displaying linear features individual species that utilize each river reach are not distinguishable. If more species specific information is needed, users should request individual species maps, digital data or contact the WLRIS database manager.

State status information is not available in the WLRIS database for these species. Please see WDFW Species of Concern List for current status. For a copy of this list, contact WDFW Endangered Species Section at (360)902-2515, or it is available on our web site at http://www.wdfw.wa.gov/wlm/diversty/soc/soc.htm.

Priority Anadromous Fish Presence:

Code	Common Name	Stream Name	Stream LLID	Record Date
CHFA	Fall Chinook	Columbia River	1240483462464	04-02-10
CHFA	Fall Chinook	Columbia River	1240483462464	05-03-14
CHMF	Fall Chum	Columbia River	1240483462464	04-02-10
CHMF	Fall Chum	Columbia River	1240483462464	05-03-14
CHSP	Spring Chinook	Columbia River	1240483462464	04-08-26
CHSP	Spring Chinook	Columbia River	1240483462464	05-03-14
CHSU	Summer Chinook	Columbia River	1240483462464	04-02-10
CHSU	Summer Chinook	Columbia River	1240483462464	04-03-26
COHO	Coho Salmon	Columbia River	1240483462464	04-02-10
COHO	Coho Salmon	Columbia River	1240483462464	05-03-14
DBT	Dolly Varden/Bull Trout	Columbia River	1240483462464	05-01-10
DBT	Dolly Varden/Bull Trout	Columbia River	1240483462464	05-03-14
PINK	Pink Salmon	Columbia River	1240483462464	04-02-10
PINK	Pink Salmon	Columbia River	1240483462464	05-03-14
SOCK	Sockeye Salmon	Columbia River	1240483462464	04-02-10
SOCK	Sockeye Salmon	Columbia River	1240483462464	05-03-14
STSU	Summer Steelhead	Columbia River	1240483462464	04-12-07
STSU	Summer Steelhead	Columbia River	1240483462464	05-03-14
STWI	Winter Steelhead	Columbia River	1240483462464	04-12-07
STWI	Winter Steelhead	Columbia River	1240483462464	05-03-14
COHO	Coho Salmon	Flume Creek	1227427457913	05-03-14
CHFA	Fall Chinook	Lake River	1227824458505	05-03-14
CHMF	Fall Chum	Lake River	1227824458505	05-03-14
CHSP	Spring Chinook	Lake River	1227824458505	05-03-14
CHSU	Summer Chinook	Lake River	1227824458505	04-03-26
COHO	Coho Salmon	Lake River	1227824458505	05-03-14
PINK	Pink Salmon	Lake River	1227824458505	05-03-14
SOCK	Sockeye Salmon	Lake River	1227824458505	05-03-14
STSU	Summer Steelhead	Lake River	1227824458505	05-03-14
STWI	Winter Steelhead	Lake River	1227824458505	05-03-14
CHFA	Fall Chinook	Lewis River	1227824458504	04-02-10
CHMF	Fall Chum	Lewis River	1227824458504	04-02-10

[illegible]	Spring Chinook	Lewis River	1227824458504	04-08-26
COHO	Coho Salmon	Lewis River	1227824458504	04-02-10
SOCK	Sockeye Salmon	Lewis River	1227824458504	04-02-10
STSU	Summer Steelhead	Lewis River	1227824458504	04-12-07
STWI	Winter Steelhead	Lewis River	1227824458504	04-12-07
CHFA	Fall Chinook	Stream name(s) not in database	1227578458298	05-03-14
CHMF	Fall Chum	Stream name(s) not in database	1227578458298	05-03-14
CHSP	Spring Chinook	Stream name(s) not in database	1227578458298	05-03-14
CHSU	Summer Chinook	Stream name(s) not in database	1227578458298	04-03-26
COHO	Coho Salmon	Stream name(s) not in database	1227578458298	05-03-14
PINK	Pink Salmon	Stream name(s) not in database	1227578458298	05-03-14
SOCK	Sockeye Salmon	Stream name(s) not in database	1227578458298	05-03-14
STSU	Summer Steelhead	Stream name(s) not in database	1227578458298	05-03-14
STWI	Winter Steelhead	Stream name(s) not in database	1227578458298	05-03-14

Priority Resident Fish Presence:

Code	Common Name	Stream Name	Stream LLID	Record Date
CCT	Resident Cutthroat	Stream name(s) not in database	1227522458355	04-12-22
CCT	Resident Cutthroat	Stream name(s) not in database	1227547458307	04-12-22
CCT	Resident Cutthroat	Columbia River	1240483462464	04-12-22
CCT	Resident Cutthroat	Columbia River	1240483462464	05-03-14
CCT	Resident Cutthroat	Gee Creek	1227824458494	04-12-22
RBT	Rainbow Trout	Gee Creek	1227824458494	04-12-16
CCT	Resident Cutthroat	Lake River	1227824458505	05-03-14
CCT	Resident Cutthroat	Lewis River	1227824458504	04-12-22

Codes Used In The Fish Presence Report

Code : WDFW alphanumeric code that identifies the fish species.

Common Name : Common name of the fish species.

Stream Name : Stream name based on the US Geological Survey, Geographic Names Information System database.

Stream LLID : Unique stream identifier (ID) generated from the node latitude and longitude located at a stream's mouth. This ID is to be construed only as an ID, and not necessarily as a reference to a stream's location.

Record Date : Date the information was entered into the database.

US Army Corps of Engineers ®

Welcome to the Corps of Engineers Regulatory Program Permit Tracking System

Status of File Number: 200501410 - (Seattle District)

File Name:	**RIDGEFIELD PUBLIC WORKS**
Date Permit Application Received:	**16-DEC-2005**
Type of Permit:	**Pending Nationwide Permit**
Additional Information Requested:	**04-JAN-2006**
Date Application Complete for Processing:	**03-APR-2006**
ESA/Programmatic Consultation Required:	**Y**
Date ESA Consultation Requested:	
Status of ESA Consultation with NMFS:	NOAA Fisheries Tracking Site
Status of ESA Consultation with USFWS:	U.S. Fish & Wildlife Service
Public Notice Issued Date:	
Date Final Action Taken:	
Work Type:	**OUTFALL STRUCTURE**
Project Manager:	Ron Klump (206)764-3495

NOAA Fisheries
PUBLIC CONSULTATION TRACKING SYSTEM

Home | Glossary | Permit Query | Federal Query

HQ Office of Protected Resources
HQ Office of Habitat Conservation
Northwest Regional Office
Southwest Regional Office
Northeast Regional Office
Southeast Regional Office
Pacific Island Regional Office
Alaska Regional Office
US Army Corps Tracking System
US Fish & Wildlife Tracking System

Permit Query - Results

1 record(s) found. For a description of one of the below fields, click on the underlined field name.

Consultation/Project Title	Wastewater Treatment Plant (Ridgefield Public Works 200501410) Clark County
Applicant/Permit#	Ridgefield Public Works - 200501410
Agency Subdivision	Seattle District
NMFS Office/Tracking	NWR - Lacey, WA - 2006/04184
Consultation Type/Statutory Authority	Informal - ESA & EFH
Consultation Status	Reviewing Request for Completeness
Request Received Date	28-AUG-06
Consultation Initiation Date	
Estimated Response date	
NMFS Response Date	
ESA Final Response	Not Yet Determined
EFH Final Response	Not Yet Determined
Federal Agencies Permit Status *(if available)*	Corps of Engineers Fish & Wildlife Service
Activity Location	
State(s)	Washington
Lat/Long	
Type of Action(s)	Waste Management
Species Affected/Status	Salmon, Chinook (Lower Columbia River) - Threatened Salmon, Chinook (Upper Columbia River spring-run) - Endangered Salmon, chum (Columbia River) - Threatened Salmon, Chinook (Unspecified)

US Army Corps of Engineers
Seattle District

INFORMAL ESA CONSULTATION
For Impacts to Aquatic and Terrestrial Listed Species and Designated / Proposed Critical Habitat from CITY OF RIDGEFIELD WASTEWATER TREATMENT PLANT OUTALL EXTENSION INTO THE LAKE RIVER CHANNEL

1. **Proposed Activity:**
The City of Ridgefield is upgrading its Wastewater Treatment Plant (WWTP) from 0.5 MGD capacity to 0.7 MGD to address population growth and in-fill within the City's existing Urban Growth Area over the next several years (2009-10). The Department of Ecology is requiring the City to extend the existing WWTP outfall from the shoreline of Lake River to mid channel in Lake River to ensure that the effluent receives adequate dilution at low tides, as the existing shoreline outfall is only submerged at the highest tides (see attached aerial photo). Work in the waters of Lake River requires a Rivers & Harbors Act, Section 10 Permit from the US Army Corps of Engineers and Endangered Species Act consultation with US Fish & Wildlife Service and NOAA Fisheries. Further, the Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996, requires that projects permitted by the Army Corps of Engineers that may adversely affect Essential Fish Habitat (EFH) must be reviewed by the National Marine Fisheries Service. This BE has been prepared to assess the proposed action's likely impact on EFH. This project is part of the first phase of the City of Ridgefield's efforts to address growth within it UGA and the surrounding area over the next 20 years. Upgrades at the WWTP will include minor piping modifications and increasing the height of the walls of one of the structures to accommodate increased loading and minor changes in the plant processes to increase treatment efficiency. The only new structure will be a small concrete splitter box installed near the north end of the site, which will direct flows between the two clarifiers. None of the proposed activity at the WWTP will occur outside of the existing plant footprint, which lies more than 200 feet to the east of Lake River. No wetlands will be impacted, and the loudest activity to be associated with the WWTP modifications will be associated with trucks delivering concrete to the site.

2. **Drawings** – Please see new aerial photo attached.

3. **Date**: February 7, 2006 **Corps Ref No.** : 20051410

4. **Applicant**: City of Ridgefield Public Works Department, Justin Clary, Public Works Director

   Address: PO Box 608, 230 Pioneer Street, Ridgefield, Washington 98642

5. **Agent**: Mike Johnson, Gray & Osborne, Inc.

   Address: 701 Dexter Avenue North, Suite 200,City: Seattle, Washington 98109

6. Project Name: Wastewater Treatment Plant Outfall Improvements

7. Location(s) of Activity:

Section:	24	Township:	4 North	Range:	1 West
Latitude:	45•49'18"	Longitude:	122•45'09"		

Waterbody: Lake River County: Clark

8. Description of Work:
Work requiring Corps of Engineers Authorization includes:

These activities will include: towing of a 110-foot long section of weighted 10-inch HPDE sewer main offshore from the site of the existing WWTP outfall and sinking it along a westerly alignment. The new outfall pipeline would then be attached to the end of the existing outfall using a clamp or flange. The upper 20 feet of the new outfall pipeline will be vibrated between two and three feet into the muddy substrate using a hydraulic or pneumatic vibratory head. The remainder of the pipeline will be allowed to partially sink into the soft substrate on the bottom of Lake River.

9. Construction Techniques:

A. Construction sequencing and timing of each stage (duration and dates):
Construction will occur during the in-water work window established by the Washington Department of Fish & Wildlife Hydraulic Project Approval. This work window on the Lower Columbia River generally extends from November 1 to February 28. Attachment of the new outfall pipe to the existing outfall and vibration of the upper end of the pipe into the sediments will occur at low tide to eliminate the potential for adverse impacts to fish associated with these activities. The new outfall pipe will be towed offshore at high tide and sunk into place. Divers will check the alignment of the pipe, once it is in place. This work will likely be completed in a period of one to two days. Once a new outfall pipeline is constructed to the Columbia River to accommodate future flows, the Lake River outfall that is the subject of this review will be removed (2009 or 2010). The intertidal portion of the outfall pipe will be excavated by hand and attached to a tractor, which will tow it onshore. This work is likely to occur over the course of a few hours.

B. Site preparation:
The end of the existing outfall pipe will be excavated from the sediments by construction personnel using shovels and other hand tools and a backhoe, if necessary (see photo). Approximately 8 feet of the existing pipe will be cut off and disposed upland. The HDPE pipe sections will be heat-welded to length on-shore either at the Ridgefield Marina, or immediately upland of the existing outfall.

C. Equipment to be used:

- Workboat to tow the new outfall pipe offshore, likely a 24-foot Boston Whaler;
- 10-inch High Density Polyethylene outfall pipe and heat welding equipment
- Steel-cutting hand-held rotary power saw;
- Mechanical clamps and fittings to attach the new outfall pipe to the end of the existing pipe;
- Weathered concrete collars will be clamped along the length of the HPDE pipe at ten-foot intervals to provide negative buoyancy.
- Shovels and other hand tools for excavation of the existing outfall pipe: A small backhoe may be used to excavate the upper end of the outfall when it is removed in 2009-2010. A small tractor or backhoe would likely be used to excavate the upper end of the outfall pipe and pull it out of Lake River, once the new outfall to the Columbia River is in service.
- Pneumatic or hydraulic vibratory head for sinking the upper portion of the outfall pipe into the soft intertidal sediments;
- SCUBA gear and underwater photographic equipment to document the alignment and location of the pipeline on the bottom of Lake River.

D. Construction materials to be used:

- 110 feet of 10-inch HDPE outfall pipe
- Concrete collars will be installed along the length of the HDPE pipe
- Shovels and other hand tools for excavating the upper portion of the existing outfall pipe
- Pneumatic or hydraulic vibratory head for sinking the upper end of the new outfall pipeline into the sediments

E. Work corridor:

The new HDPE pipeline will likely be welded together either immediately upland of the end of the existing outfall, or on the shore at the Ridgefield boat ramp. The pipe will be towed offshore approximately 110 feet in a southwesterly alignment and sunk into place.

F. Staging areas and equipment wash outs:

The outfall pipe will be heat-welded together either immediately upland of the existing outfall, or at the Ridgefield boat launching ramp. Hand tool used to excavate the existing outfall pipe will be washed down at the Ridgefield WWTP. The diving gear used for the outfall inspection and vessel used for towing the new outfall pipe will likely be washed at the Ridgefield Marina.

G. Stockpiling areas:
No stockpiling of materials will be required for this project, as the HDPE outfall pipeline materials will fit on one truck, which will deliver them to the Ridgefield WWTP just prior to construction. If the pipe must be stockpiled it would be at the WWTP site.

H. Running of equipment during construction:
Hours of equipment operation will extend from 0700 am until 0600 pm. Construction equipment (possibly a front end loader/backhoe) and vessels will be shut down when not in use.

I. Soil stabilization needs / techniques:
The outfall installation technique proposed has been chosen to eliminate disturbance of benthic sediments in Lake River. Specifically, the upper section of the new pipeline will be vibrated into the soft mud using a vibratory head to avoid open trench excavation and side-cast of sediments. This work and the connection of the new outfall pipeline to the existing outfall will be accomplished at low tide while the end of the existing outfall and the upper end of the new outfall pipe is exposed to minimize disturbance of benthic sediments.

J. Clean-up and re-vegetation:
It is unlikely that a significant amount of vegetation will be removed or disturbed associated with the proposed outfall extension project, due to the level of development along the outfall pipeline alignment between the Ridgefield WWTP and the existing outfall. Any significant riparian plant materials (primarily grasses) impacted by the proposed activities will be replanted. In the event that the outfall pipe is assembled at the Ridgefield Boat Launch and towed to the site by boat, it is unlikely that any vegetation will be impacted, as the end of the existing outfall lies below the OHWM. There is plenty of room to assemble the outfall pipe without disturbing vegetation at the Ridgefield boat launching area.

K. Stormwater controls / management:
Construction Best Management practices for the Control of Sedimentation and Erosion will be implemented during construction. Pipeline installation and vibration into the intertidal sediments will occur at low tide, so that disturbed sediment can settle into the surface prior to the incoming tide. Straw bales will be utilized to contain disturbed sediments, if needed.

L. Source location of any fill used:
No fill will be required for this project.

M. Location of any spoil disposal:

A pneumatic or hydraulic vibratory head will be used to drive the upper portion of the proposed outfall pipe into the intertidal sediments to avoid excavation of benthic sediments and generation of spoil materials. The subtidal portion of the outfall pipeline will be weighted with concrete collars, placed on the bottom of Lake River and allowed to partially settle into the benthic sediments, no generation of excavation spoils is anticipated.**10. Action Area**

The Action Area for this project would extend for one half mile in all directions from the end of the existing outfall due to noise that would be generated by the boat towing the new outfall pipeline offshore. The Action Area would also extend approximately 0.25 mile upstream and downstream of the proposed outfall alignment in Lake River, due to noise generated by the construction vessel and potential disturbance caused by divers inspecting the pipeline. Any sediments disturbed by placement of the new outfall pipe on the bottom or disturbed by divers would settle out within this distance from the disturbance. It should be noted that the construction vessel is not likely to generate as much noise during project implementation as the small vessel traffic running in and out of the Ridgefield Marina on Lake River

11. Species Information:

Listed Species under the Jurisdiction of the National Marine Fisheries Service, (from the NMFS Northwest Region Webpage, visited 12-28-05) that occur in the Lower Columbia River:

The following table presents evolutionarily significant units (ESUs) of salmon that pass Ridgefield in the Columbia River during rearing and transport portions of their life cycles

Species/ESU/DPS	Status	Date	FR Notice
Salmonids Under NMFS Jurisdiction			
Lower Columbia Chinook	**Threatened**	**3-24-98**	**63 FR14308**
	Critical habitat	**9-2-05**	**70 FR 52631**
Lower Columbia steelhead	**Threatened**	**3-19-98**	**63 FR 13347**
	Critical habitat	**9-2-05**	**70 FR 52631**
Columbia River chum	**Threatened**	**3-25-99**	**63 FR 30455**
	Critical habitat	**9-2-05**	**70 FR 52631**
Lower Columbia coho	**Threatened**	**6-28-05**	
Upper Columbia spring chinook	**Endangered**	**3-24-99**	**64 FR 14308**
	Critical habitat	**9-2-05**	**70 FR 52631**
Snake River sockeye	**Endangered**	**11-20-91**	**56 FR 58619**
	Critical habitat	**12-28-93**	**58 FR 53635**
Upper Columbia steelhead	**Threatened**	**1-5-06**	**71FR**
	Critical habitat	**9-2-05**	**70 FR 52631**
Snake River fall chinook	**Threatened**	**4-22-92**	**57 FR 14653**
	Critical habitat	**12-28-93**	**58 FR 68543**

Snake River spring/summer chinook	**Threatened** **Critical habitat**	**4-22-92** **12-28-93**	**57 FR 14653** **58 FR 68543**
Mid Columbia steelhead	**Threatened** **Critical habitat**	**3-25-99** **9-2-05**	**64 FR 14517** **70 FR 52631**
Snake River steelhead	**Threatened** **Critical habitat**	**8-18-97** **9-2-05**	**62 FR 43937** **70 FR 52631**
Upper Willamette steelhead	**Listed** **Critical Habitat**	**3-25-99** **9-2-05**	
Southwest Washington & Lower Columbia River cutthroat trout	**Proposed** **Removed**	**4-26-99** **7-5-02**	**64 FR 16397**
USFWS Jurisdiction Columbia River bull trout (Distinct Population Segment)	**Threatened** **Critical habitat**	**6-10-98** **9-25-05**	

Listed Species under the Jurisdiction of the National Marine Fisheries Service, (from the NMFS Northwest Region Webpage, visited December 1, 2005).

LISTED SALMONIDS PRESENT IN THE COLUMBIA RIVER THAT OCCUR IN THE COLUMBIA RIVER IN THE VICINITY OF THE RIDGEFIELD WWTP OUTFALL EXTENSION PROJECT:

LISTED EVOLUTIONARILY SIGNIFICANT UNITS (ESUs) OF CHINOOK SALMON:
Lower Columbia chinook salmon, *Oncorhynchus tshawytscha:* Both spring and fall chinook populations on the lower Columbia River were listed as threatened on March 28, 1998. Critical habitat was designated for this ESU on September 2, 2005.

Spring chinook are present in the Cowlitz, Kalama and Lewis rivers. Spring chinook populations from these rivers are of mixed hatchery and wild origin. Return migration for these stocks occurs from late January to May. Tributary migration occurs from March through July, while spawning extends from late August through early October.

Lower Columbia *fall chinook* consist of 14 stocks. These stocks can be further divided into two general groups; the Tule early spawning stocks with strong hatchery influence of mixed origin, and a Lewis River wild stock that spawns later with little hatchery influence. Return migration through the lower Columbia extends from August through November. Spawning is generally October for early stocks and November for late stocks.

Upper Columbia spring chinook
Upper Columbia spring chinook were listed as endangered on March 24, 1999. Critical habitat was adopted for this ESU on February 15, 2000. Spring chinook destined for areas upstream of Bonneville Dam usually reach peak abundance at the dam between April 20 and April 28 but can

be earlier during low flow years or later during high run-off periods. Tributary entry is May-June with spawning in late August to late September.

Snake River fall chinook
Snake River fall chinook were listed as threatened on April 22, 1992, and critical habitat for this ESU was adopted on February 28, 1993.

Snake River spring/summer chinook
Snake River spring/summer chinook were listed as threatened on April 22, 1992 and critical habitat was finalized on December 28, 1993.

COLUMBIA RIVER CHUM SALMON, Listed Threatened:
Columbia chum salmon, *Oncorhynchus. keta:*
Columbia River chum salmon were once widespread in the lower Columbia River. They were listed as threatened on March 25, 1999. Today chum salmon produced in the lower Columbia are concentrated in the Grays River system near the mouth of the Columbia and near Bonneville Dam in Hardy and Hamilton creeks. Some non-native chum introductions have been attempted, with little apparent success. Chum enter the Columbia in October and November, and spawn in November and December. The present run size is estimated to range between 3,000 and 10,000 fish annually. Lake River is designated as **Critical Habitat** for Columbia River chum salmon (Federal Register Vol. 70, Number 170, June 14).

LISTED ESUs OF COLUMBIA RIVER BASIN STEELHEAD:
Lower Columbia steelhead *Oncorhynchus. mykiss*
Lower Columbia River steelhead were listed as threatened on March 19, 1999. Critical habitat was designated for this ESU on September 2, 2005. According to the SASSI Columbia River Appendix, the Lower Columbia River supports five summer steelhead stocks and eighteen winter steelhead stocks. Run timing of the summer steelhead extends from May through October, and run timing of winter steelhead stocks extends from December through April in the Lower Columbia River.

Mid Columbia steelhead
Mid Columbia River steelhead were listed as threatened on March 25, 1999. Critical habitat was designated for this ESU on September 2, 2005.

Upper Columbia steelhead
Upper Columbia River steelhead were listed as threatened on January 5, 2006. Critical habitat was designated for this ESU on September 2, 2005.

Snake River steelhead
Snake River steelhead were listed as threatened on August 18, 1997. Critical habitat was designated for this ESU on September 2, 2005.

Upper Willamette River steelhead
Upper Willamette River steelhead were listed as threatened on March 25, 1999. Critical habitat was designated for this ESU on September 2, 2005.

SNAKE RIVER SOCKEYE, Listed as Endangered:
Snake River sockeye salmon, *Oncorhynchus nerka*
Snake River sockeye salmon were listed as endangered on November 20, 1991 and critical habitat for this ESU was adopted on December 28, 1993.

LOWER COLUMBIA RIVER COHO SALMON, Proposed for listing as Threatened:
Southwest Washington and Lower Columbia River coho, *Oncorhynchus kisutch,* has been a candidate for listing for protection under the authority of the Endangered Species Act since July 25, 1995. This ESU was listed as threatened on June 28, 2005.

Listed Species under the Jurisdiction of the US Fish & Wildlife Service in Clark County (October 8, 2004).

- Bald eagle, *Haliaeetus leucocephalus, Threatened*
- Bull Trout, *Salvelinus confluentus,* Threatened
- Gray wolves, *Canis lupus,* Endangered
- Marbled murrelets, *Brachyramphus marmoratus,* Threatened
- Northern spotted owls, *Strix occidentalis caurina,* Threatened
- Golden paintbrush, Castilleja levisecta, Threatened
- Water howellia, *Howellia aquatilis,* Threatened
- Bradshaw's lomatium, *Lomatium bradshawii,* Threatened
-

Candidate Species

- Oregon spotted frog

ESSENTIAL FISHERIES HABITAT:
Commercially important salmonid species present in Lake River and the Lower Columbia include Columbia River chinook salmon, Columbia River coho and a small population of pink salmon.

12. Existing Environmental Conditions:
See new aerial photograph in Appendices:

A. Shoreline riparian vegetation and habitat features

The shoreline adjacent to the existing Lake River Outfall for the Ridgefield WWTP on the north side of Lake River consists of low grasses and riparian plants (primarily willows & blackberries). There are no large trees in the immediate project vicinity. There is a small roofed structure immediately to the SE of the existing WWTP outfall that houses an abandoned water intake structure. The area to the southeast on the other side of Lake River is owned and operated by the USFWS Ridgefield Wildlife Refuge. Riparian vegetation is developing in this area with deciduous trees including alders, poplars and cottonwoods approaching 20 to 30 feet in height. This vegetation and a slight rise in topography blocks the view to the west toward the Columbia River from the project site.

B. Aquatic substrate and vegetation

Substrate observed in the project area during a site reconnaissance on August 8, 2005 was fine sand mixed with mud and silt. Old aerial photos of the outfall indicate that angular rock and small riprap underlying the mud and silt may be exposed at the outfall site seasonally. No vegetation was apparent below the OHWM. Benthic substrate in the vicinity of the Port of Ridgefield may contain some residual contamination from the creosote plant that operated on Port property until the 1970s, however deposition of sediments in the intervening years minimizes the potential for exposure of these contaminated sediments to the biologically active surface layer of the sediments. The proposed outfall extension design allows for minimal disturbance of potentially contaminated sediments during outfall pipeline installation and eventual removal.

C. Surrounding land/water uses

Uplands to the south of the Ridgefield WWTP and outfall are primarily industrial. A creosote plant was once located on Port Property. This facility ceased operation in the 1970s (Draft Ridgefield General Sewer Comprehensive Plan 2006). There are a number of industrial and storage buildings to the southeast of the effluent conveyance pipeline, which are served by the railroad tracks that constitute the eastern boundary of the Ridgefield WWTP site. North of the effluent conveyance pipeline and west of the WWTP lies a large grassland surrounding Carty Lake. There is a group of bald eagle nests northeast of Carty Lake ranging from 0.75 to 1 mile from the outfall construction site (Priority Habitat & Species Map, August 16, 2005). The area to the west across Lake River is owned and operated as a Wildlife Refuge by the US Fish and Wildlife Service.

D. Level of development

South and east of the Ridgefield WWTP and associated conveyance pipeline is a moderately developed industrial area. North and west of the site is an undeveloped area surrounding Carty Lake. This area was the site of a large Native American Village in the early 1800s when the Lewis & Clark Expedition passed through the area and has a high potential for discovery/disturbance of materials of cultural, historic and archaeological significance. To the west, north and south, the US Fish & Wildlife Service maintains the "River S Unit" on the mainland and Bachelor Island as the Ridgefield National Wildlife Refuge. The Refuge is being returned to near its natural state after many years of agricultural cultivation to promote birding and wildlife viewing. Agricultural activities in the area ceased in the 1980s. Powerboat and canoe launching facilities and a marina are located to the southwest of the WWTP. Vegetation immediately upland from the existing WWTP outfall site consists of grasses, willows and Himalayan blackberries.

E. Water quality

Lake River is on the Section 303(d) list for fecal coliform, which is likely, a result of poor circulation, failing septic systems and input from birds and wildlife. It is also on the 303(d) list for high summer temperatures.

F. Distance to nearest bald eagle nest and wintering features (perch trees; roost trees; and important foraging areas such as waterfowl concentration areas and salmon spawning areas).

Eric Holman, WDFW Eagle Biologist for Clark County, indicated that there was an active bald eagle nest approximately 0.75 mile to the northeast of the project area in the large trees beyond Carty Lake. He said that this nest has successfully fledged young eagles in the past couple of years. The Priority Habitat & Species Map issued by WDFW for this area on August 16, 2005 also indicated that there is a group of active bald eagle nests on Bachelor Island approximately 1.5 mile to the west. All of these nests are out of line of sight from the project area. Trees along the shoreline to the north of the project area block the view from Carty Lake, and trees, levees and the form of Bachelor Island block views from the nests to the west. Another group of bald eagle nests lies to the south of the Bachelor Island group on the USFWS River S Unit (See attached PHS map), which is also out of line of sight of the project area.

G. Distance to nearest marbled murrelet nesting and foraging areas.

The marbled murrelet nesting area nearest to Ridgefield lies approximately 50 miles to the northwest near Cathlamet. Marbled murrelets forage on the Pacific Ocean approximately 85 miles to the northwest.

H. Distance to nearest bull trout spawning / foraging / overwintering areas. Is the project in or adjacent to bull trout migratory waters?

Bull trout are known to spawn in Cougar Creek above Yale and Merwin Dams, which lie 15 and 30 miles up the Lewis River, respectively. Apparently, only a few bull trout have been collected in the lower Lewis River, below these impassable dams. The mouth of the Lewis River is approximately three miles to the northwest of the project area. It is unlikely that bull trout would be present in the project area during construction, as they are generally on high elevation spawning grounds during the in-water work window for the Lower Columbia River, which extends from November 1 to February 28.

I. Is the project located within designated / proposed bull trout critical habitat? If so, please address the proposed projects' potential direct and indirect effect to primary constituent elements (please see the USFWS proposed rule – Federal Register / Vol. 69, No. 122/ Friday, June 25, 2004; Page 35776).

No. The nearest designated critical habitat for bull trout is located on the lower Lewis River. The mouth of the Lewis River lies approximately three miles downstream from the project area. The lower reaches of the Lewis River are being included in the Critical Habitat designation for bull trout in the event that passage is restored around Merwin and Yale Dams. Once passage is restored, the lower Lewis River would provide important migratory, foraging and overwintering habitat for Columbia River bull trout.

J. Is the project located within designated / proposed Pacific salmon critical habitat? If so, please address the proposed projects' potential direct and indirect effect to primary constituent elements.

Lake River is designated as Critical Habitat for Columbia River chum salmon. See discussion in the Effects Analysis Section below.

13. Effects Analysis:

Indirect Effects:

Operation of the new, temporary, Lake River outfall extension in conjunction with the concurrent upgrade of the City of Ridgefield WWTP will provide wastewater treatment and disposal meeting the requirements of the WWTP National Pollutant Discharge Elimination System (NPDES) Permit until Maximum Day Flows exceed 0.7 MGD, which is projected to occur in 2009. Operation of this interim outfall and WWTP configuration will allow the City of Ridgefield time to develop plans and obtain permits for future WWTP upgrades and construction of an outfall to the Columbia River, which will serve areas surrounding Ridgefield that will be incorporated into the City's UGA in the next few years. The area between I-5 and Ridgefield has been designated a "Growth Area" by Clark County, and the City must provide wastewater treatment facilities for this growth. New construction in this area must comply with the stormwater detention and treatment requirements in the Department of Ecology's 1992 Stormwater Manual.

It should be noted that the City of Ridgefield is currently in negotiations with the Department of Ecology to allow continued discharge from the proposed Lake River WWTP Outfall until plant discharge reaches 1.0 MGD. It is the City's contention that the advanced secondary treatment nutrient removal will meet all current water quality standards.

The WWTP upgrade under review in this Biological Evaluation/Informal ESA Consultation will bring the Ridgefield WWTP into compliance with its current NDPES Permit requirements and allow for planned growth within the existing UGA (See population growth estimates from the City's Wastewater Facilities Plan in Appendices) until 2009-2010. Improvements under this phase of the WWTP Improvements will include minor modifications to existing structures and construction of a new 100-foot X 80-foot Compost Processing Building (see Sheets G-5 & G-7 in the Appendices). Future WWTP Upgrades and the construction and operation of a larger outfall to the Columbia River will be addressed in future Biological Assessments that are likely to be submitted to the Corps of Engineers within the next year.

Direct Effects:

A. Water Quality & Fisheries Habitat

Listed Fish in the Project Area:

Listed salmonid species most likely to be present in lower Lake River include Lower Columbia River chinook, Lower Columbia River steelhead, Lower Columbia River coho and Columbia River chum. All of these species utilize the project area for transportation and rearing activities. The fish most likely to be present in the project area during the In-Water Work Window (November 1 to February 28) would be residual chinook, coho and steelhead overwintering in freshwater prior to migrating toward the Pacific Ocean.

Construction:
Extension of the Ridgefield WWTP outfall by 110 feet into the Lake River will be accomplished by attaching a new HDPE pipe to the end of the existing outfall and pulling it offshore using a boat. Weathered (as opposed to freshly poured) concrete collars will be clamped approximately every ten feet along the pipe to provide negative buoyancy. All in-water work would be accomplished during and round slack tide and it is unlikely that the work will take more than two tide cycles to complete. Construction will take place during the In-Water Work Window established by the Washington Department of Fish and Wildlife. Any salmon present in the vicinity of the outfall installation would be able to avoid the area during construction and pipeline inspection. These fish could return to the area once construction activity is complete.

Operation
According to David Knight of the Washington State Department of Ecology, extension of the outfall 110 feet into Lake River would ensure that the effluent would be discharged into at least seven feet of water during the lowest tides. Extension of the outfall into Lake River will help to improve water quality in the vicinity of the existing beach outfall and in the dilution zone downstream. Improving dilution of WWTF effluent will reduce the concentrations of pollutants in the effluent near the point of discharge and the dilution zone, which will improve migratory and rearing habitat for chum salmon and other listed salmonids present in the area.

Modeling and Project Longevity
Results of modeling conducted by G & O indicated that once the outfall is extended into Lake River, water quality would not be significantly impacted beyond the outfall dilution zone, regardless of loading, until plant flows exceed 0.7 MGD in 2009-2010. Once the daily discharge at the Ridgefield WWTF reaches 0.7 MGD, effluent will be redirected to a new outfall discharging into the Columbia River. Construction of this outfall will be covered under a separate Rivers & Harbors Act, Section 10 Permit and a new Biological Assessment.

B. Bald eagles, *Haliaeetus leucocephalus*
Potential for Impacts to Bald Eagles

Construction:
Modifications to the outfall will require operation of a medium-sized work vessel for a few hours over the course of one or two days. Once the outfall pipe is installed, a team of divers will inspect the pipeline to ensure that it is located along the proposed alignment and is not obstructing vessel traffic. Addition of one boat to the traffic on the surface of Lake River over the course of a few days will have no impact on wintering bald eagles that may roost and forage in the project area. Eric Holman, WDFW Biologist for the Vancouver Office, indicated that the project area is far enough away from bald eagle nesting areas that the proposed outfall installation activities are not likely to impact nesting bald eagles (personal communication November 7, 2005).

Operation:
Operation of the modified outfall will preserve the quality of surface waters in the vicinity of the Ridgefield WWTF Outfall until flows exceed 0.7 MGD. Effluent will be discharged over a broader area along the outfall and farther from the shoreline, which will aid in dispersion as flows increase over the next several years. Operation of the modified outfall will have no effect on wintering bald eagles that may forage in the vicinity of the project. Water quality and migratory habitat for chum salmon and other listed species present along the Lake River shoreline in the project area will be improved by project implementation. This should enhance survival for Columbia River chum salmon and other salmonids present. Improved fisheries resources in the project area will improve foraging for bald eagles. Therefore, construction and operation of the proposed improvements to the Ridgefield WWTP and temporary extension of the WWTP outfall to mid-channel in Lake River **may affect, but is unlikely to adversely affect** bald eagles.

C. Bull Trout, *Salvelinus confluentus*
The US Fish & Wildlife Service listed the **Columbia River bull trout, *Salvelinus confluentus,*** as threatened on June 10, 1998. ESA Section 4 (d) rules were adopted at this time. **Critical Habitat** for Columbia River bull trout was designated on September 26, 2005. The designated critical habitat nearest the project area occurs in the lower Lewis River. This area was designated as critical habitat in anticipation of restoring bull trout passage around the dams upstream, in which case the lower Lewis would provide foraging, migratory & overwintering habitat. The mouth of the Lewis River lies approximately three miles downstream of the project area. Most bull trout production in the Lewis River occurs above Merwin Dam (critical habitat was not designated in this area due to existing conservation easements), and only two bull trout have been captured and recorded below the dam. Therefore, the potential for bull trout in the lower reaches of Lake River approximately three miles upstream of the mouth of the Lewis River is very low (USFWS Bull Trout Draft Recovery Plan, Chapter 20, 2005). Therefore, the proposed Ridgefield WWTP improvements and extension of the WWTP outfall to mid-channel in Lake River will have **no effect** on Columbia River bull trout or designated critical habitat on the lower Lewis River.

D. Gray wolves, *Canis lupus*
Gray wolves may be present in the more remote portion of the North Cascades and are not likely to enter areas with a large human presence (Mathews 1999), such as, urban Clark County. Carl Dugger, WDFW Biologist for Clark County indicated that it is likely that any wolf-like animals present in Clark County are hybrids, which are not protected under the Endangered Species Act. The nearest known wolf population is located in the mountains of northeastern Washington. Any wolves that managed to find their way to the vicinity of the Ridgefield WWTP would be able to avoid any noise or disturbance caused by project construction. Therefore, construction and operation of the proposed improvements to the Ridgefield WWTP and outfall will have **no effect** on the gray wolf.

E. Marbled murrelets, *Brachyramphus marmoratus*
The nearest known marbled murrelet nesting area to the Ridgefield WWTP lies approximately 50 miles to the NW near Cathlamet. Marbled murrelets generally nest in old growth forests within 60 miles of marine waters. It is approximately 85 to the Pacific Ocean from Ridgefield. Therefore, construction and operation of the proposed improvements to the Ridgefield WWTP and extension of the outfall into Lake River will have **no effect** on marbled murrelets.

F. Northern spotted owls, *Strix occidentalis caurina*
Northern spotted owl, *Strix occidentalis,* Listed Threatened*:*
Northern spotted owls occur in Clark County throughout the year. According to the Priority Habitats & Species Map prepared by WDFW for the area surrounding Section 24, Township 4 North, Range 1 West on October 12, 2005, there are no northern spotted owl nests or management circles within two miles of the project area. The Old Growth Map provided by WDFW on August 16, 2005 indicated that there are four small areas of old growth forest within two miles of the project area. No northern spotted owl nests or territories were identified in these areas. The proposed improvements to the Ridgefield WWTP and temporary extension of the outfall into Lake River will have **no effect** on northern spotted owls.

Listed plant species:
G. Golden paintbrush, *Castilleja levisecta,*
The golden paintbrush was listed as "threatened" in 1990: Historically occurred in the Mill Plain area of Clark County Washington. This species is typically found in wet prairie areas, which are not present in the vicinity of the Ridgefield WWTP or at the site of the proposed outfall extension into Lake River. Therefore the proposed improvements will have **no effect** on golden paintbrush (USFWS 2000).

H. Water howellia, *Howellia aquatilis,*
Water howellia was listed as "threatened" in 1994, occurs in two small populations in the floodplain of the Columbia River in Clark County on the Ridgefield Wildlife Refuge near the City of Ridgefield. Water howellia, is an aquatic annual plant that grows from four to 24 inches in height. It has two types of flowers: small inconspicuous flowers beneath the water's surface and emergent white flowers 2-2.7 mm in length. Water howellia historically occurred over a large area. It currently occurs in only a fraction of its former habitat due to loss of wetland habitat and changes due to timber harvesting, livestock grazing, residential development and competition by introduced plant species. This species is unlikely to be present below the OHWM of Lake River and, therefore, project implementation will have **no effect** on this species.

I. Bradshaw's lomatium, *Lomatium bradshawii,*
Bradshaw's lomatium was listed as Endangered on September 30, 1988. It is thought to be endemic to the area around (within ten miles of) Salem, Oregon. According to Ron Klump of the US Army Corps of Engineers, Bradshaw's lomatium was recently discovered along Lacamas

Creek near Camas, Washington approximately 30 miles southeast (upstream) of Ridgefield. Therefore, the proposed improvements to the Ridgefield WWTP and outfall will have **no effect** on Bradshaw's lomatium.

Candidate Species:

- **Oregon spotted frog**
  According to the WDFW Species of Concern Webpage, Management Recommendations for Washington Priority Species (WDFW November-97) Oregon spotted frogs were once widespread in the Puget Sound Region and in southwestern Washington. They are almost entirely aquatic in habit and they inhabit marshes and the shallow margins of ponds, streams and lakes. These frogs hibernate in muddy bottoms near breeding sites during the winter. The Lake River channel environment is likely to be too dynamic for development of Oregon spotted frogs, though they could be present in Carty Lake. In the event that Oregon spotted frogs are present in the sediments near the Ridgefield WWTP outfall, it is unlikely that they would be disturbed by project activities, as excavation/disturbance of sediments will be limited to minor excavation around the end of the existing outfall. Lowering the effluent pipeline into place on the bottom of Lake River and discharge of high quality effluent near mid-channel is unlikely to disturb sediments containing Oregon spotted frog eggs, which are generally laid in ponds and lakes with less moving water. It is unlikely that Oregon spotted frogs are present in the immediate project vicinity; and in the event that they are present construction and operation of the new outfall into Lake River would only disturb a few eggs. Water quality in Lake River would be improved/preserved by implementation of the proposed project through the proposed planning period. Therefore, the proposed project **will not jeopardize the continued existence** of Oregon spotted frogs.

DESIGNATED CRITICAL HABITAT FOR COLUMBIA RIVER CHUM SALMON PRIMARY CONSTITUENT ELEMENTS.
The NMFS has identified six primary constituent elements essential to the conservation of listed Columbia River salmonids. These six PCEs for chum salmon are summarized from the Federal Register below.

PCEs for conservation of Columbia River chum salmon:

1. **Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development of Columbia River chum salmon:**

According to the WDFW SASSI for Columbia River steelhead (WDF 1992). Lower Columbia chinook salmon, Lower Columbia steelhead, Lower Columbia coho and Columbia River chum salmon may all be present in the lower reaches of Lake River and downstream on the Columbia River. Lower Columbia coho, steelhead and chinook utilize habitat in Lake River and the Lower Columbia for rearing and foraging. Lake River has been designated as Critical Habitat for Columbia River chum salmon, which spawn in lower reaches of streams upstream of Ridgefield. Substrate quality in the immediate project area is not conducive to salmonid spawning, as benthic sediments are primarily muddy sand that is unsuitable for spawning, incubation and larval development. Implementation of the proposed project would result in relocation of the Ridgefield WWTP outfall to mid channel in Lake River, which would improve effluent dilution in the project area and improve and preserve water quality and rearing and transportation habitat along the eastern shore of Lake River until a new outfall can be permitted and extended to the Columbia River (2009-10).

2. **Freshwater migration corridors free of obstruction, freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions that support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.**

Upgrading the Ridgefield WWTP and extending the outfall into Lake River will help to minimize potential adverse impacts on water quality in Lake River associated with population growth and development within the Ridgefield City Limits and UGA. Construction of the proposed outfall extension into Lake River is likely to take less than one day of work on the site in Lake River to complete, however it is possible that it could extend over the course of several days. Salmonids present in the area will be able to avoid noise and turbidity generated by construction, and are likely to return to the area, once construction is complete. Noise impacts associated with pipeline installation are likely to be minimal, as the work will generate significantly less noise than the recreational boat traffic in and out of the Ridgefield Marina, which lies just upstream of the project area on Lake River. Little, if any, riparian vegetation (grasses, willows & blackberries) will be removed to install the new outfall pipeline, as the attachment point will be at the end of the existing outfall pipe, just waterward of the OHWM. The new 110-foot outfall pipeline will be installed across the bottom of Lake River to the discharge point. The pipe will be towed offshore using a boat. End caps from the pipe will be removed and the pipe will be gently lowered to the bottom of Lake River where it will likely settle partially into the sediments over time. Construction BMPs for the control of sedimentation and erosion will be implemented, if necessary. Riparian vegetation, water quality and forage supporting juvenile salmonid development will not be impacted significantly, as the connection of the new outfall pipe to the outfall will occur below the OHWM. Any riparian vegetation inadvertently disturbed by construction will be replanted with native vegetation as soon as possible, once construction is complete.

Once the proposed outfall pipeline extension is in place, the proposed project will improve the migration corridor along the east bank of Lake River through the project area. Effluent discharged via the outfall will receive more complete dilution than with the existing riverbank discharge. The proposed installation and operation of a new outfall near mid-channel will improve effluent dilution and water quality in Lake River. It will have no observable effect on water quantity or floodplain connectivity in Lake River, though flows from the outfall are projected to increase in the next few years. The subject Lake River outfall pipeline will be removed once a new larger outfall can be permitted and extended to the Columbia River, once Ridgefield WWTP flows reach 0.7 MGD (2009-10).

3. **In-water habitat with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival:**

Installation of the proposed 10-inch sewer outfall extension to mid-channel in Lake River would generate only minor amounts of suspended sediment over the course of a few hours on one or two working days during the WDFW In-Water Work Window, which extends from November 1 to February 28. Construction of the project will have no impact on natural cover, large wood, side channels or undercut banks that support juvenile and adult mobility and survival. Relocation of the outfall to mid channel would aid in dilution & dispersion of effluent over a wider area. Nutrients in the effluent could increase productivity of aquatic algae and riparian vegetation over the life of the project. Advanced secondary treatment with nutrient removal should minimize the potential for algal blooms and associated dissolved oxygen reductions. The temporary outfall pipe could aid in recruitment of large rocks in the project area by slowing or stopping them as they roll down the Lake River during high flow events, possibly providing resting areas for migrating salmonids. Construction BMPs for control of sedimentation and erosion will be implemented during construction, as necessary. Any riparian areas disturbed by the proposed project will be replanted with native shrubs and grasses to stabilize the stream channel and enhance/preserve the riparian zone.

4. **Estuarine areas free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between freshwater and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation:**

The proposed installation of a new 10-inch wastewater outfall to mid-channel in Lake River during the winter In-water Work Window will have little potential to obstruct juvenile and adult salmonid foraging activities, as the work is likely to be completed in a few hours over the course of one or two days. Estuarine conditions on the Lower Columbia approximately 85 miles downstream will not be significantly impacted. Effluent from the Ridgefield WWTP will be diluted more effectively and consistently by discharging from the new outfall pipeline at mid channel in Lake River. This will improve/preserve estuarine conditions in Lake River and downstream on the Columbia until a new outfall and diffuser discharging to the Columbia River can be permitted and constructed (2009-2010). Natural cover conditions including submerged and overhanging large wood and side channels to Lake River would not be affected. Aquatic vegetation including planktonic algae and larger plant would receive additional nutrients that will be dispersed over a larger area by the mid-channel outfall. A slight increase in algal productivity could result in increased production of aquatic invertebrates that constitute a significant portion of the diet of rearing salmonids. Presence of the outfall near mid channel may help to recruit large rocks and boulders on the northeastern portion of Lake River. The proposed relocation of the outfall to the Columbia River once WWTP flows reach 0.7 MGD will assure that algal productivity does not increase to the point of causing blooms, which eventually die back and are consumed by bacteria that metabolize dissolved oxygen and result in reduced DO concentrations that adversely impact aquatic productivity and the health of salmonids and other fish.

5. Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels:

Installation of the proposed outfall extension to the middle of Lake River will have minimal potential to degrade water quality for a short period, likely a few hours over the course of one or two days. Nearshore water quality improvements associated with the relocation of the outfall to mid channel will facilitate growth and maturation of juvenile salmonids rearing along the northwestern shore of Lake River. The productivity of aquatic prey organisms present in the sediments along the northwestern shore of Lake River may also be increased slightly. The proposed project is not anticipated to have any measurable effect on submerged and overhanging large wood, aquatic vegetation, large rocks and boulders or side channels in nearshore marine areas approximately 90 miles downstream from the project area.

6. Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation:

The proposed project will have no effect on nearshore marine areas, as Lake River is approximately 90 miles upstream from the mouth of the Columbia River, and the level of effluent treatment and dilution associated with the proposed improvement to the Ridgefield WWTP and extension of the outfall into mid-channel of Lake River will not change enough to be observable 90 miles downstream.

Based on this analysis, the proposed construction and operation of the proposed improvements to the Ridgefield WWTP and the extension of the outfall to mid channel **may affect, but is unlikely to adversely affect** designated critical habitat for Columbia River chum salmon.

14. Conservation measures:

Conservation measures designed to minimize potential impacts to listed species include:

- The proposed extension of the Ridgefield WWTP Outfall 110 feet into Lake River will occur during the in-water work window established by WDFW and the Corps of Engineers in the permit conditions for the HPA and Rivers & Harbors Act, Section 10 Permit. The in-water work window extends from November 1 to February 28 in the Lower Columbia River and its tributaries. Working during this window would protect nesting bald eagles and juvenile salmonids that migrate through the project area en route to the Pacific Ocean.

- Construction Best Management Practices for the control of sedimentation and erosion will be implemented during construction: i.e. connection of the new outfall pipe to the end of the existing outfall will occur at low tide. Straw bales will be used to filter turbid water reaching the beach, if necessary.
- The upper intertidal portion of the new outfall pipe will be vibrated into the sediments using a hydraulic or pneumatic head to eliminate the need for excavation and side cast of benthic materials to protect water quality.
- Construction vessels and equipment will be equipped with spill cleanup kits and operators shall be trained their use.
- Construction equipment shall be stored in upland areas away from the beach when not in use.

15. Determination of Effect:

Listed Species:

1. The construction and operation of the proposed improvements to the Ridgefield WWTF Outfall and the indirect effects associated with the proposed improvements will be minimal or discountable. Construction impacts would be limited to potential disturbance of listed salmonids during installation of the outfall, which would take place over the course of a few days during the In-Water Work Window established to protect juvenile salmonids in the Lower Columbia River. The benthic surface of Lake River would not be excavated, so potentially contaminated sediments would not be disturbed. The effluent pipeline and outfall to Lake River will be removed once the outfall to the Columbia is in service (approximately 2010). Operation of the extended outfall would improve/preserve water quality in Lake River through the planning period. Therefore, implementation of the proposed project **may affect, but is unlikely to adversely affect** on the listed anadromous salmonids that occur in Lower Lake River and the Lower Columbia River near the project area. These species/Evolutionarily Significant Units/Distinct Population Segments include:

    - Lower Columbia River chinook salmon
    - Lower Columbia River steelhead
    - Lower Columbia River coho
    - Columbia River chum salmon

2. Construction of the proposed project will be implemented in a manner that minimizes the disturbance of benthic sediments, and operation of the upgraded WWTP and extended outfall will preserve water quality through the project design period (2009-2010). Therefore, the proposed project **may affect, but is unlikely to adversely affect** Critical Habitat for Lower Columbia River chum salmon.

3. The potential for utilization of the project area by bull trout during the in-water work window for the Lower Columbia River is very low, as bull trout are generally on high elevation

spawning areas during this period. . Operation of the extended outfall and upgraded WWTP will improve/preserve water quality in lower Lake River through the design period. Therefore, implementation of the proposed project will have **no effect** on Columbia River bull trout.

4. Because all work on the Ridgefield WWTF outfall will take place out of line of sight from known bald eagle nesting areas approximately 0.75 mile to the NE and 1.5 miles NW on the western side of Bachelor Island and the River S Unit, construction of the proposed project is unlikely to disturb nesting bald eagles. Operation of the extended outfall pipe will help to improve/maintain water quality in the Lake River (beyond the outfall mixing zone). The proposed outfall extension would improve habitat for fish and other aquatic species upon which bald eagles prey. Therefore, proposed WWTP improvements and extension of the Ridgefield WWTP outfall by 110 feet into the Lake River channel would be likely to result in a minor improvement to foraging habitat for bald eagles. This improvement in habitat is not likely to be quantifiable or observable. Therefore, implementation of the proposed project **may affect, but is unlikely to adversely affect** bald eagles in the vicinity of Ridgefield.

5. There are no northern spotted owls nests or management circles within two miles of the project area. Therefore, the proposed project will have **no effect** on northern spotted owls.

6. Gray wolves are not likely to be present in the project area due to the distance from known gray wolf populations in northeastern Washington and the level of development in the City of Ridgefield. Therefore, the proposed outfall extension project will have **no effect** on the gray wolf.

7. Golden paintbrush is a wet meadow plant generally associated with upland prairies. It is not likely to be present in the intertidal portion of Lake River in Ridgefield where the project will occur. Therefore, the proposed outfall extension project will have **no effect** on golden paintbrush.

8. Because the two small populations of water howellia present in Clark County are not in the immediate vicinity of the Ridgefield WWTF outfall, the proposed outfall extension will have **no effect** on this rare plant species.

9. Bradshaw's lomatium is generally found along streams in disturbed areas. It is unlikely that it will be present in the immediate vicinity of the end of the Ridgefield WWTP outfall, which is located below the high tide elevation on the bank of Lake River. The nearest known population of this plant occurs approximately 30 miles to the southeast along Lacamas Creek in the City of Camas. It is unlikely to be present in the project area. Therefore, extension of the Ridgefield WWTF outfall by 110 feet into Lake River will have **no effect** on Bradshaw's lomatium.

10. Installation of the proposed 110-foot extension to the Ridgefield WWTP outfall to Lake River will have minimal potential to adversely impact chinook, coho or pink salmon. Further, operation of the improved WWTF and outfall will improve habitat for these species in Lower Lake River and downstream on the Columbia River. Therefore, the proposed extension of the Ridgefield WWTF outfall into Lake River and minor improvements to the Ridgefield WWTP will have **no effect** on EFH for these species.

Candidate Species:

1. Because the proposed installation of the 110-foot extension to the Ridgefield WWTP outfall will occur in Lake River and will improve/preserve water quality through the planning period (2009-2010), this project **will not jeopardize the continued existence of** Oregon spotted frogs.

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18. Appendices:

Corps Project Manager ________ Date

Corps Environmental Analyst/ESA Coordinator ________ Date

APPENDIX C

MIXING ZONE STUDY PART I – EXISTING DISCHARGE

City of Ridgefield

Mixing Zone Study
Part I – Existing Discharge

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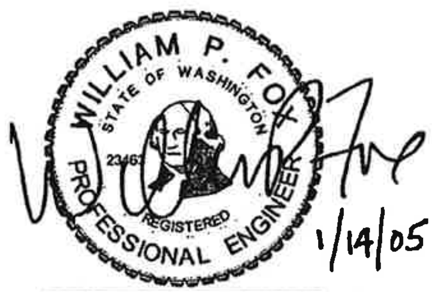
January 2005
G&O014

CERTIFICATE OF ENGINEER

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal as a professional engineer licensed to practice as such, is affixed below.



1/14/05

EXPIRES	10-29-05

William P. Fox, P.E.

Cosmopolitan Engineering Group, Inc.

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EXECUTIVE SUMMARY

This mixing zone study is being submitted per section S8 of the City of Ridgefield's Wastewater Treatment Plant (WWTP) NPDES permit. The study establishes dilution factors under critical effluent and receiving water conditions at acute and chronic mixing zone boundaries for the outfall currently authorized in the permit.

The City of Ridgefield is currently conducting wastewater facility planning to meet projected system demand and water quality regulations. An additional effluent mixing zone study being conducted as part of that effort, will consider outfall and treatment plant improvement alternatives. Ecology may use this information, along with ambient receiving water and effluent data, to assess the need for additional treatment plant or outfall controls to meet receiving water quality standards.

The Ridgefield WWTP outfall discharges along the eastern shoreline of Lake River, approximately 10,000 feet upstream of its confluence with the Columbia River main channel. Lake River is part of the Columbia River estuary and experiences twice-daily flow reversal during flood tides. The mean tide range is 2.0 feet. At low tide the outfall terminates above the river surface elevation, and effluent flows over rocks to reach the river flow. The outfall is submerged only during high tides.

Because Lake River experiences reversing flow due to tidal influence, the mixing zone surrounding the Ridgefield outfall is classified as estuarine under the water quality standards, and in the NPDES permit. Critical conditions for mixing and water quality in estuaries occur during late summer when river discharge is minimum. The reversing tidal flow causes accumulation of pollutants after multiple tide cycles, termed reflux. A dye tracer study was conducted in September 2004 to document the reflux concentration.

The dye tracer study and other ambient measurements from summer 2004 were used to develop a dilution model for the existing discharge. Under critical ambient conditions and design effluent flows, the effective dilution factors (including reflux) were determined to be 1.0 at the acute mixing zone and 6.5 at the chronic mixing zone.

Ecology's design guidelines recommend submergence of wastewater outfalls and avoidance of effluent contact with shorelines. Ridgefield's outfall does not meet these design standards, provides limited dilution within mixing zones, and may not satisfy water quality criteria. If the City continues to discharge effluent to Lake River, the City should consider extending the outfall into the main channel along with the addition of a diffuser. These alternatives will be evaluated in the next phase of the mixing zone study.

SECTION 1:
INTRODUCTION

The City of Ridgefield discharges wastewater treatment plant (WWTP) effluent to Lake River 10,000 feet upstream of its confluence with the Columbia River. Lake River is an 11-mile slough of the Columbia River that originates at the outlet of Vancouver Lake. Several streams, including Burnt Bridge, Salmon, Whipple, and Flume creeks flow into Lake River upstream from Ridgefield. Also, tidal effects in the Columbia River cause Lake River to reverse its flow direction back toward Vancouver Lake. Columbia River, Lake River, and the City of Ridgefield WWTP outfall location are shown in Figure 1.

1.1 NPDES PERMIT SECTION S8

The City of Ridgefield was issued NPDES Permit No. WA0023272 by the Department of Ecology on December 12, 2003. Section S8 of the NPDES permit requires the City to conduct a mixing zone study, which will determine the degree of effluent and receiving water mixing which occurs within the mixing zone authorized in Section S1B of the permit.

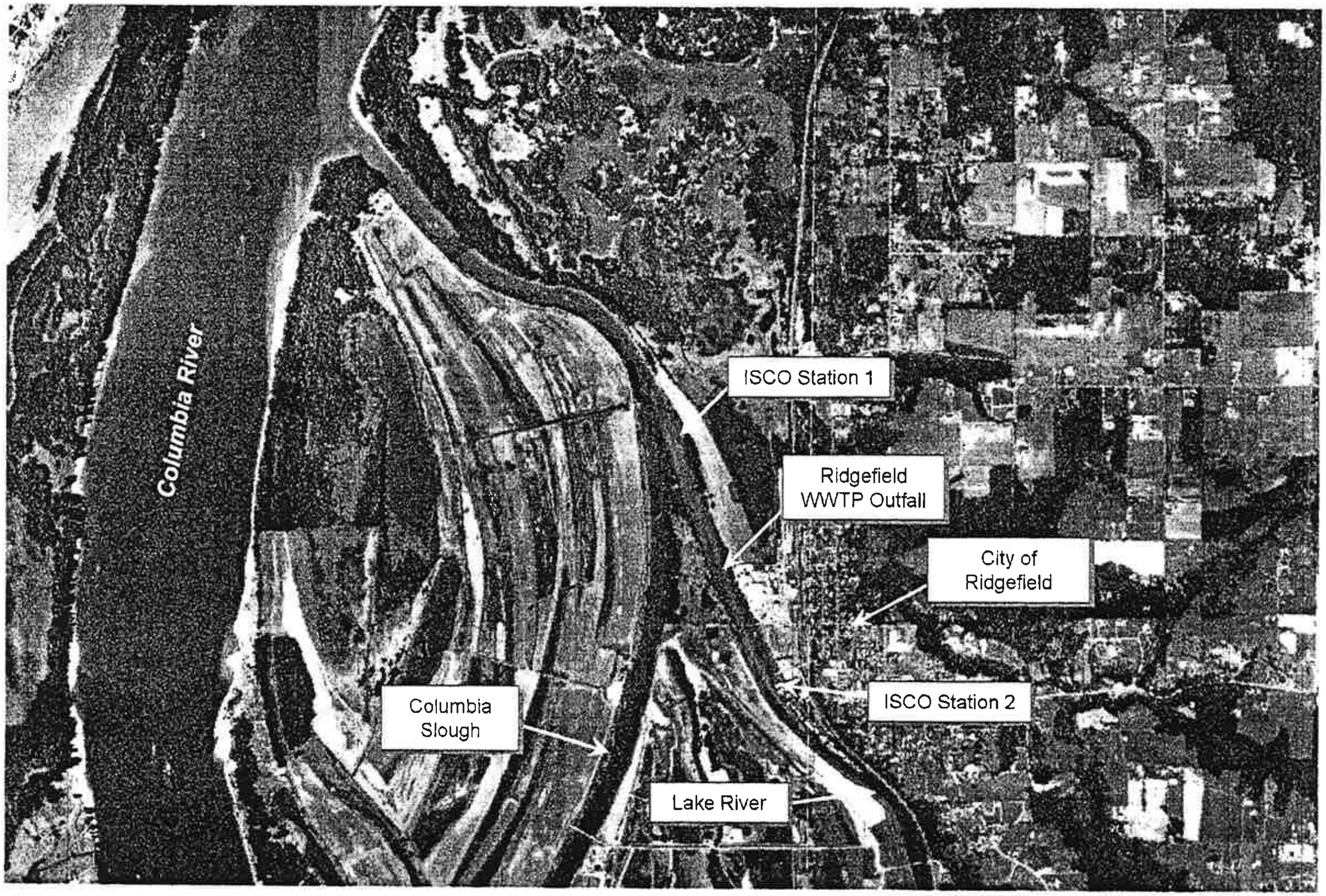
The mixing zone study is presented in two parts. The purpose of this report (Part I) is to satisfy the requirements of Section S8 of the NPDES permit. Specifically, this report will establish the dilution factors at the acute and chronic mixing zone boundaries for the existing outfall and the existing treatment plant capacity specified in the NPDES permit.

1.2 FACILITY PLANNING

Part II of the mixing zone study will establish dilution factors for various alternatives being considered in wastewater facilities planning currently being conducted by Gray & Osborne for the City of Ridgefield. The facilities plan is targeted for completion in spring 2005. Alternatives evaluated under Part II will include various WWTP design flows, extension of the outfall and the addition of diffusers. Part II of the mixing zone study will be presented as an appendix to the facilities plan.

1.3 SAMPLING AND ANALYSIS PLAN

Lower Lake River is a complex hydrodynamic system in which summer low runoff from Lake Vancouver, Salmon Creek and other tributaries combine with tidal reversal in the Columbia River to create critical water quality conditions. The NPDES permit specifies field studies to be conducted in support of this report. Therefore, a sampling and analysis plan (SAP) for the mixing zone study was prepared in May 2004 and submitted to Ecology for review prior to conducting field studies. The SAP established a dye tracer study to establish effluent reflux and dispersion in Lake River during these critical receiving water conditions. Dilution models and modeling protocol were also established in the SAP.



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COSMOPOLITAN ENGINEERING GROUP
Civil, Environmental, and Recreational Consulting

Figure 1: Aerial View of Lake River in the Vicinity of Ridgefield

The SAP was reviewed by Ecology and comments were received via email from David Knight on June 1, 2004.

1.4 DEVIATIONS FROM THE SAP

The previous mixing zone study conducted by Wallis Engineering in February 1997 described the outfall as having a minimum discharge depth of 5 feet. During reconnaissance for the field studies and after the SAP was prepared, it was discovered that the outfall actually discharges at or above the shoreline and is not submerged except at high tide. A photograph of the existing discharge at low tide is shown in Figure 2.

As a result of the actual outfall configuration, several significant aspects of the field study and modeling varied from the original SAP, and are outlined below:

- Only two ISCO samplers were available from Ecology (of three planned fixed-station samplers), therefore the downstream station near the Lake River entrance to the Columbia River was omitted.

- The SAP called for a continuous injection of dye into the WWTP effluent to establish the reflux concentration in the tidally reversing estuary. When the unsubmerged outfall was discovered, the City elected to focus the tracer study on establishing reflux for a submerged outfall alternative. If the long-term plan for the wastewater discharge is to remain in Lake River, the City anticipates extending the outfall to a submerged location. Therefore, the dye was directly injected into the receiving water via 3/8-inch plastic tubing for one tidal day. This method of direct injection replicates the USGS injection methods cited in the SAP.

- The dilution models cited in the SAP (PLUMES, CORMIX, and UDKHDEN) are not appropriate for an unsubmerged, side-bank discharge at the water surface. The model RIVPLUM5 has been selected to model dilution for the existing side-bank discharge.

- The SAP proposed evaluating the "reasonable potential" to exceed water quality standards for toxicants according to Ecology's protocol in the *Permit Writer's Manual* (Ecology Publication 92-109). Ecology's SAP comments requested that this analysis not be included as part of the S8 mixing zone study. Therefore, this report is limited to establishment of the acute and chronic dilution factors for the existing discharge, and does not include any of the water quality analyses described in Section 5.3 of the SAP. Water quality compliance and projected effluent criteria for future alternatives will be addressed in Part II of the mixing zone study.

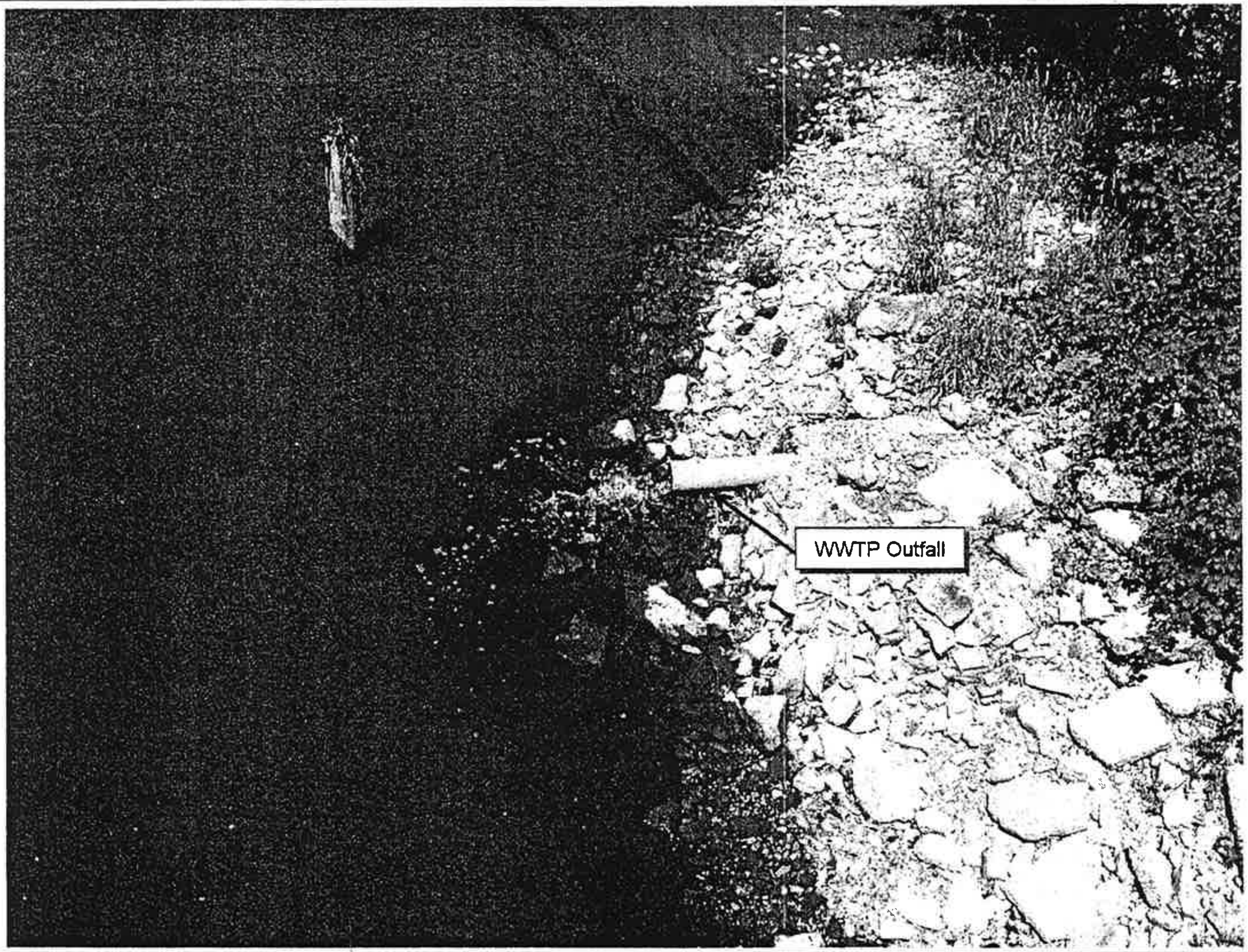

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Figure 2: Photo of the Ridgefield Outfall at Low Tide

1.5 OUTFALL LOCATION

The NPDES permit requires the City to determine the latitude and longitude of the outfall. Surveyors with Gray & Osborne Engineers determined the following coordinates for the terminus of the existing outfall:

- Latitude N 45° 49' 17.969"
- Longitude W 122° 45' 13.665"
- Elevation 7.95' NAVD88

The latitude reported on the NPDES permit is correct. However, the longitude listed on the permit is approximately 300 feet east of the actual location. The coordinates listed on the NPDES permit are likely the location where the outfall leaves the treatment plant site. The NPDES permit should be modified accordingly.

SECTION 2:
DESIGN CRITERIA

The NPDES permit requires mixing to be determined for critical conditions or as close to critical conditions as reasonably possible. WAC 173-201A-020 defines critical conditions as follows:

> *...when the physical, chemical, and biological characteristics of the receiving water environment interact with the effluent to produce the greatest potential adverse impact on aquatic biota and existing or characteristic water uses...*

2.1 CRITICAL AMBIENT CONDITIONS

For riverine systems the critical river discharge is taken as the lowest 7-day flow rate with a 10-year statistical recurrence interval (7Q10). For tidally reversing waters, the critical ambient current for the acute boundary is the 10^{th} percentile speed from measurements representative of neap and spring tidal conditions. The critical current speed for the chronic boundary is the 50^{th} percentile (median) current speed. The critical tide elevation is mean lower low water (MLLW).

Lake River is part of the Columbia River estuary, in which flow reverses due to the tidal influence. Tidal reversal can cause effluent to accumulate in the receiving water surrounding an outfall, thereby limiting the dilution factors obtained at the mixing zone boundaries. Therefore, a dye tracer study has been specified to quantify the farfield accumulation of effluent (termed reflux) near the Ridgefield discharge to Lake River. The tracer study was conducted in September 2004, during the seasonal period of lowest river discharge (late summer) to capture the combination of critical tidal and river discharge conditions. This selection of critical conditions is consistent with previous tracer studies conducted in similar estuarine discharge locations (*e.g.*, Longview, Raymond, Snohomish).

In estuaries, lakes, and slow-moving rivers, mixing may be influenced by ambient density stratification (*i.e.*, differences in density with depth between the effluent and receiving water). In the absence of a salt wedge, such as in Lake River, density stratification is principally a function of solar heating. Therefore, late summer is typically the critical period for density stratification due to the warm ambient air temperatures and longer days. Temperature and salinity profiling was conducted in Lake River on September 3, 2004, to quantify ambient density and density stratification during the dye tracer study. Continuous ambient temperature monitoring was also conducted by the City of Ridgefield during summer 2004, as required under NPDES permit Section S9.

2.2 7Q10 DISCHARGE

Lake River has not been gauged to measure flow; principally the tidal influence makes this impractical. Some tributaries to Lake River, however, have available stream flow records. For streams that discharge to Lake River, Table 1 presents the available discharge data, source of the data, and the period of flow measurement record:

Table 1 Gauging Stations Tributary to Lake River

Creek Name	Organization	Station No.	Period of Record
Salmon Creek	USGS	14213000	02/17/1988 to 09/30/1989
Salmon Creek	Clark Public Utilities	S08	08/16/1996 to present
Burnt Bridge Creek	USGS	14211902	10/01/1998 to 09/30/2000

The only long-term flow data for any water body that flows into Lake River has been collected by Clark Public Utilities for Salmon Creek. Therefore, Salmon Creek flow data are used to estimate flow from the other watersheds that discharge into Lake River, and to then calculate the 7Q10 low flow for Lake River near Ridgefield. A constructed channel from the Columbia River to Lake Vancouver has been used to provide additional flushing flows for Lake River, but that channel is currently plugged.

Ratios of the ungauged watershed areas to the Salmon Creek watershed area were determined and then applied to the Salmon Creek flow data to develop flows for the other watersheds. Salmon Creek daily stream flow data from October 1, 1996, to September 30, 2004, are used to determine the 7Q10 low flow for Salmon Creek and to estimate daily flows and calculate the 7Q10 low flows for Burnt Bridge Creek, Whipple Creek, and the Lake Vancouver watershed. The estimated 7Q10 low flows are listed in Table 2.

Table 2 Estimated 7Q10 Discharge for Lake River

Water Body	Watershed Area (square miles)	7Q10 Flow (cfs)
Burnt Bridge Creek	28	4.0
Salmon Creek	89	11.8
Whipple Creek	20	2.7
Lake Vancouver Watershed	31	4.1
Lake River at Ridgefield		$\sum$= 22.6

Note: Does not include any flow from the constructed channel linking the Columbia River to Lake Vancouver

Although the USGS stream flow data for Burnt Bridge Creek is limited to a 2-year period, the 7Q10 low flow ranges between 4 and 6 cubic feet per second (cfs) when calculated using the simple plot method. Using the area ratio and Salmon Creek flow data yields a 7Q10 low flow of 4 cfs for Burnt Bridge Creek. The similarity in results indicates the area method reported in Table 2 provides reasonable 7Q10 low flow estimates for the Lake River watershed and its tributaries.

The 7Q10 discharge for the Columbia River near the confluence with Lake River is estimated to be 85,346 cfs (CH2M Hill, *Outfall Dilution Study Report for Salmon Creek Wastewater Treatment Plant*, January 2004).

2.3 CRITICAL EFFLUENT FLOW RATE

The NPDES *Permit Writer's Manual* (Ecology Publication 92-109) specifies the critical effluent flow rates to be used in mixing zone studies. For a continuous municipal treatment plant discharge such as Ridgefield, the appropriate critical effluent flow rates are (1) maximum monthly average flow rate for the chronic mixing zone boundary, and (2) highest daily (*i.e.*, 24-hr average) flow rate for the acute mixing zone boundary. The maximum monthly design flow rate for the WWTP is 0.5 mgd as specified in the NPDES permit. The maximum daily effluent flow at the 0.5 mgd level has been estimated by Gray & Osborne at 0.9 mgd.

2.4 MIXING ZONE CRITERIA

Mixing zone classifications in WAC 173-201A-100(7) include (a) rivers and streams, (b) estuaries, (c) oceanic waters, and (d) lakes and reservoirs. Ridgefield's NPDES permit Section S1.B includes the following mixing zone definition derived from the estuary classification:

> *The mixing zone appears to fit the model of the estuary best because of the tide reversals. The maximum boundaries of the mixing zones are therefore defined as follows:*
>
> - *The chronic boundary extends 200 feet upstream and 200 feet downstream. The width of Lake River is 240 feet wide and the mixing zone is allowed only 25 percent of the width, which is 60 feet.*
>
> - *The acute boundary is 10 percent of the 200-foot value established above, which is a 20-foot radius from the end of the pipe.*

Ecology and the City disagree about the proper classification of the Ridgefield mixing zone (12/10/04 email from David Knight, Ecology, to Bill Fox, Cosmopolitan Engineering Group).

Ecology contends that the receiving water should now be classified as a river for mixing zone criteria, including very restrictive limitations based on the 7Q10 discharge, on the basis of the following excerpt from WAC 173-201A-100(7):

> *... this size limitation [for rivers] may be applied to estuaries having flow characteristics that resemble rivers...*

This interpretation has been tested and resolved in other similar discharge situations. Most notably, for the Cowlitz wastewater discharge to the Columbia in Longview, Ecology differentiated between "tidally-influenced" and "tidally-reversed" receiving water environments (8/14/98 memorandum from Norm Glenn, Ecology, to Darrel Anderson and Al Bolinger, Ecology). Ecology concluded that "tidally-influenced" is a term consistent with "estuaries having flow characteristics that resemble rivers." "Tidally-reversed" was found to be consistent with the estuarine mixing zone classification, which does not include the 7Q10 discharge restriction. The hydrodynamic conditions including tidal reversal are the same at Ridgefield as at Longview.

A proposed riverine mixing zone classification was contested under an NPDES permit appeal to the PCHB by the City of Snohomish (PCHB No. 00-063). Like Ridgefield and Longview, Snohomish discharges to a fresh water, tidally-reversed estuary in which Ecology applied riverine mixing zone criteria. The appeal was settled with estuarine mixing zone criteria applied in the permit and in the mixing zone study.

The City of Ridgefield contends that the proper mixing zone classification for their outfall is estuarine, that the dimensions in Section S1.B of the current NPDES permit are correct, and restrictions based on the 7Q10 discharge do not apply. This mixing zone study is therefore conducted on the basis of this classification.

2.5 OUTFALL DESIGN GUIDELINES

Ecology's *Criteria for Sewage Works Design (Orange Book)* (Ecology Publication 98-37) includes design guidelines for outfalls into estuaries. Side-bank discharges such as Ridgefield's existing outfall do not meet these design criteria. Where feasible, outfalls should not discharge above the low tide line, exposing effluent to potential public contact. Effluent contact with adjacent shorelines should be minimized, especially in areas with potential public contact. There are kayak launching areas and a public boat launch just upstream of the outfall, so public contact is feasible. In addition, the shoreline discharge restricts the dilution achieved within the mixing zones. All of these design guidelines could be achieved if the outfall were extended into the channel of Lake River.

SECTION 3:
AMBIENT CONDITIONS

Various field studies were conducted in 2004 in support of this mixing zone study. The dye tracer studies were conducted in the first two weeks of September 2004. Most of the critical ambient measurements were obtained during intensive field studies on the last day of the dye injection, September 3, 2004.

3.1 TIDE

Lake River is over 70 miles from the ocean, and tidal predictions are difficult in the upper reach of the Columbia River estuary. National Oceanic and Atmospheric Administration (NOAA) has a tide station near St. Helens, OR, approximately 2.5 miles downstream of Ridgefield. Tide predictions for September 3, 2004, near St. Helens are shown in Figure 3, including the times of plume dye transects. It was noted during the field studies that the tidal elevation range was accurate, but times of high and low tides were up to two hours later than published times.

The tides occurring the week of September 3, 2004, were selected for the study because they were fairly symmetrical. That is, the highs and lows were approximately equal. These tide conditions were judged to be critical because the two flood tides maximized the time when the river reverses and flows upstream, causing effluent reflux.

3.2 RIVER DISCHARGE

As stated previously, Clark County's Salmon Creek station is the only tributary gauge currently in operation. Discharge data for the week of September 3, 2004, are presented in Table 3, including the same area extrapolation method used to derive 7Q10 statistics.

Table 3 River Discharge Data for the Week of September 3, 2004

	Salmon Creek	Burnt Bridge	Whipple Creek	Lake Vancouver Watershed	Lake River Total	Columbia River[1]
8/30/2004	36.7	11.4	8.2	12.8	69.1	189,550
8/31/2004	32.4	10.0	7.3	11.3	61.0	182,340
9/1/2004	30.6	9.5	6.9	10.7	57.7	142,970
9/2/2004	28.5	8.8	6.4	9.9	53.6	154,780
9/3/2004	37.6	11.6	8.4	13.1	70.7	128,420

NOTE: Discharge units are cubic feet per second (cfs)

(1) Sum of Columbia River at Bonneville Dam, Sandy River, and Willamette River.

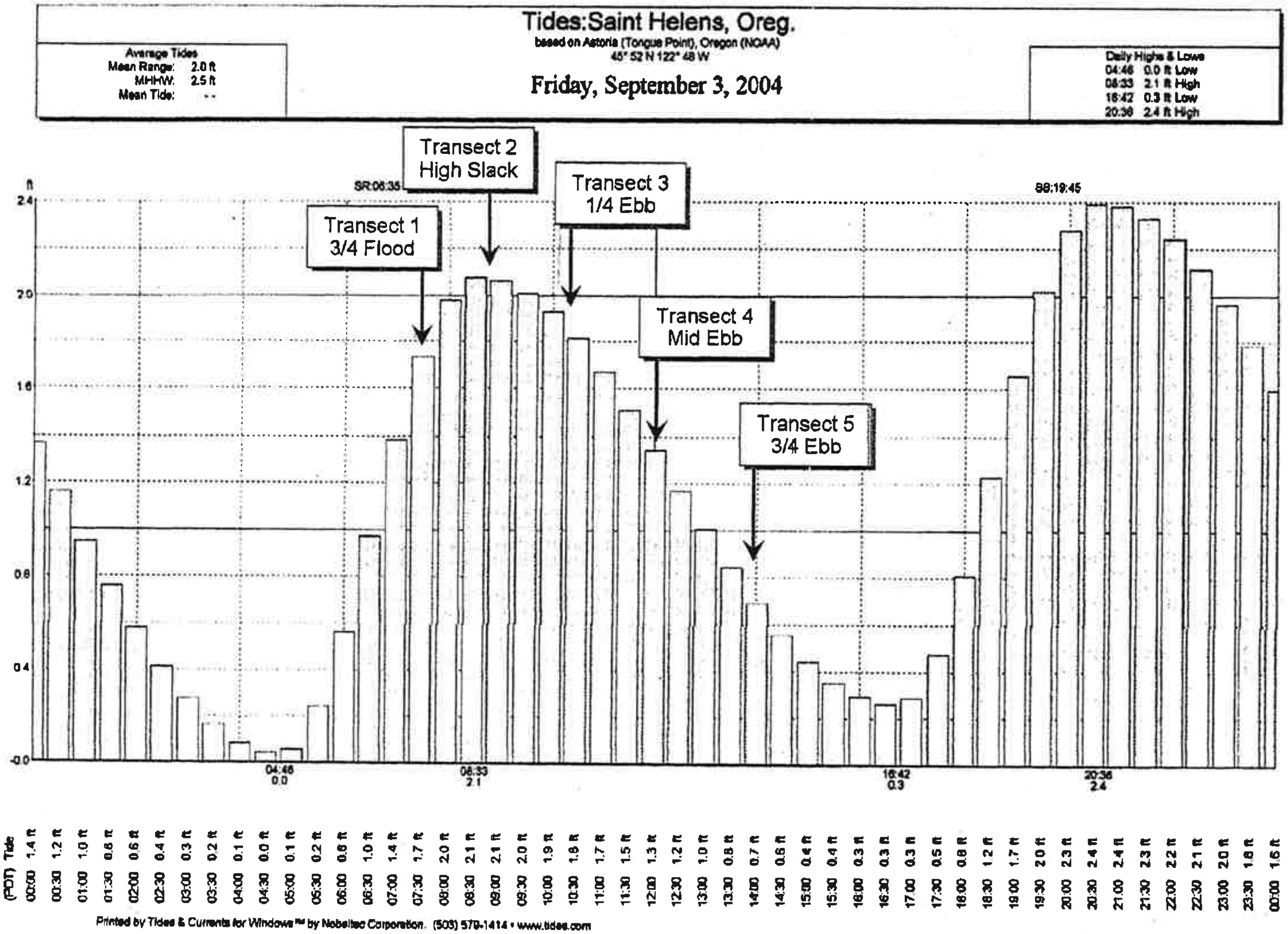

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Figure 3: Predicted Tide for St. Helens, OR, September 3, 2004

3.3 CROSS-SECTION

The cross-section of Lake River was measured at the location of the existing outfall. The section was measured during an estimated tide elevation of +1.6 feet above MLLW based on the NOAA tide predictions for St. Helens. The measured cross-section using the MLLW datum is shown in Figure 4. The injection point for the dye study discussed later is also shown in the figure. No conversion to NAVD88 or any other local datum has been assessed.

3.4 CTD PROFILES

Density is a function of salinity and temperature. Salinity is determined from the temperature and conductivity. Conductivity, temperature and depth (CTD) profiles were measured six times during the intensive field study on September 3, 2004. CTD profiles were obtained with a Seabird Instruments Model SBE19 Profiler. Temperature, conductivity, and pressure sensors were calibrated by the manufacturer in October 2004.

Fresh water was measured at the site, which is consistent with historic measurements in the Columbia River that indicate the salt wedge does not intrude past Longview. Salinity was very stable at approximately 0.07 ppt. None of the six profiles revealed any salinity stratification.

Measured temperature profiles are shown in Figure 5. Only slight thermal stratification was observed. The early morning profile revealed no stratification. Thermal stratification built to a peak from noon to 3 PM due to solar heating at the surface, then fell off in the late afternoon. The sky was cloudless during these measurements. Even during peak solar heating, temperature stratification was not significant, with a maximum temperature difference between the surface and bottom of only 0.1°C.

3.5 CURRENT SPEED

The City of Ridgefield measured nearshore current speed at the kayak dock approximately 1,000 feet upstream of the outfall as part of twice-weekly ambient monitoring conducted during summer 2004. The purpose of these measurements was to develop the 10^{th} and 50^{th} percentile current statistics necessary to model dilution for the existing outfall. Current speed was measured by the travel time of a surface drifter (orange) over a fixed distance. The results of 44 random current measurements obtained over varied and representative tidal conditions from May through October 2004 are presented in Table 4.

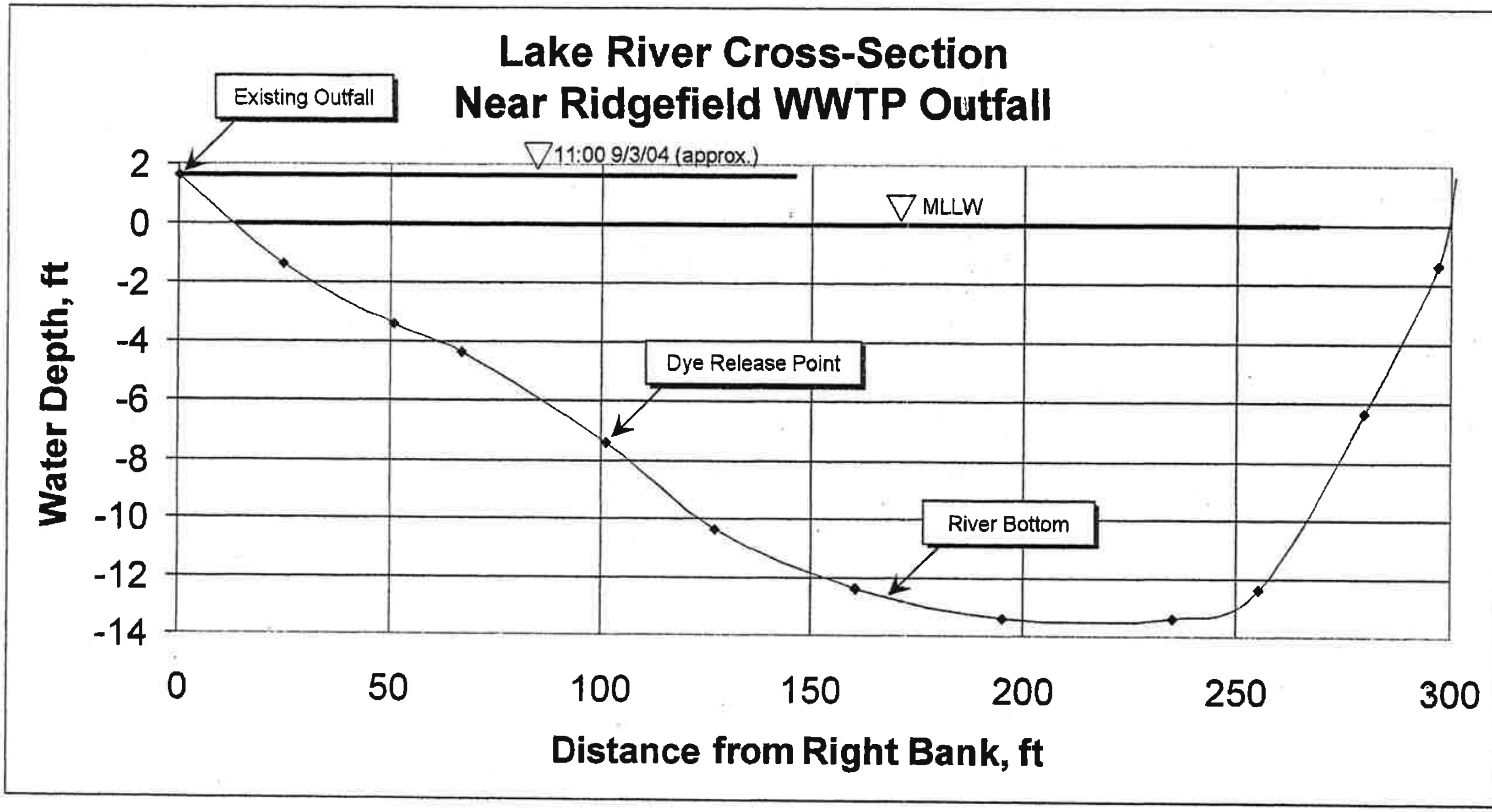

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Figure 4: Lake River Cross-Section Near the Ridgefield Outfall

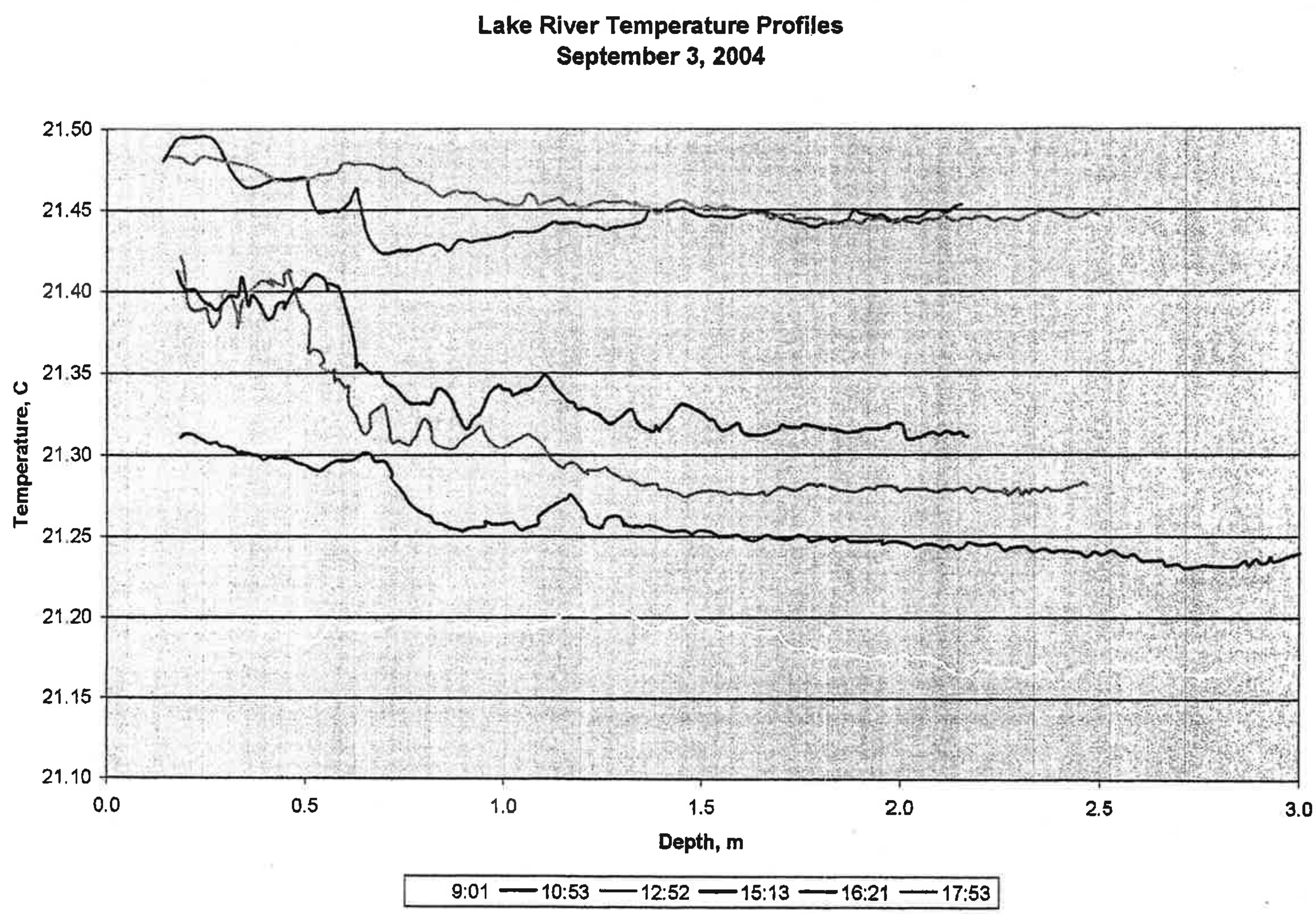

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Figure 5: Lake River Temperature Profiles, September 3, 2004

Table 4 Critical 10th and 50th Percentile Nearshore Current Speed Statistics, Summer 2004

10th percentile current speed	0.13 ft/sec
Median (50th percentile) current speed	0.42 ft/sec

Current speed in Lake River was also measured during the intensive field study on September 3, 2004. These measurements were made near mid-channel with a Swoffer current meter. Current speed was measured at a water depth of approximately 0.6 times the water depth to estimate the depth-averaged velocity per USGS protocol. Each current speed measurement consisted of the average of three discrete measurements of 15 second durations. The purpose of these measurements was to provide concurrent speed data with the dye transects and profiles described in the next section. The mid-channel current data for five critical tide stages on September 3, 2004, are presented in Table 5. Corresponding dispersion coefficients derived from the dye transects are also shown.

Table 5 Lake River Current Speed September 3, 2004

Tide Stage	Speed (fps)	Direction	(1)Dispersion Coefficient (ft^2/sec)
¾ Flood	0.9	Upstream	0.09
High Slack	0.6(2)	Variable(2)	0.13
¼ Ebb	1.0	Downstream	0.08
Mid Ebb	1.6	Downstream	0.13
¾ Ebb	1.2	Downstream	0.10

(1) Dispersion coefficients based on observed plume widths and concentrations during dye study.
(2) Ambient flow broke into visible small-scale eddies with variable upstream net velocity near high slack water. Speed estimated based on model calibration to dye study.

SECTION 4:
DYE TRACER STUDIES

4.1 OBJECTIVES AND METHODS

The principal objective of the dye tracer studies was to quantify farfield accumulation (reflux) of effluent resulting from the reversing currents in the Lake River estuary. To achieve this objective we followed the USGS superposition method (Hubbard and Stamper, *Movement and Dispersion of Soluble Pollutants in the Northeast Cape Fear Estuary, North Carolina*, USGS Water Supply Paper 1873-E, 1972), in which a conservative tracer is injected at a fixed rate and location for one tidal day (24.8 hours) and measured continuously at fixed monitoring stations until it returns to background concentrations. This is described as Method 1 under Section 6.3 of Appendix 6.1 of the *Department of Ecology's Permit Writer's Manual.*

The secondary objective of the tracer study was to provide direct field measurements of dye concentration at the proposed chronic mixing zone boundary for a submerged outfall. Lateral transects, profiles and stationary time series were measured at discrete tide phases on September 3, 2004, corresponding with critical tidal conditions (*i.e.*, flood tide followed by ebb), which were shown in Figure 3.

A final objective of the tracer studies was to provide data that may be useful in understanding macro-hydrodynamic phenomena in Lake River, such as flushing rates, residual circulation and residence time. These data may be useful in the development of a comprehensive Total Maximum Daily Load (TMDL) model for Lake River in the future.

4.2 QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance and quality control (QA/QC) measures for the tracer studies included the following:

- Field documentation procedures
- Documentation of the dye source
- Preparation of dye standards prior to conducting the field studies
- Fluorometer specifications
- Pre-calibration of the fluorometer
- Field calibration checks during the field studies
- Calibration checks during the laboratory measurements of field samples
- Raw data correction
- Dye injection setup and equipment

- Calibration and measurement of dye injection rate
- Sample positioning (horizontal and vertical)
- Sample handling and transportation protocol
- Laboratory sampling methods (including temperature correction)
- Dye loss due to photochemical decay
- Dye loss due to adsorption/sedimentation
- Background concentration and turbidity

QA/QC procedures and results as applicable are provided in Appendix A.

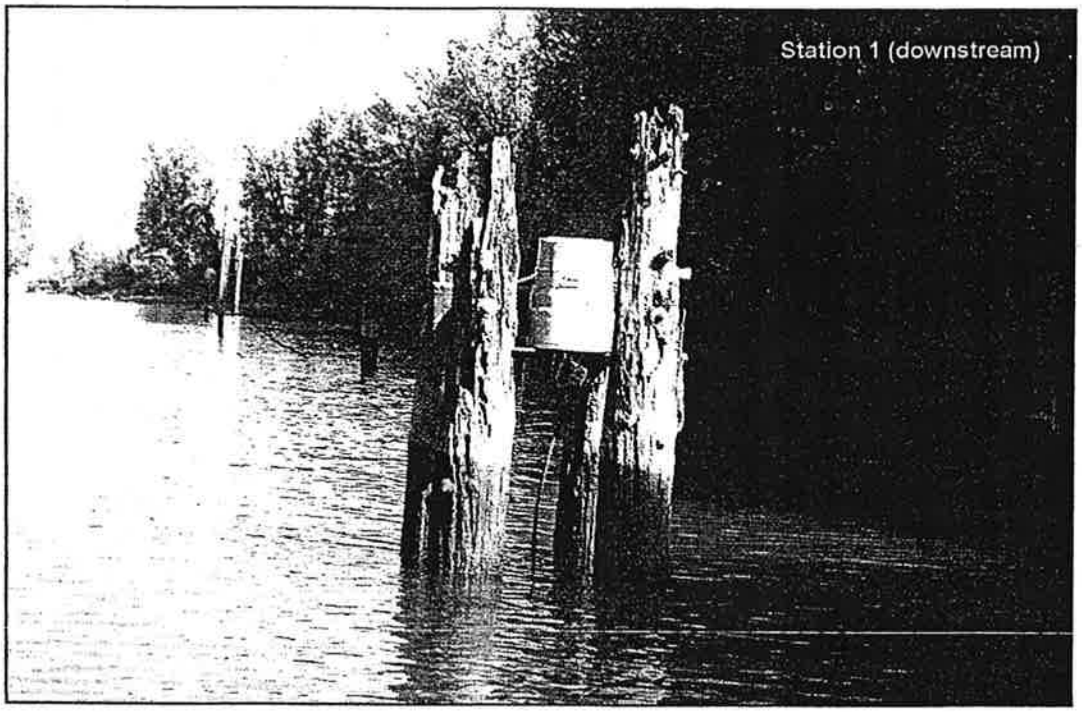
4.3 REFLUX MEASUREMENTS

Farfield accumulation (reflux) was determined from the second dye injection on September 2-3, 2004. A 2.6 percent solution of Rhodamine WT dye was injected into Lake River at a rate of 34 mL/min from 15:15 on September 2 through 16:00 on September 3, which is equal to one tidal day (24.8 hrs). The corresponding mass discharge rate for the fluorescent dye was 0.015 grams/sec (2.8 lbs/day). This would correspond to an effluent concentration of 680 parts per billion (ppb) for a 500,000 gallons per day (gpd) discharge.

The dye injection point was established approximately 100 feet from the shoreline, as shown in Figure 4, to simulate a proposed submerged outfall. Establishing the injection point away from the shoreline also provided a more representative injection point for assessing farfield accumulation of effluent than would have been created by injecting dye into the existing effluent.

Two fixed monitoring stations provided dye concentration data at intervals ranging from 45 minutes to 3 hours depending on the status of the dye injection. Station 1 was located approximately 2,000 feet downstream from the injection site, and Station 2 was located approximately 2,200 feet upstream (Figure 1). The samplers consisted of ISCO carousel samplers housing 24 one-liter bottles. The ISCO sample stations are shown in Figure 6.

The data from the ISCO sampling stations are shown in Figure 7. The St. Helens tide prediction and period of dye injection are also shown on each graph. The top graph shows the time series for the duration of the study, terminating on September 7. This graph clearly shows that effluent is fully flushed from the estuary and concentrations returned to background within the first few days.



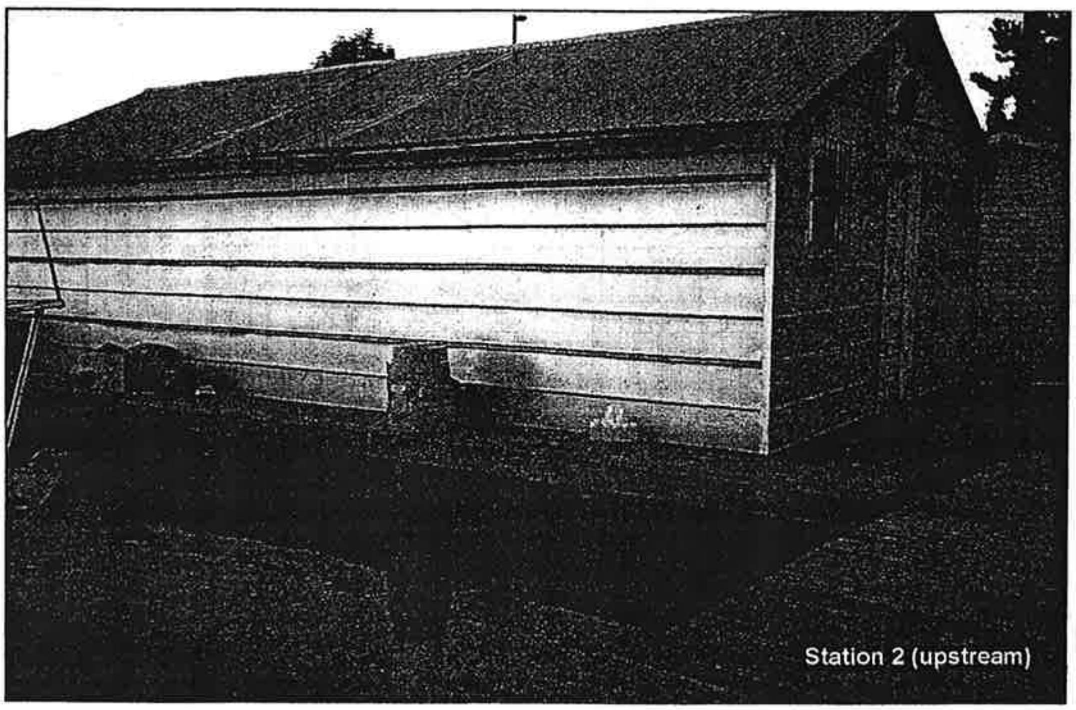


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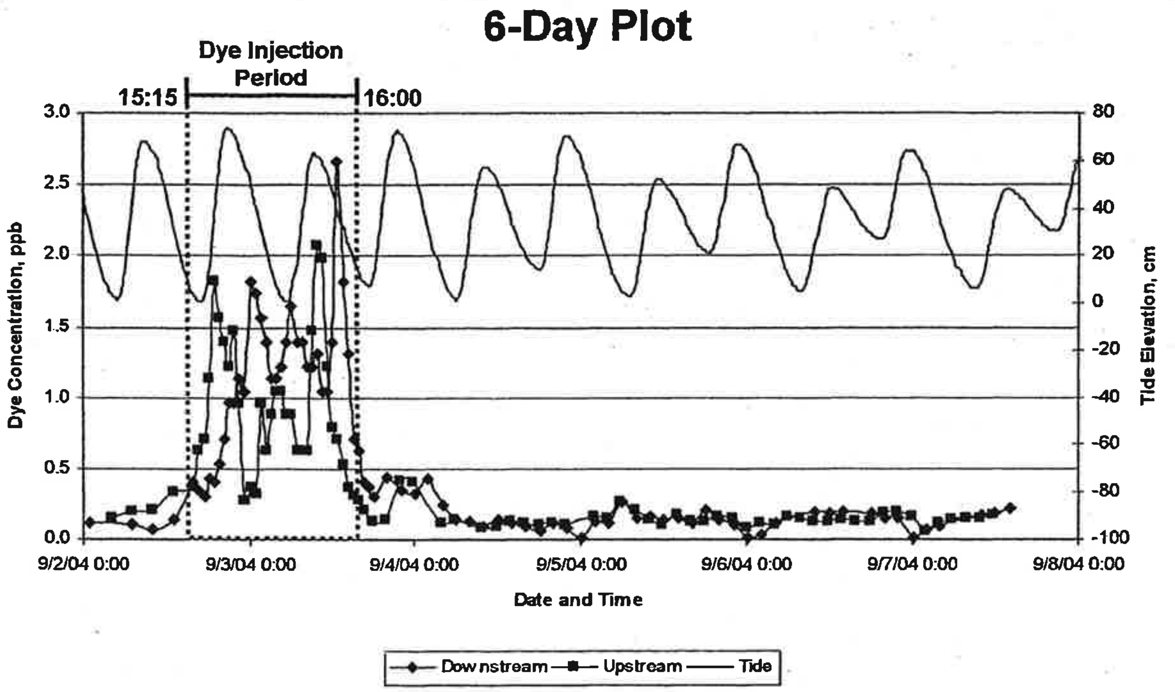
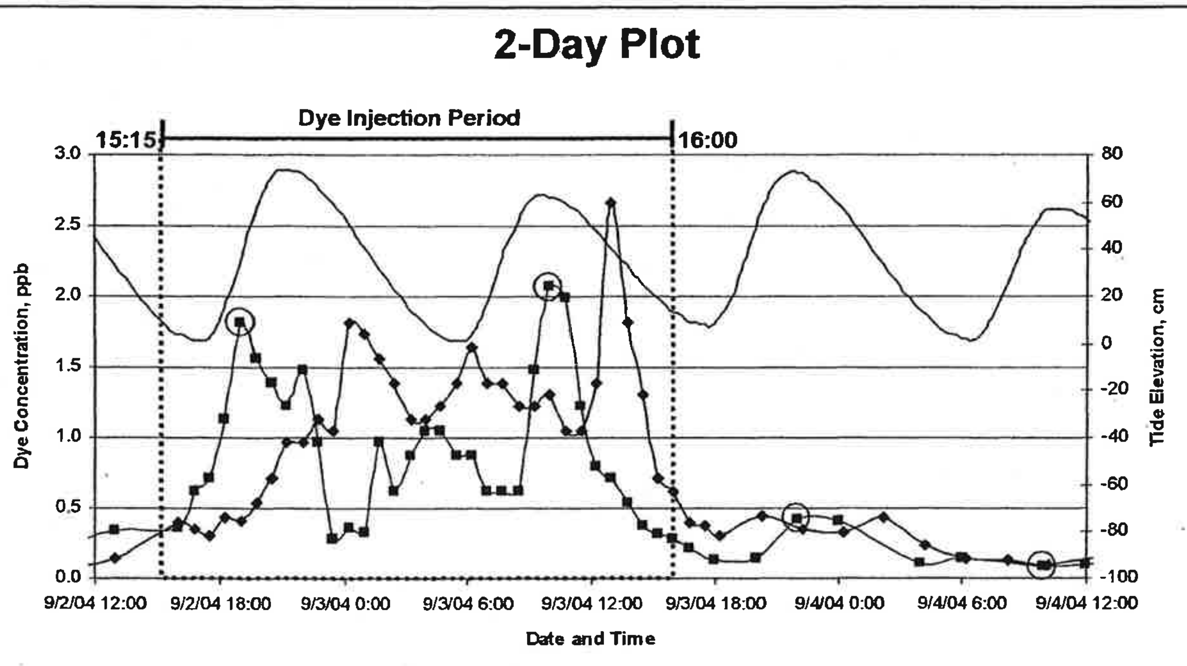
Figure 6: ISCO Sampling Stations





Note: upstream peaks used to calculate reflux are circled

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Figure 7: Farfield Dye Concentration Time Series – Release 2

The bottom graph in Figure 7 shows the 48-hour period from noon September 2 through noon September 4. This graph is more revealing of the dynamics of the plume movement as a function of tide. The upstream station reveals peaks on flood tide and near high slack water, as expected. The downstream station peaks at about mid ebb tide after the third dose of the "triple dose" phenomenon (1st dose early in flood tide as downstream flow slows, 2nd dose after current reverses and flows upstream, 3rd dose after 2nd current reversal and downstream flow resumes).

We selected the monitoring stations according to Alternative 2 as described in Section 6.3 of Appendix 6.1 of the *Permit Writer's Manual*. Following Ecology protocol for Alternative 2:

> *... tracer concentrations are measured in the farfield at some considerable distance from the effluent plume at a position that is representative of the source of dilution water for the plume...*

By method of superposition, reflux is calculated by addition of peaks from corresponding tide stages at stations up-current from the mixing zone at any time. These up-current peaks used to calculate reflux are circled on Figure 7. The first set of peaks occurred during the dye injection period. The second set of peaks are from the first full tidal day after the dye injection stopped. There were no measurable peaks in the third or subsequent tidal days. Although there was a significant mid-ebb spike at 13:00 on September 3, this station was down-current of the mixing zone and is therefore not applicable under Alternative 2.

Reflux calculations using the principal of superposition are provided in Table 6. Each tidal day included two peaks at up-current stations, each occurring mid to late in the flood tide (*i.e.*, just prior to tide reversal to resume downstream flow). The sum of peaks for the first and second both equaled 2.2 ppb, which is not surprising since the tides were nearly symmetrical. The resulting volume fraction of effluent as defined in the Ecology protocol for farfield accumulation is 0.33 percent effluent for the chronic design flow rate of 0.5 mgd, and 0.60 percent effluent for the acute design flow rate of 0.9 mgd. These reflux rates will be used in the dilution modeling for the existing outfall and all outfall improvement alternatives.

Table 6 Reflux Calculations from September 3, 2004, Dye Study using Principal of Superposition

Tide	1st Peak	2nd Peak	Total	Chronic Reflux(1)	Acute Reflux(2)
1st Ebb	1.8 ppb	0.4 ppb	2.2 ppb	0.33%	0.60%
2nd Ebb	2.1 ppb	0.1 ppb	2.2 ppb	0.33%	0.60%

(1) Based on 500,000 gpd discharge of 0.015 g/sec (2.8 lbs/day) for a simulated effluent concentration of 680 ppb.
(2) Based on 900,000 gpd discharge for a simulated effluent concentration of 370 ppb.

4.4 DIRECT PLUME MEASUREMENTS

Dye concentration was measured at the down-current mixing zone boundary at five tide stages during and after the critical "triple dosing" event. The critical tide stages were shown on the tide chart for September 3, 2004 in Figure 3. The measurements consisted of (1) horizontal transects through the plume at several depths, (2) vertical profiles at the horizontal centerline of the plume as determined during the transects, and (3) stationary time series holding the sampler at the horizontal and vertical position of maximum concentration. The results are described below.

4.4.1 3/4 Flood Tide

The first down-current transect was taken late in the flood tide (*i.e.*, flood tide was approximately ¾ of the way through). The tide had reversed and current was flowing upstream at approximately 0.9 ft/sec. Therefore, the down-current station for the transects was the upstream mixing zone boundary.

Results are shown in Figure 8. Horizontal transects through the plume at several depths are shown on the main graph, and the results of the vertical profile at the plume centerline are shown on the inset. The data logger was set at a 10-second averaging interval. The observed plume width was approximately 30 feet. Peak centerline concentration was 8 ppb. Note the accumulated background dye concentration (*i.e.* reflux) was approximately 1.5 ppb outside the plume.

4.4.2 High Slack

The second set of transects was obtained at high slack water, just as the tide was reversing a second time. As the tide reversed, the normally unidirectional current pattern dissipated into a series of small-scale eddies, which is typical of tide changes. The data were obtained at the upstream mixing zone boundary.

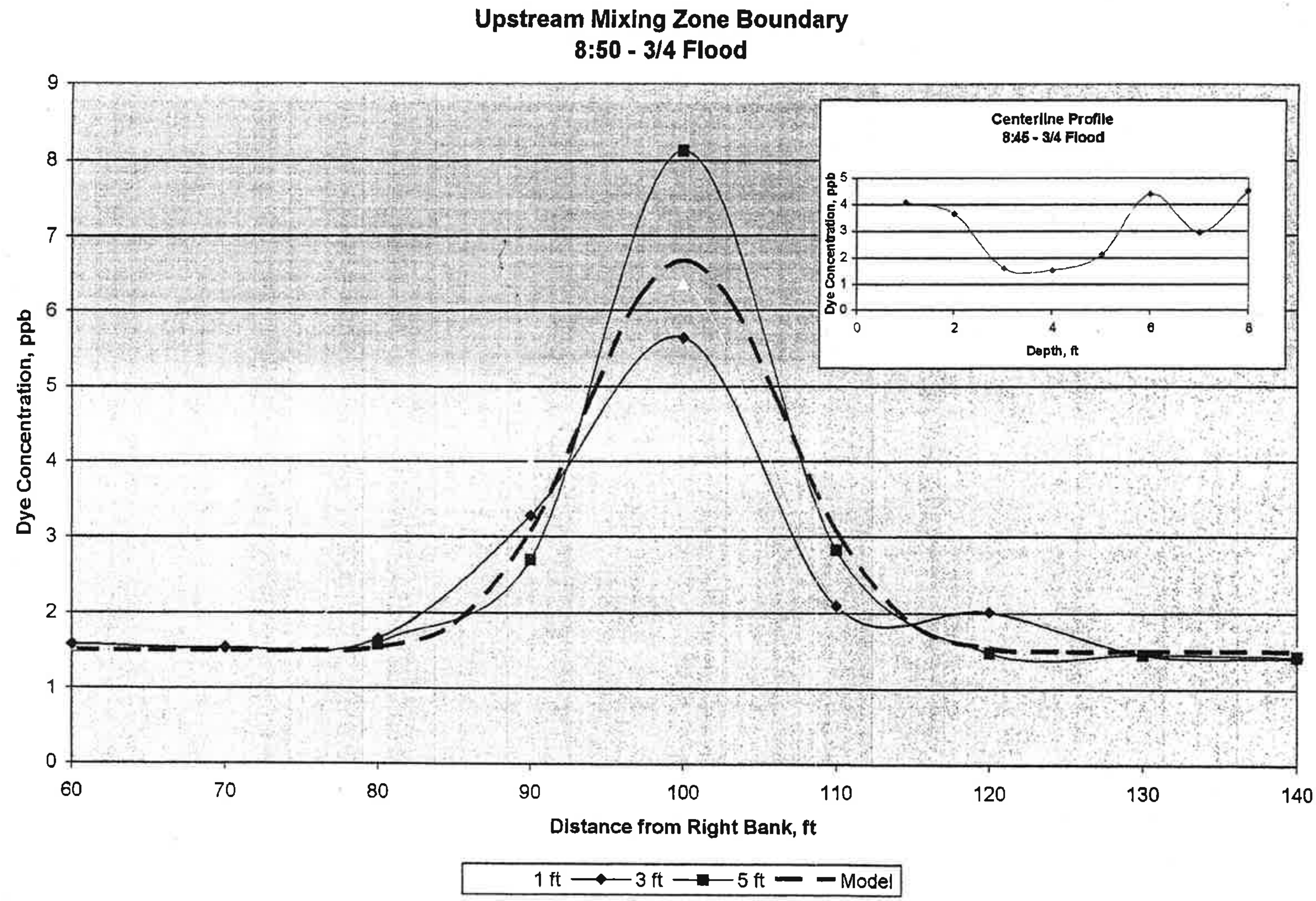

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Figure 8: Dye Transect and Profile – 3/4 Flood Tide

Results are shown in Figure 9. Four horizontal transects were obtained, but no profiles. The data acquisition period was reduced to 3 seconds to provide more detail. The plume width was approximately 50 feet, consistent with the lateral eddies observed. Peak observed concentration was approximately 6 ppb, and the reflux concentration outside the plume was 1.6 ppb.

4.4.3 1/4 Ebb Tide

The third set of transects and profiles were obtained shortly after the second tide reversal. The sampler was repositioned to the downstream mixing zone boundary, which had become the down-current boundary. The highest plume concentrations were observed during this period. This is consistent with mixing zone studies in similar estuaries. That is, the highest concentrations at any mixing zone boundary occur at the downstream boundary just after the second tide reversal (*i.e.*, after the third dose of the triple-dosing phenomenon).

Results are shown in Figure 10. The data include two horizontal transects, two profiles at the centerline, and a stationary time series at the plume centerline. The maximum observed concentration was over 13 ppb, but the time-averaged concentration at the plume centerline was approximately 7 ppb. The plume width was approximately 25 feet, and the reflux concentration outside the plume was 2.0 ppb. Note this peak reflux concentration is consistent with the upstream peak shown in Figure 7.

4.4.4 Mid Ebb Tide

The fourth set of transects and profiles were obtained around mid ebb tide. The downstream current was strongest at this stage.

Results are shown in Figure 11. Although an instantaneous peak concentration of almost 9 ppb was observed, the time and depth averaged concentration was between 4 and 5 ppb. Time-variability was observed in the data, but no significant depth stratification. The plume width was approximately 20 feet, and the reflux concentration had reduced to just less than 1 ppb.

4.4.5 3/4 Ebb Tide

The fifth set of transects and profiles were obtained at the ¾ phase of the ebb tide.

Results are shown in Figure 12. The instantaneous peak was over 7 ppb, but the time and depth average was approximately 4 ppb. No stratification of the dye was observed. The current had slowed from mid ebb, the plume width was approximately 25 feet, and the reflux concentration outside the plume had dropped to 0.7 ppb.

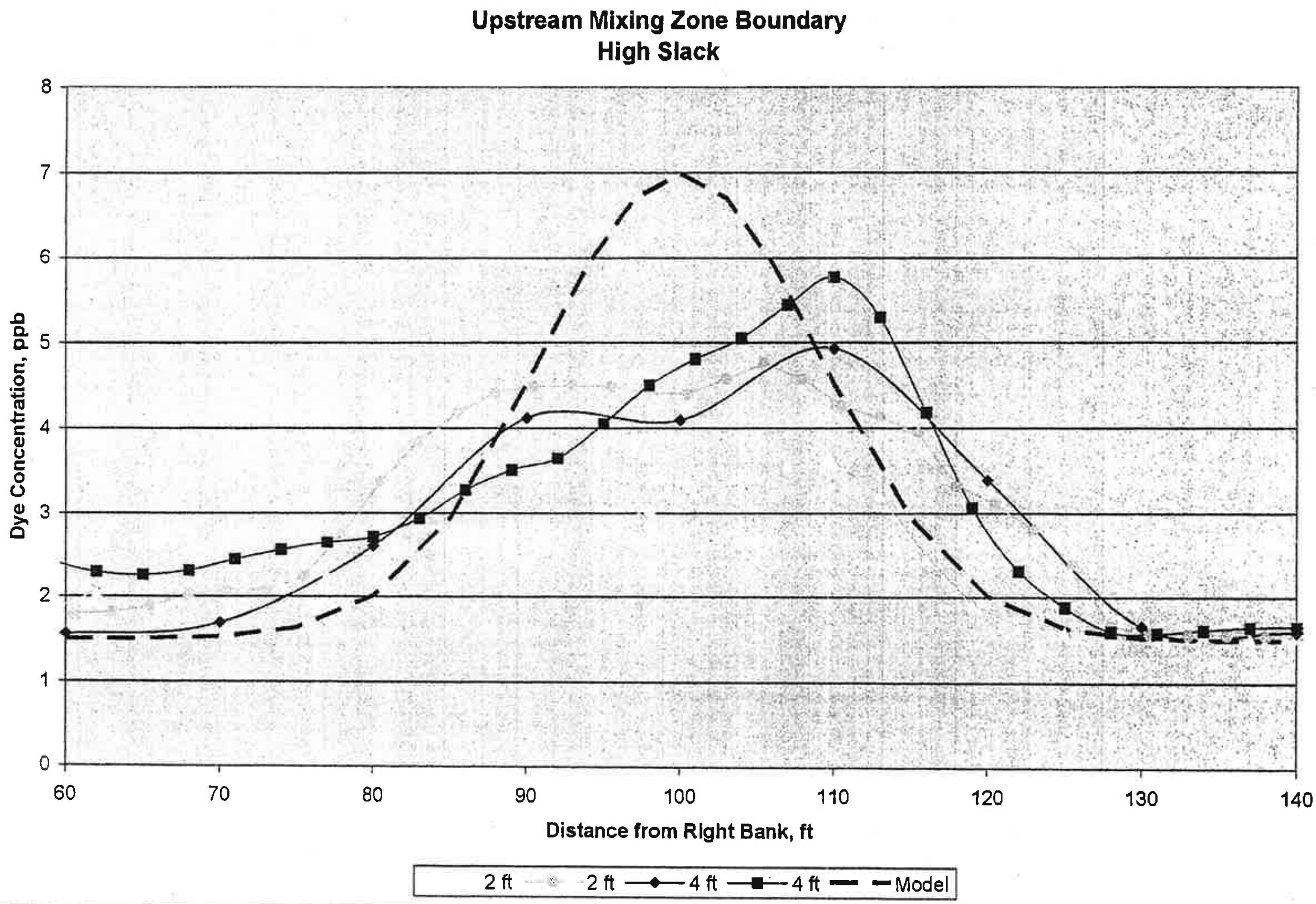

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Figure 9: Dye Transect – High Slack Tide

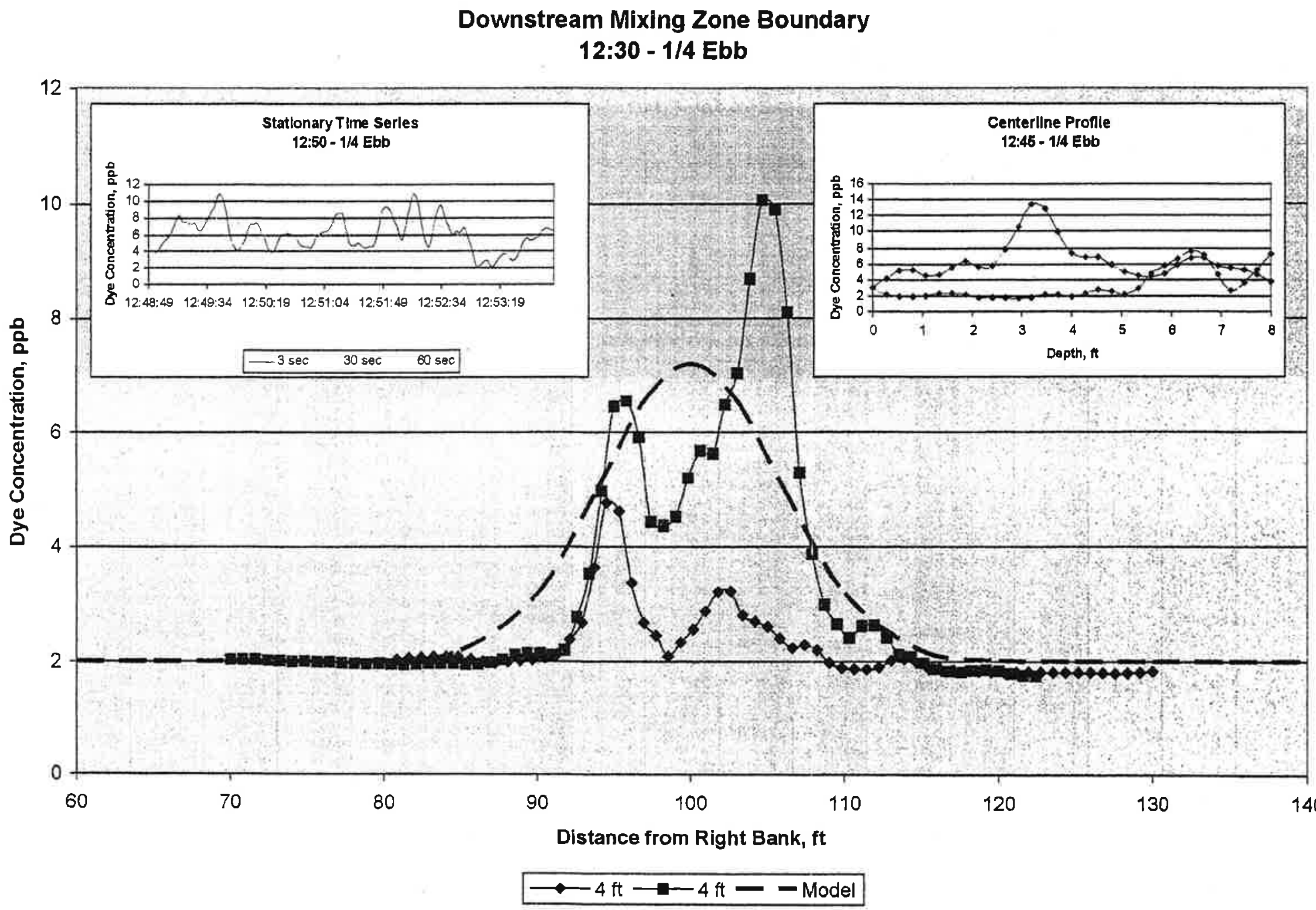

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Figure 10: Dye Transect, Profile, and Stationary Time Series – 1/4 Ebb Tide

Downstream Mixing Zone Boundary
13:35 - Mid Ebb

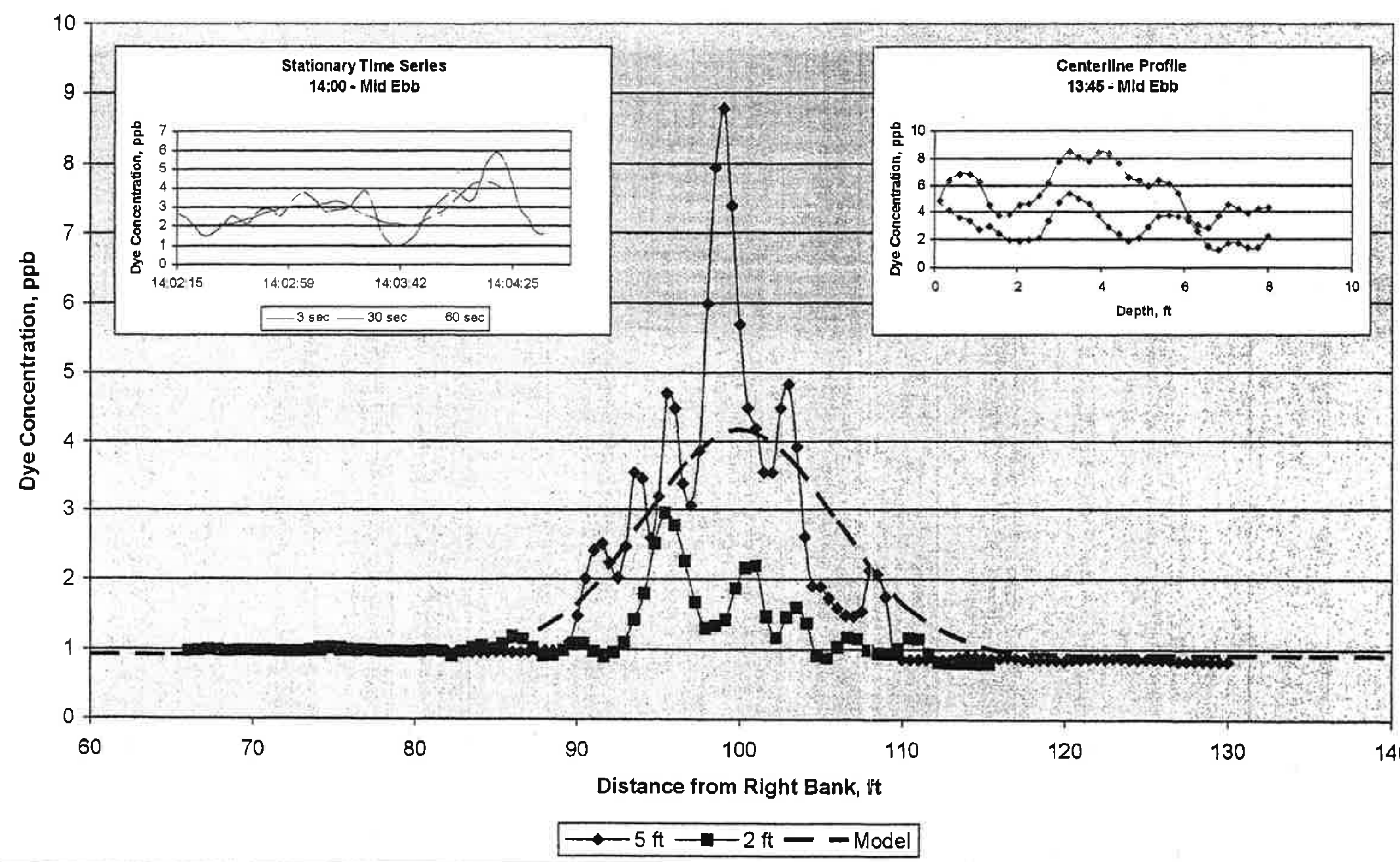

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Figure 11: Dye Transect, Profile, and Stationary Time Series – Mid Ebb Tide

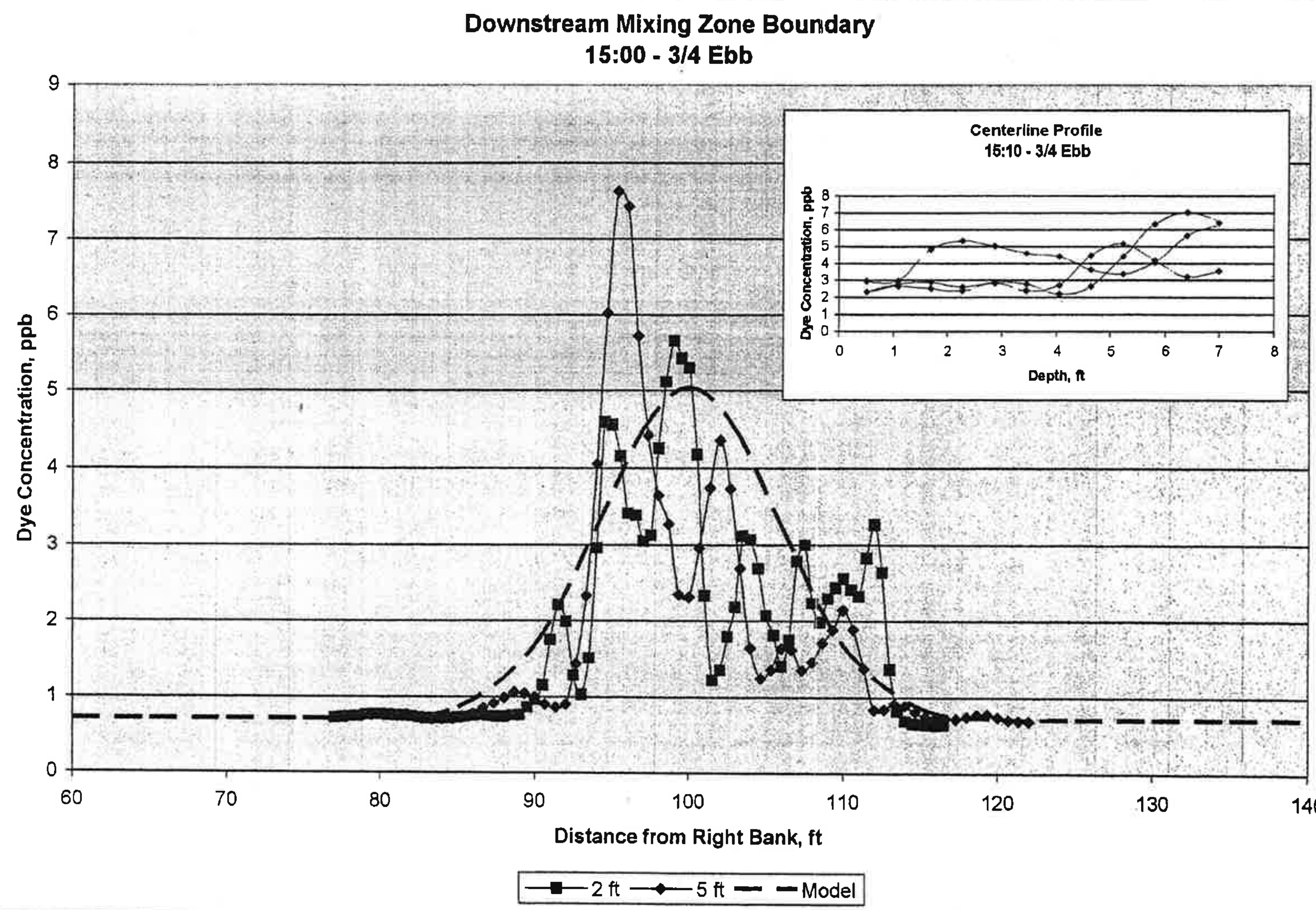

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Figure 12: Dye Transect and Profile – 3/4 Ebb Tide

4.4.6 Transverse Mixing

Also shown on Figures 8 through 12 are curves labeled "Model," which are solutions to the 2-dimensional advection-dispersion equation as presented in *Mixing in Inland and Coastal Waters* (Fischer, H.B. *et. al*, Academic Press, 1979). This equation, shown below, is the basis for Ecology's RIVPLUM5 model.

$$C = \dot{M} / du\sqrt{4\pi\varepsilon_t x / u} \quad \exp^{-\left\{\frac{y^2 u}{4\varepsilon_t x}\right\}}$$

Where:

- C = tracer concentration
- $\dot{M}$ = mass discharge rate
- d = local water depth
- u = local water velocity
- x = downstream distance to point of interest
- y = lateral distance to point of interest
- εt = transverse dispersion coefficient

Also,

$$W = 4\sqrt{2\varepsilon_t x / u}$$

Where:

- W = plume width

Since the equation is two-dimensional, vertical mixing is implicit. We will reserve the demonstration of vertical uniformity to the Part II report if this method is selected for modeling of a submerged outfall in Lake River. For this Part I report, however, we will limit the utility of these equations to the determination of the transverse mixing coefficient (ε_t) and hence the plume width. All of the other parameters in the 2-D equation are known, so ε_t was estimated to match the observed plume widths in Figures 8 through 12. The values of the transverse mixing coefficients chosen to fit the data were listed with the current speeds in Table 5.

4.4.7 ISCO Station Transect

A single transverse transect was run across Lake River at the downstream ISCO station during mid ebb tide. This transect was run to (1) determine if the dye plume overlapped the downstream monitoring station, or if the station was outside the plume, and (2) test the 2-D equation at a distance of 2,000 feet from the source.

The results of the ISCO station transect are shown in Figure 13. The data plotted include the transect results at 14:20 (blue), the ISCO sample result from Station 1 at 14:30 (red), and the 2-D model results (yellow). The transect data near the ISCO sampler (1.46 ppb) revealed 12 percent higher concentration at the ISCO station than the corresponding bottle sample result (1.30 ppb).

The 2-D equation prediction was close to the transect data, but we had to use a much higher dispersion coefficient (0.25 ft^2/sec) than was used to calibrate at the mixing zone boundary (0.13 ft^2/sec). We also had to modify the lateral boundary of the model of the shoreline, because the 2-D cannot account for a sloping bottom. This affected the required distance to an image source used in the model. Therefore, we established the artificial lateral boundary (*i.e.*, shoreline) to 50 feet from the dye source (image = 100 feet), whereas the actual distance to shoreline at the water surface was 100 feet.

4.5 FIRST DYE RELEASE

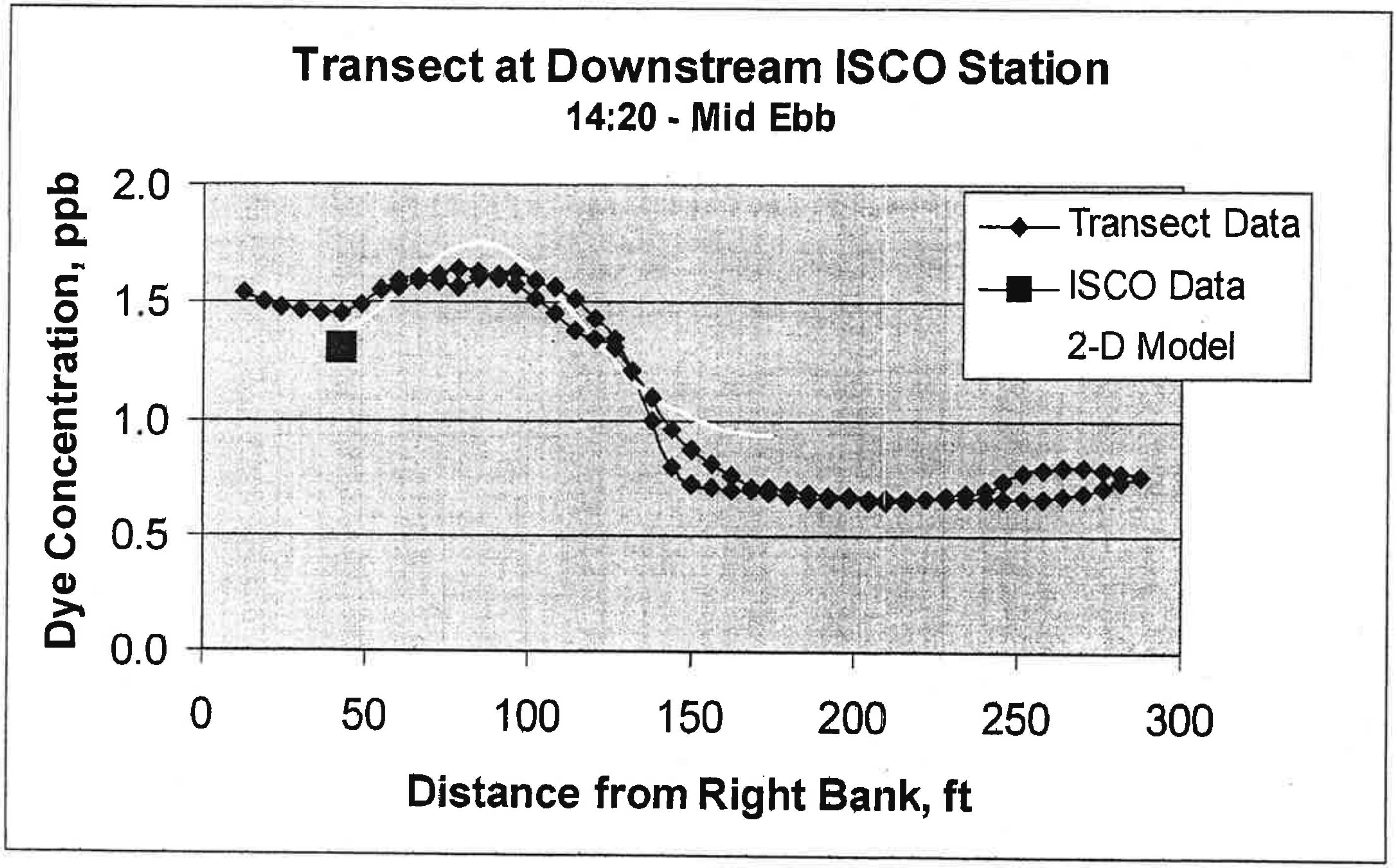
On August 30, 2004, 16 lbs of Rhodamine dye were accidentally released approximately two hours prior to high slack tide. This slug release was used to assess the flushing time for Lake River.

4.5.1 Longitudinal Dye Distribution

The longitudinal distribution of dye concentration in Lake River is shown in Figure 14 for four time steps following the dye release. The top figure shows the data on a logarithmic scale, and the lower shows only the last three time series on an arithmetic time series. The data show the distribution of the dye cloud at the first two high and low tides following the release. Mass balance calculations based on these dye data are provided in Appendix A.

The tide was flooding at the time of the slug release, so the data reveal that almost the entirety of the cloud was found upstream of the outfall at the first high tide two hours later. The length of the plume was approximately 2,500 feet in length, and had an average concentration of approximately 50 ppb. As shown in the mass balance calculations, the entire 16 pounds of dye were accounted for within this cloud.

The concentration distribution was measured again with a second longitudinal transect at the subsequent low tide. The results reveal that the peak concentration in the dye cloud had reached the mouth of Lake River where it enters the Columbia River. The mass of dye in Lake River at low tide was calculated to be five pounds, approximately 35 percent of the dye that had been released. Approximately 65 percent of the dye had been advected by tidal currents to the Columbia River during the first ebb tide.



FILE: G&O014/Reports/Mixing Zone Study/Figures L.ppt

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Figure 13: Transect at Downstream ISCO Station

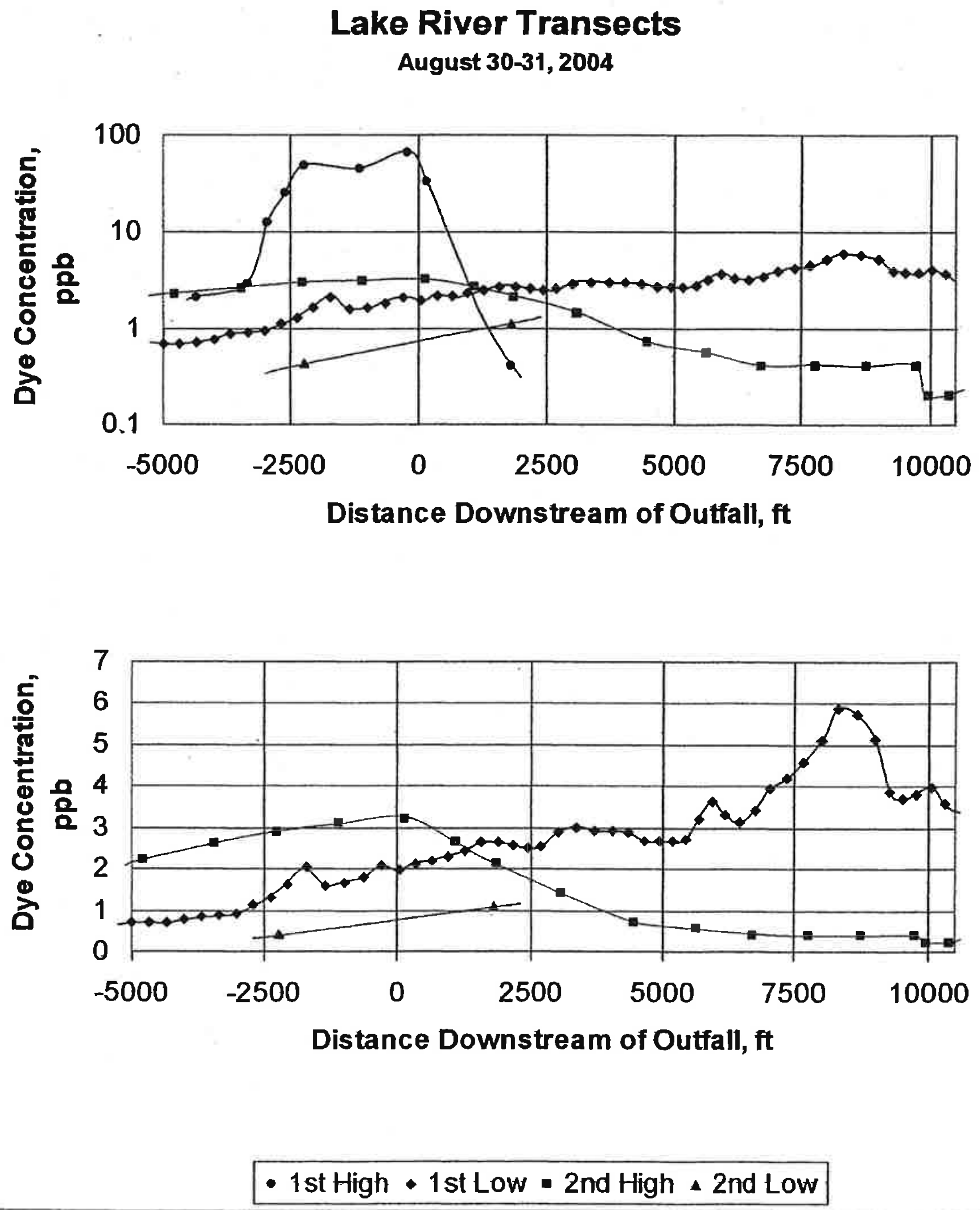

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Figure 14: Longitudinal Transects Following Release No. 1

The concentration distribution was measured again with a third longitudinal transect at the second high tide after the release. The results reveal that the peak concentration in the remaining dye cloud was upstream of the outfall. The mass of dye in Lake River at the second high tide was calculated to be approximately seven pounds, approximately 45 percent of the dye that had been released. Five of these pounds were accounted for from the low tide transect, and two more pounds were presumably refluxed into Lake River from the Columbia River during the flood tide. These mass balance calculations are imprecise and thus have a large margin for error. However, it is clear that approximately half of the discharged dye had been assimilated into the Columbia River flow and did not return to Lake River after one full tide cycle (*i.e.*, high tide to high tide).

The second low tide following release occurred during nighttime hours, so the only data shown on Figure 14 were from the ISCO sampling stations. No mass balance is possible with such little data, but the results do indicate that the higher concentrations had returned to downstream of the outfall.

4.5.2 ISCO Time Series

The time series of dye concentrations measured at the ISCO stations are shown in Figure 15. These data corroborate the other dye measurements that show rapid flushing of the dye cloud from Lake River. The estuary returned to near background concentrations within only two days following the release.

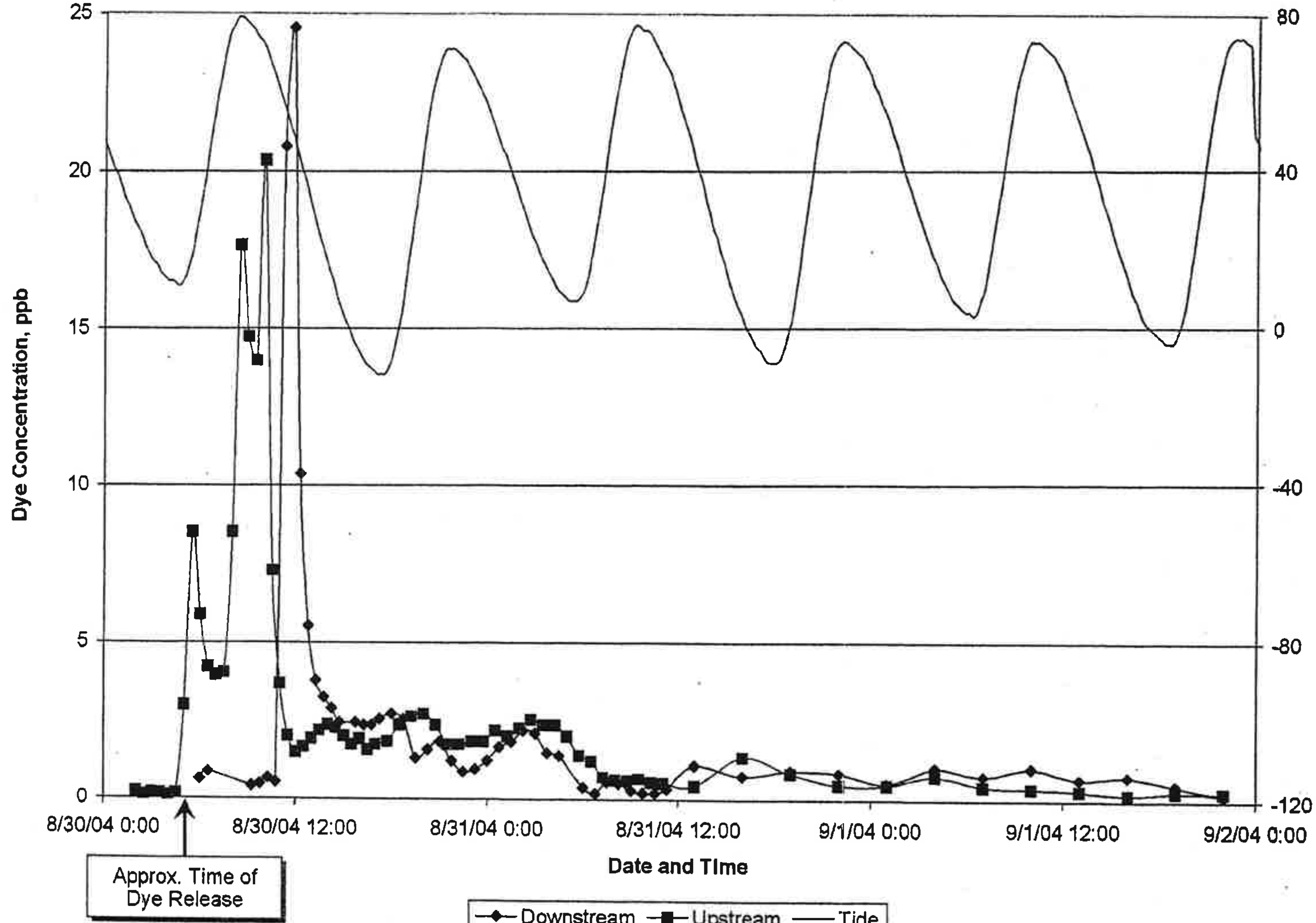
4.5.3 Flushing Time and Residual Circulation

Fischer's *Mixing in Inland and Coastal Waters* in Chapter 7 introduces the concepts of flushing time and residual circulation in estuaries, also known as "tidal pumping." Flushing time is the time it takes to replace the volume of water in an estuary. Residual circulation is the net flow produced by the tides in an estuary that may be superimposed on the background freshwater runoff. The equations for flushing time and residual circulation are defined below:

$$dM/dt + M(Q/V_o) = 0$$

Where:

- V_o = mean volume of the estuary downstream of a tracer source
- M = mass of a conservative tracer in an estuary
- Q = the residual circulation
- t = time



FILE: G&O014/Reports/Mixing Zone Study/Figures L.ppt

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Figure 15: Farfield Dye Concentration Time Series – Release 1

The solution of this differential equation demonstrates that the mass of tracer in an estuary (or concentration) would be inversely proportional to the residual circulation:

$$M(t) = M_o\, e^{-t/\tau}$$

Where:

τ = flushing time of the estuary = Vo/Q
t = time
M0 = initial mass of tracer discharged
M(t)= tracer mass in estuary as a function of time

The solutions to these equations are provided in Appendix A. The results are summarized in Table 7.

Table 7 Flushing Time and Residual Circulation

Flushing Time	18 hours
Residual Circulation	400 cfs

SECTION 5:
MIXING ZONE MODELING

5.1 RIVERINE VS. TIDAL FLUX

One of the principal considerations in establishing critical conditions for the Ridgefield outfall is the relative importance of tidal flux vs. river discharge conditions. During low discharge conditions during warm dry summer weather, the tide is by far the principal hydrodynamic phenomenon affecting effluent mixing. As evidence we present the following simple mass balance comparisons:

A. Lake River has a mean cross-sectional area of approximately 2,500 square feet. At the estimated 7Q10 river discharge of 23 cfs (Table 2), the resulting net velocity would be 0.009 ft/sec, which would be immeasurable by any conventional means. The resulting excursion distance over one day (86,400 sec) would be only 800 feet.

B. Lake River has a main channel average tidal current speed on the order of 0.9 ft/sec. Thus the average tidal flux is approximately 2,300 cfs, which clearly masks the river net velocity and makes it impossible to directly measure the river discharge at this location. The tidal excursion distance (distance traveled each ebb or flood tide – 6.2 hour period) is on the order of 20,000 feet, or 4 miles. This tidal excursion distance was confirmed in the first dye release, as discussed in Section 4.5.

C. The residual circulation caused by the tide is approximately 400 cfs, as documented in Section 4.5.3. This is a net discharge created by tidal flows and the interaction with the Columbia River, and is superimposed on the freshwater runoff 7Q10 discharge.

While tidal excursion produces no net transport and does cause reflux as quantified by the dye studies, it is very significant in the context of effluent mixing. The energy provided by the tide accelerates transverse and longitudinal mixing and assimilation of the waste field compared to mixing that would be provided by the river net velocity alone.

Perhaps the most significant aspect of the dominant tidal influence at Ridgefield is the interface between Lake River and the Columbia. The Ridgefield outfall is located less than two miles from the Columbia River, and about one-half mile from the Columbia Slough branch channel. The first dye release and the excursion calculation above clearly revealed that much of the effluent was transported on ebb tide into the Columbia River, and most did not return on the following flood tide. This rapid assimilation into the much larger Columbia River flow is the dominant phenomenon influencing the mixing, assimilation and residence time of effluent discharged from the Ridgefield outfall.

In conclusion, we find that the freshwater discharge rate from tributaries to Lake River does not significantly influence dilution during critical conditions. This is consistent with the similar findings at other wastewater discharges to channelized estuaries (*e.g.*, Cowlitz, Raymond, Snohomish). Freshwater runoff to Lake River would probably become significant only at some undetermined threshold rate corresponding to storm events.

5.2 CRITICAL CONDITIONS SUMMARY

The critical conditions and design criteria for the mixing zone study are summarized in Table 8.

Table 8 Critical Design Criteria for the Ridgefield Mixing Zone Study – Existing Shoreline Discharge

	Acute	Chronic
Effluent Flow Rate (mgd)		
Maximum day	0.90	
Maximum monthly average		0.50
Current Speed (ft/sec)		
10^{th} percentile	0.13	
Median		0.42
7Q10 Discharge (cfs)	23	
Residual Tidal Circulation (cfs)	400	
Ambient Density Stratification	9/3/04 Profiles	
Reflux (percent effluent)	0.60%	0.33%
Transverse Mixing Coefficient	0.1 ft^2/sec	

5.3 MODEL SELECTION

The existing exposed discharge at the shoreline of Lake River is challenging to model for several reasons:

- The standard Visual Plumes models (UM3, DKHDEN, and RSB) require a submerged discharge and do not apply.
- The PDS surface discharge model in the Visual Plumes interface appears to have a bug and does not run at these ambient conditions.
- Effluent flows across and between rocks at low tide to reach the river edge, so the initial momentum is negligible.
- The river is shallow and slopes gradually away from the shoreline on this side of the river. Most deterministic models must specify a rectangular cross-section.
- Current velocities are small and variable near the shoreline, making selection of current speed criteria imprecise.

Given these limitations, we believe that the RIVPLUM5 and CORMIX3 are the only models appropriate for this discharge. RIVPLUM5 was selected for this report, in part because its results are conservative in comparison to CORMIX3. The two features of this method that make RIVPLUM5 reasonable for this application are:

- It is wholly an ambient-induced mixing model, does not consider any initial momentum, and is thus conservative.
- The main utility of RIVPLUM5 is its prediction of the lateral width of the plume based on the transverse mixing coefficient, which was assessed in the dye studies.

Basically, all of the RIVPLUM5 calculations after the plume width are simple mass balance equations based on the velocity and depth of flow. If we can provide reasonably protective criteria for nearshore geometry and current speed, the RIVPLUM5 model prediction for plume width produces a reasonably protective dilution prediction for critical conditions.

5.4 MODEL RESULTS

The RIVPLUM5 model predictions for the existing discharge under critical conditions are presented in Table 9. At the acute boundary, the predicted plume width is 11 feet. The average depth over this distance from the shoreline, as shown in Figure 4, is approximately 0.6 feet. Similarly, the average water depth for a predicted 20-foot-wide plume at the chronic mixing zone boundary is approximately 1.0 foot. Excluding reflux, the acute and chronic dilution factors for the existing discharge have been determined from Table 9 to be 1.0 and 6.7, respectively. At 20 feet downstream, the Gaussian plume profile has not been fully established, thus no effective dilution may be credited for the acute mixing zone boundary.

The affect of reflux must be considered, using the following equation in Section 6.3 of Appendix 6.1 of the *Permit Writer's Manual:*

$$\overline{DF} = \frac{DF}{[1 + \overline{V}(DF - 1)]}$$

Where:

$\overline{DF}$ = effective dilution factor (reciprocal of volume fraction of effluent) after several tidal cycles result in equilibrium with farfield accumulation

DF = initial dilution at acute or chronic mixing zone boundary by RIVPLUM5 or other applicable model

$\overline{V}$ = quasi-steady-state farfield effluent concentration (*i.e.*, reflux volume fraction)

Table 9 RIVPLUM5 Model Output

Spread of a plume from a point source in a river with boundary effects from the shoreline based on the method of Fischer *et al.* (1979) with correction for the effective origin of effluent.

Revised 22-Feb-96

INPUT	Acute	Chronic
1. Effluent Discharge Rate (cfs):	1.39	0.77
2. Receiving Water Characteristics Downstream From Waste Input		
Stream Depth (ft):	0.60	1.00
Stream Velocity (fps):	0.13	0.42
Channel Width (ft):	300	300
Stream Slope (ft/ft) or Manning roughness "n":	0.03	0.03
0 if slope or 1 if Manning "n" in previous cell:	1	1
3. Discharge Distance From Nearest Shoreline (ft):	0	0
4. Location of Point of Interest to Estimate Dilution		
Distance Downstream to Point of Interest (ft):	20	200
Distance From Nearest Shoreline (ft):	0	0
5. Transverse Mixing Coefficient Constant (usually 0.6):	NA	NA
6. Original Fischer Method (enter 0) or *Effective Origin* Modification (enter 1)	0	0

OUTPUT	Acute	Chronic
1. Source Conservative Mass Input Rate		
Concentration of Conservative Substance (%):	100.00	100.00
Source Conservative Mass Input Rate (cfs*%):	139.00	77.00
2. Shear Velocity		
Shear Velocity based on slope (ft/sec):	#N/A	#N/A
Shear Velocity based on Manning "n":		
using Prasuhn equations 8-26 and 8-54 assuming		
hydraulic radius equals depth for wide channel		
Darcy-Weisbach friction factor "f":	0.124	0.104
Shear Velocity from Darcy-Weisbach "f" (ft/sec):	0.016	0.048
Selected Shear Velocity for next step (ft/sec):	0.016	0.048
3. Transverse Mixing Coefficient (ft2/sec):	0.100	0.100
4. Plume Characteristics Accounting for Shoreline Effect (Fischer *et al.*, 1979)		
Co	5.94E+00	6.11E-01
x'	1.71E-04	5.29E-04
y'o	0.00E+00	0.00E+00
y' at point of interest	0.00E+00	0.00E+00
Solution using superposition equation (Fischer eqn 5.9)		
Term for n= -2	0.00E+00	0.00E+00
Term for n= -1	0.00E+00	0.00E+00
Term for n= 0	2.00E+00	2.00E+00
Term for n= 1	0.00E+00	0.00E+00
Term for n= 2	0.00E+00	0.00E+00
Upstream Distance from Outfall to *Effective Origin* of Effluent Source (ft)	#N/A	#N/A
Effective Distance Downstream from Effluent to Point of Interest (ft)	20.00	200.00
x' Adjusted for *Effective Origin*	1.71E-04	5.29E-04
C/Co (dimensionless)	4.32E+01	2.45E+01
Concentration at Point of Interest (Fischer Eqn 5.9)	1.00E+02	1.50E+01
Unbounded Plume Width at Point of Interest (ft)	22.188	39.036
Unbounded Plume half-width (ft)	11.094	19.518
Distance from near shore to discharge point (ft)	0.00	0.00
Distance from far shore to discharge point (ft)	300.00	300.00
Plume width bounded by shoreline (ft)	11.09	19.52
Approximate Downstream Distance to Complete Mix (ft):	46,800	151,200
Theoretical Dilution Factor at Complete Mix:	16.835	163.636
Calculated Flux-Average Dilution Factor Across Entire Plume Width:	0.623	10.646
Calculated Dilution Factor at Point of Interest:	1.000	6.672

Taking *DF* from Table 9 and $\bar{V}$ from Table 6 yields the effective acute and chronic dilution factors listed in Table 10. These are the dilution factors that will be used to determine pollutant concentrations at the mixing zone boundaries.

Table 10 Effective Acute and Chronic Dilution Factors for the Existing Discharge

Mixing Zone Boundary	Dilution Factor
Acute	1.0
Chronic	6.5

5.5 CONCLUSIONS AND RECOMMENDATIONS

Dilution factors listed in Table 10 are lower than those achieved by most wastewater treatment plant outfalls, due to the shallow depth and sluggish currents along the eastern shoreline of Lake River. The existing outfall may not provide adequate mixing to achieve water quality standards at design flows. The city is currently collecting effluent and receiving water data that will assist in making this determination. If water quality standards are not met within the mixing zones, Ecology may reopen the NPDES permit and issue requirements to achieve compliance.

The existing outfall does not meet design guidelines in Chapter E2 of Washington's *Criteria for Sewage Works Design* (Ecology Publication No. 98-37). Lake River has an assimilative capacity that would allow for higher dilution factors than provided by the existing discharge location. A properly sited outfall would likely include a submerged discharge extended into the higher-velocity portion of Lake River. This would reduce effluent concentrations within the mixing zones and minimize plume contact with the shoreline.

The next phase of the mixing zone study, being conducted as part of the City's wastewater facilities planning, will evaluate wastewater treatment plant and outfall improvements that will comply with water quality standards. The mixing zone study should evaluate extension of the outfall to access stronger currents further out in the channel, submerging the discharge under all tidal conditions, and minimizing effluent contact with the shoreline. The addition of a diffuser should also be considered.

Appendix A

QA/QC Report

APPENDIX A
QA/QC REPORT

This report documents the field and laboratory methods employed during the Ridgefield dye studies and the results of quality assurance/quality control (QA/QC) measurements.

GUIDANCE DOCUMENTS

Field methods for the tracer study followed guidance from the following sources:

- Section 6.3 of Appendix 6.1 of Ecology's *Permit Writer's Manual* (Ecology Publication 92-109)
- *Movement and Dispersion of Soluble Pollutants in the Northeast Cape Fear Estuary, North Carolina* (E.F. Hubbard and W.G. Stamper, USGS Water Supply Paper 1873-E, 1972)
- *Simulation of Soluble Waste Transport and Buildup in Surface Waters Using Tracers* (F.A. Kilpatrick, in Techniques of Water Resources Investigation of the U.S. Geological Survey, Book 3, Chapter A20)

LABORATORY AND FIELD NOTES

All work conducted in the laboratory and field was documented in field notebooks that are retained on file at Cosmopolitan Engineering Group. The Ridgefield dye studies are documented in three different books.

DYE SOURCE

The dye used in the Ridgefield tracer studies was Rhodamine WT liquid fluorescent dye manufactured by Keystone Industries of Compton, California. The dye was shipped in 2002 in 33-gallon sealed HDPE drums at 23.8 percent solution, with a specific gravity of 1.13. MSDS for this lot are available from Cosmopolitan Engineering Group.

PREPARATION OF DYE STANDARDS

Dye standards were prepared for this project on August 25, 2004 using serial dilution techniques presented in *Fluorometric Facts – Preparation of Standards for Dye Studies Using Rhodamine WT* by Turner Designs, document 998-5111 (11/28/95). Two liters each of 30 ppb and 0.6 ppb standard were prepared and used throughout the study. Standards were stored in a cooler, non-iced, at ambient temperatures at all times.

FLUOROMETER

The fluorometer used in the study was a Turner Designs Model 10-AU-005 field fluorometer. Limits of detectability are 0.01 ppb in deionized water. Features included internal data logging, continuous-flow cuvettes, full auto-ranging and temperature compensation. Field measurements were accomplished in the flow-through mode with a bilge pump and garden hose. Bench top measurements of bottle-collected samples were accomplished by injection of discrete samples into the flow-through cuvette with a syringe. Both the syringe and cuvette were twice-rinsed with sample before each measurement.

FLUOROMETER CALIBRATION

The fluorometer was calibrated to the dye standards and a DI blank in a laboratory on August 29, 2004 following the instructions in Section 3 of Turner Designs *Model 10-AU-005 Field Fluorometer User's Manual*. The ranges were set zero to 10.7 ppb for low-range, high-sensitivity and zero to 107 ppb for mid-range. Blank measurements were not deducted from readings.

POST-CALIBRATION CHECKS

Post-calibration was checked with the 30 ppb and 0.6 ppb standards routinely throughout the dye study. Checks were performed by inserting the standard into the flow-through cell as described above for bench top measurements, including the rinses. For a reason we have been unable to confirm (we suspect the temperature compensation may not have been on during initial calibration), the calibration slipped almost immediately, so that all subsequent readings of the standards were greater than the initial calibration.

The post-calibration check data were relatively consistent, as shown in Table A-1:

Table A-1. Fluorometer Calibration Check Data

Date	Location	30 ppb standard	0.6 ppb standard
30-Aug-04	Field	35.5	0.79
1-Sep-04	Laboratory	34.3	0.79
3-Sep-04	Field	35.3	0.79
5-Sep-04	Laboratory	35.3	0.81
13-Sep-04	Laboratory	38.0	0.80

RAW DATA CORRECTION

The raw concentration data were temperature corrected internally by the fluorometer (see Turner manual for further discussion). The daily data were adjusted to be consistent with the calibration checks by linear functions (*i.e.*, $y = ax + b$) with intersects at both checkpoints shown in the table above.

FLUOROMETER DATA ARCHIVE

Fluorometer data are archived on a project CD available from Cosmopolitan Engineering Group, including the raw and corrected data. Data are also reduced into excel spreadsheets that include graphs, many of which are provided in the January 2005 mixing zone study report.

DYE INJECTION SETUP

Dye injection was accomplished with a FMI model RHSY1CKC sample pump. The pump ran on 120 VAC power delivered from a 12 VDC car battery routed through an 800W inverter. The dye pump was secured on the lid of the 33-gallon dye barrel. The pump intake consisted of ¼-inch PVC tubing with a weight on the end inserted through a cutout on the barrel lid and resting on the bottom. The exhaust side of the injection pump consisted of 145 feet of ⅜-inch polyethylene tubing. The tubing was weighted every 20 feet with dive weights and extended 100 feet into Lake River to the point shown in Figure 3 of the mixing zone study report. The outlet was suspended approximately 18 inches above the bottom at the outlet with a subsurface float.

DYE INJECTION RATES

As discussed in the mixing zone study report, two dye releases were conducted. In the first, the dye barrel was upended and a slug dose was discharged shortly before dawn on August 30, 2004. As a result, a second dye injection was conducted later that week after ambient concentrations had returned to background. The second dye injection was at a continuous rate over a 24.8 hour period, which is equal to one tidal day (*i.e.* two ebb and two flood tide cycles). The dye pump was set and checked prior to the study to a rate of 35 mL/min. Actual dye delivery rate was confirmed by measuring down from the barrel rim at the beginning and end of the injection.

Dye release data are shown in Table A-2.

Table A-2 Dye Release Data

Release No.	Date / Time	Total Discharged			Discharge Rate	
		Volume (gal)	Conc (%)	Weight (lbs)	Pump Rate (mL/min)	Mass Rate (g/sec)
1	30 Aug / 5:30	16	12	16	NA	NA
2	2 Sep / 15:15 to 3 Sep / 16:00	13	2.6	2.9	34	0.015

SAMPLE POSITIONING AND NAVIGATION

All navigation data was determined with a Garmin eTrex Legend dGPS, including the existing outfall, dye injection point, ISCO station sites, and all in-water sample sites.

The continuous fluorometric measurements were obtained from a boat. The sample depths were determined by 1-ft marks on the sample inlet hose and logged into the field book. Sample depth was matched to logged fluorometer data by time stamp. The horizontal position of the sampler was determined by GPS and indexed to fluorometer data by time stamp. A twelve-second lag was measured between the sample pump and the fluorometer, and the time stamp was adjusted accordingly.

The ISCO stations included fixed inlet hoses to the sampler. The downstream station (No. 1) was fixed to pilings, so the inlet was set at a fixed elevation of approximately 2 feet above the bottom. Water depths at that site varied between approximately 4 and 6 feet depending on tide stage. The upstream ISCO station (No. 2) was fixed on a dock that rose and dropped with the tide. The mean water depth at that site was about 6 feet, and the sampler was suspended at a constant depth of 3 feet below the water surface.

For the mixing zone boundary data, anchors were set 200 feet down-current of the dye injection site on both sides of the river. The sampler was towed across the mixing zone boundary by towing the sample vessel back and forth along a line marked at 10-ft intervals. Each 10-ft interval was then time stamped to the corresponding fluorometer data that was internally logged.

For the longitudinal transects, the intake was held at a constant depth while the vessel trolled at slow speed from one end of the estuary to the other. Positions were recorded by dGPS every five minutes and indexed to fluorometer data by time stamp.

SAMPLE HANDLING, TRANSPORTATION AND STORAGE

Bottle samples taken either directly or from the ISCO stations were handled within strict guidelines. ISCO samples were transferred from carousel bottles to 250 mL bottles on a batch basis near the end of each cycle. Bottle numbers were recorded for later determination of sample time based on the ISCO program settings, which were recorded in the field books. All sample bottles were immediately transferred to storage boxes and stored in the dark. Sample boxes were transported by car and stored in a laboratory until measured by the fluorometer. The samples were allowed to acclimate to the room temperature before concentrations were read.

DYE LOSS

Dye loss during extended tracer studies results from (1) photochemical decay and (2) adherence, adsorption or other interferences associated with suspended matter in the water column. Both loss mechanisms were quantified in this study.

Photochemical decay was determined by holding standards in the water column throughout the study in light and dark bottles. Light and dark bottles were filled with 30 ppb standards and suspended two feet below the water surface at the Station 2 dock for the duration of the field studies. The results of the light and dark bottle tests are shown in Table A-3. The measured photochemical decay was equal to 2.3 percent per day (*i.e.* kinetic rate constant $k = 0.023\ day^{-1}$).

Dye loss due to adsorption and settling of suspended matter in the water column was tested by decanting several of the ambient samples that had higher concentrations and visible sediment at the bottom. Dye concentration was measured first from a well-mixed aliquot of the sample, and then again after approximately two hours of decanting. The decant samples were withdrawn carefully and slowly from near the water surface to avoid resuspension. The results are shown in Table A-3, and indicate that this potential interference is not significant.

F.A. Kilpatrick's *Simulation of Soluble Waste Transport and Buildup in Surface Waters Using Tracers* cited several studies that have measured Rhodamine WT dye loss in tracer studies that have ranged from 2 to 4 percent per day, which is consistent with our photochemical decay measurements. Kilpatrick recommends a dye loss or decay rate of 3.4 percent per day. Since dye was mostly flushed from Lake River after two days, photochemical decay was not believed to be significant in this study.

Table A-3 Dye Loss Data

PHOTOCHEMICAL DECAY					
Bottle	Date	Conc (ppb)	Decay (%)	Duration	Decay Rate "K" (day^{-1})
Light/Dark	Aug 25	30			
Light/Dark	Aug 29	29.7	1.0	4	0.002
Light	Sep 7	24.2	18.5	9	0.023
Dark	Sep 7	29.0	2.4	9	0.003

ALGAE/TSS ADSORPTION		
Sample No.	Decant Conc (ppb)	Mixed Conc (ppb)
H41	24.2	24.3
H45	18.9	19.0
H4	8.2	8.2

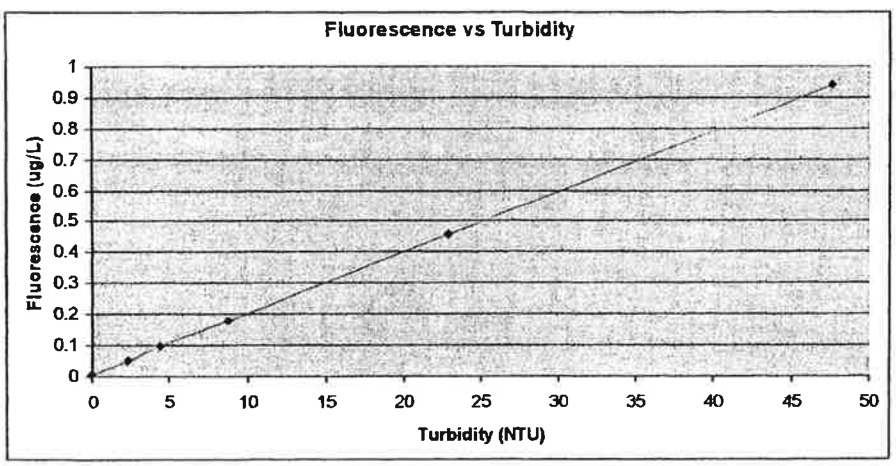
RELEVANT KING COUNTY QA/QC DATA

King County conducted extensive laboratory QA/QC tests on Rhodamine WT as part of dye studies performed for the Brightwater outfall, including effects of turbidity on fluorometer readings. These QA/QC results are relevant to this study. Excerpts from that study are presented below (*Appendix 2 – Dye Studies, Brightwater Oceanographic Studies Report*, Cosmopolitan Engineering, 2002):

TURBIDITY STANDARDS

The King County lab prepared a series of turbidity standards in the absence of Rhodamine dye and measured fluorescence with a Turner Model 10-AU fluorometer. The results are shown in Figure 2-3. There was a clear linear relationship between turbidity and fluorescence in the range of 2 to 50 NTU.

The turbidity standards were then spiked with 0.092 ppb Rhodamine WT dye and analyzed without filtration. A linear regression analysis was used to correlate the expected fluorescence associated with turbidity and subtract that out leaving the response associated with the detection of dye. There was good (>90%) recovery of dye for turbidity concentrations less than 8.76 NTU. Recovery was poor at turbidity concentrations greater than 8.76 NTU.



LIVE CONTROL SAMPLES

King County prepared Rhodamine WT standards at concentrations of 92 ppb, 0.92 ppb and 0.092 ppb. The 0.92 standard was used for the live control sample (LCS) for the entire duration of the study. The LCS was measured several times each day that fluorescent measurements were made in the laboratory. The LCS was sealed with Para film and stored in a dark and dry environment at all other times. Over the four-month duration of the study, there was no degradation of the LCS.

FILTERED VS. UNFILTERED SAMPLES

The dye standards were filtered through 0.45 micron filters to assess whether filtration captured any of the tracer. After several replicates of this test, a statistically significant effect on the 92 ppb standard was concluded. There was a statistically significant difference at the 0.92 ppb level, but the difference was less than the RDL of 0.04 ppb and thus considered negligible. There was no statistically significant difference on the 0.092 ppb standard.

BACKGROUND TURBIDITY AND FLUORESCENCE CONCENTRATION

Background samples were collected from Lake River on September 29 prior to dye release. The measured background concentrations were 0.30 and 0.34 ppb. This is consistent with the lowest concentrations measured several days following the dye releases. Background concentration in the Columbia River was approximately 0.2 ppb, indicating lower turbidity there.

The King County study revealed a strong linear correlation between turbidity and fluorescence in the range of 0 to 50 NTU, as shown on the table above. Turbidity was not measured during the Ridgefield dye study, but was measured by Ecology in Lake River near Ridgefield in Water Year 1992 (Ecology Station 28F070). Turbidity ranged from 6 to 18 NTU, with a mean of 12. This range would correspond to a fluorescence background concentration of 0.2 to 0.4 ppb, which is consistent with the background concentration measured during this field study.

APPENDIX D

MIXING ZONE STUDY PART II – FUTURE DISCHARGE ALTERNATIVES

COSMOPOLITAN ENGINEERING GROUP

Civil, Environmental, and Recreational Consulting

City of Ridgefield

Mixing Zone Study
Part II – Future Discharge Alternatives

Prepared for:

City of Ridgefield
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Ridgefield, Washington 98642

and

Gray and Osborne
2401 Bristol Court S.W., Building A
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Prepared by:

Cosmopolitan Engineering Group
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December 2005
G&O014

City of Ridgefield

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December 2005
G&O014

CERTIFICATE OF ENGINEER

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal as a professional engineer licensed to practice as such, is affixed below.

WILLIAM P. FOX
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REGISTERED
PROFESSIONAL ENGINEER

12/13/5

EXPIRES 10-29-07

William P. Fox, P.E.
Cosmopolitan Engineering Group, Inc.

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EXECUTIVE SUMMARY

The outfall from the Ridgefield wastewater treatment plant currently discharges along the eastern shoreline of Lake River, approximately 10,000 feet upstream of its confluence with the Columbia River main channel. Lake River is a branch channel of the lower Columbia River, which experiences twice-daily flow reversal during flood tides. At low tide the exiting outfall terminates above the river surface, and effluent flows over rocks to reach the river. The outfall is submerged only during high tides or high river flows.

A report titled *Mixing Zone Study Part I – Existing Discharge* was submitted to Ecology in January 2005, as required under Section S8 of the NPDES permit issued to the City of Ridgefield. That report established dilution factors at acute and chronic mixing zone boundaries for the existing discharge from the City's wastewater treatment plant. The existing exposed side-bank outfall does not meet Ecology design guidelines. As a result, the outfall provides limited dilution within the mixing zones, and may not satisfy water quality standards. The report recommended that the City consider extending the outfall into the main channel of Lake River, or into the Columbia River mainstem.

The City has committed to extending the outfall to the Columbia River mainstem, and will begin the environmental and engineering studies in 2006. Construction is anticipated to be completed in 2010. In addition, the existing outfall will also be extended to meet design guidelines and water quality standards on an interim basis until the Columbia River outfall is in service.

The purpose of this report is to support the wastewater facility planning conducted for the City of Ridgefield by Gray & Osborne. This report evaluates dilution factors at acute and chronic mixing zone boundaries for future wastewater flow projections up to buildout conditions, for both the Lake River outfall (through 2010) and the final Columbia River mainstem (after 2010).

Potential effluent limits necessary to meet water quality standards at the acute and chronic mixing zone boundaries are presented for each planning option. These design criteria may be issued in future NPDES permits and will provide the basis for Gray & Osborne's wastewater treatment evaluations for the facility planning alternatives.

SECTION 1: INTRODUCTION

The City of Ridgefield discharges wastewater treatment plant (WWTP) effluent to Lake River 10,000 feet upstream of its confluence with the Columbia River. Lake River is an 11-mile slough of the Columbia River that originates at the outlet of Vancouver Lake. Several streams, including Burnt Bridge, Salmon, Whipple, and Flume creeks flow into Lake River upstream from Ridgefield. Also, tidal effects in the Columbia River cause Lake River to reverse its flow direction back toward Vancouver Lake. Columbia River, Lake River, and the City of Ridgefield WWTP outfall location are shown in Figure 1.

1.1 NPDES PERMIT SECTION S8

The City of Ridgefield was issued NPDES Permit No. WA0023272 by the Department of Ecology on December 12, 2003. Section S8 of the NPDES permit requires the City to conduct a mixing zone study to determine the degree of effluent and receiving water mixing which occurs within the mixing zone authorized in Section S1B of the permit.

Field studies were conducted in September 2004 in support of the specified mixing zone study, featuring a series of effluent dye tracer releases. A report titled *Mixing Zone Study Part I – Existing Discharge* was submitted to Ecology in January 2005. That report documented the results of the field studies and established dilution factors at acute and chronic mixing zone boundaries for the existing discharge.

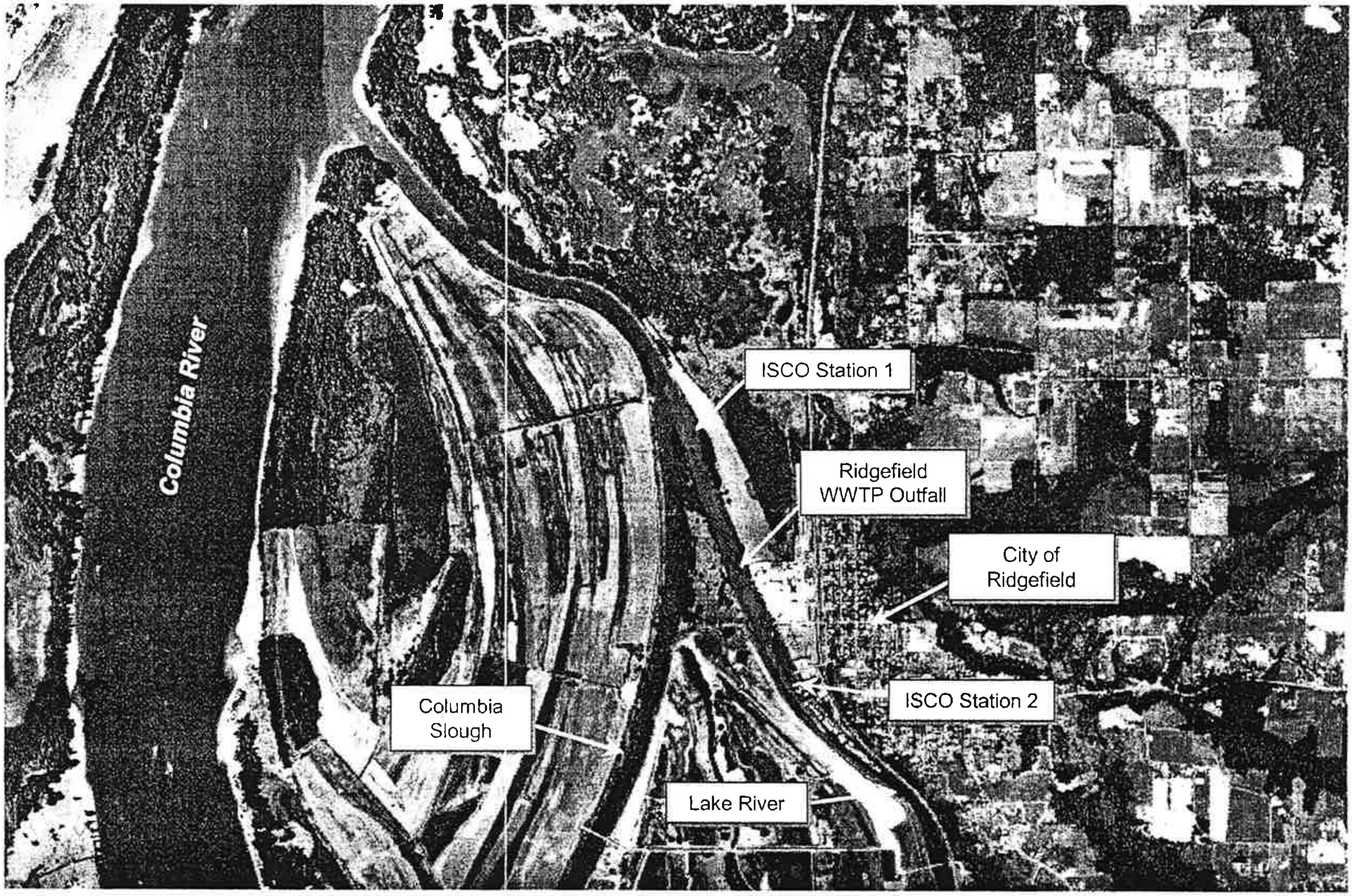
The existing outfall does not meet Ecology design guidelines. As a result, the outfall provides limited dilution within the mixing zones, and may not satisfy water quality standards. The report recommended that the City consider extending the outfall into the main channel of Lake River.

1.2 FACILITY PLANNING REQUIREMENTS

The purpose of this report is to support the wastewater facility planning conducted for the City of Ridgefield by Gray & Osborne. Part II of the mixing zone study, presented herein, satisfies the following requirements for wastewater facility planning established in WAC 173-240-060:

(d) The degree of treatment required based upon … the receiving body of water…

(e) A description of the receiving water, applicable water quality standards, and how water quality standards will be met outside of any applicable dilution zone.



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0 1,000 2,000 3,000
Approximate Scale, feet

Figure 1: Aerial View of Lake River in the Vicinity of Ridgefield

This report evaluates dilution factors at acute and chronic mixing zone boundaries for future wastewater flow projections up to buildout conditions, and for outfall alternatives to Lake River and the Columbia River mainstem. Diffuser options are also considered in this analysis.

1.3 SAMPLING AND ANALYSIS PLAN

Lower Lake River is a complex hydrodynamic system in which summer low runoff from Lake Vancouver, Salmon Creek and other tributaries combine with tidal reversal in the Columbia River to create critical water quality conditions. The NPDES permit specifies field studies to be conducted in support of this report. Therefore, a sampling and analysis plan (SAP) for the mixing zone study was submitted on April 21, 2004, to Ecology for review prior to conducting field studies (Appendix A). The SAP described a dye tracer study to establish effluent reflux and dispersion in Lake River during these critical receiving water conditions. Dilution models and modeling protocol were also established in the SAP.

The SAP was reviewed by Ecology and comments were received via email from David Knight on June 1, 2004.

1.4 DEVIATIONS FROM THE SAP

The previous mixing zone study conducted by Wallis Engineering in February 1997 described the outfall as having a minimum discharge depth of 5 feet. During reconnaissance for the field studies and after the SAP was prepared, it was discovered that the outfall actually discharges at or above the shoreline and is not submerged except at high tide. A photograph of the existing discharge at low tide is shown in Figure 2.

As a result of the actual outfall configuration, several significant aspects of the field study and modeling varied from the original SAP, and are outlined below:

- Only two ISCO samplers were available from Ecology (of three planned fixed-station samplers), therefore the downstream station near the Lake River entrance to the Columbia River was omitted.

- The SAP called for a continuous injection of dye into the WWTP effluent to establish the reflux concentration in the tidally reversing estuary. When the unsubmerged outfall was discovered, the City elected to focus the tracer study on establishing reflux for a submerged outfall alternative. If the long-term plan for the wastewater discharge is to remain in Lake River, the City anticipates extending the outfall to a submerged location. Therefore, the dye was directly injected into the receiving water via 3/8-inch plastic tubing for one tidal day. This method of direct injection replicates the USGS injection methods cited in the SAP.

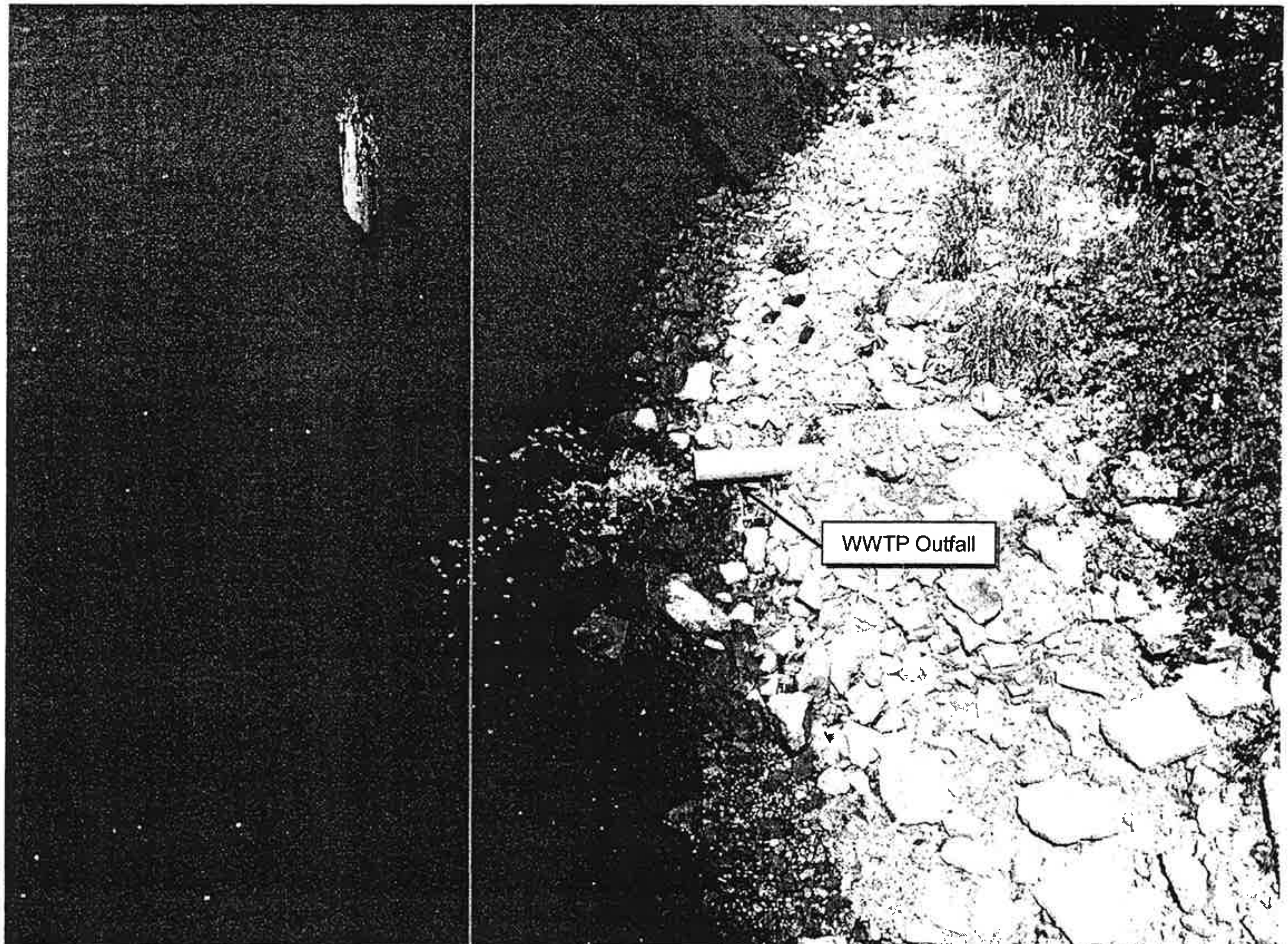

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Figure 2: Photo of the Ridgefield Outfall at Low Tide

- The SAP proposed evaluating the "reasonable potential" to exceed water quality standards for toxicants according to Ecology's protocol in the *Permit Writer's Manual* (Ecology Publication 92-109). Ecology's SAP comments requested that this analysis not be included as part of the mixing zone study. Therefore, this report is limited to establishment of the acute and chronic dilution factors for the existing discharge, and development of effluent design criteria for the various WWTP and outfall alternatives.

SECTION 2:
DESIGN CRITERIA

2.1 MIXING ZONE CRITERIA

The NPDES permit requires mixing to be determined for critical conditions or as close to critical conditions as reasonably possible. WAC 173-201A-020 defines critical conditions as follows:

> *...when the physical, chemical, and biological characteristics of the receiving water environment interact with the effluent to produce the greatest potential adverse impact on aquatic biota and existing or characteristic water uses...*

Acute and chronic mixing zones are authorized under WAC 173-201A-100 for river and estuary classifications. Lake River and the Columbia River exhibit both riverine and estuarine characteristics. In a letter dated February 3, 2005, Ecology has stated that certain aspects of both mixing zones classifications will apply. The following mixing zone guidelines will apply, consistent with the Ecology guidance:

- The mixing zone will extend 200 feet plus the water depth in each direction.
- Critical ambient current speeds will be the 50^{th} percentile for the chronic mixing zone, and the 10^{th} and 90^{th} percentiles for the acute mixing zone.
- Chronic mixing ratios will be limited to 25 percent of the ambient 7Q10 discharge, and acute ratios to 2.5 percent of the ambient 7Q10.

2.2 AMBIENT RIVER DISCHARGE

Ambient discharge at the Lake River outfall consists of the following components:

- Upstream discharge from Salmon, Burnt Bridge, and Whipple Creeks.
- Upstream discharge from Lake Vancouver consisting of groundwater and inflow from the Columbia River (via a gated constructed channel).
- Residual circulation from the Columbia River.

River discharge is normally measured as a function of stage. However, the stage-discharge method of direct measurement is not possible in Lake River near Ridgefield because of the tidal influence. Only Salmon Creek and the Columbia River have any long-term discharge data, which are summarized in Table 1.

Table 1 Existing Ambient Discharge Data

Creek Name	Organization	Station No.	Period of Record	7Q10 Discharge
Salmon Creek	Clark Public Utilities	S08	08/16/1996 to present	11.8 cfs
Columbia River Mainstem	Clark Public Utilities(1)	Various	N/A	85,346 cfs

(1) 7Q10 for the Columbia River mainstem estimated to be 85,346 cfs (CH2M Hill, *Outfall Dilution Study Report for Salmon Creek Wastewater Treatment Plant*, January 2004)

There are no long term data for the other upstream creeks or Lake Vancouver discharge. Residual circulation from the Columbia River has never been measured at this location in Lake River. Therefore, residual discharge from the Columbia River was measured and calculated using fluorometric techniques during the critical low flow season (September 2004), which is presented in Sections 3 and 4 of this report.

2.3 EFFLUENT FLOW RATE

The NPDES *Permit Writer's Manual* (Ecology Publication 92-109) specifies the critical effluent flow rates to be used in mixing zone studies. For a continuous municipal treatment plant discharge such as Ridgefield, the appropriate critical effluent flow rates are (1) maximum monthly average flow rate for the chronic mixing zone boundary, and (2) highest daily (*i.e.*, 24-hr average) flow rate for the acute mixing zone boundary.

Gray & Osborne have developed effluent flow projections for the WWTP facility planning alternatives. These design flows are presented in Table 2 and will be used in the mixing zone modeling in this report.

Table 2 Effluent Flows for Outfall Modeling

Phase	Design Year	Max Month (mgd)	Peak Day (mgd)
Existing	2005	0.5	0.9
1A	2010	1.0	1.6
1B	2019	1.8	2.6
Buildout	2024	2.7	3.7

2.4 OUTFALL ALTERNATIVES

Ecology's *Criteria for Sewage Works Design* (Ecology Publication 98-37) includes design guidelines for outfalls. Ridgefield's existing side-bank outfall does not meet these criteria. Outfalls should not discharge above the low tide line, exposing effluent to potential public contact. Effluent contact with adjacent shorelines should be minimized, especially in areas with potential public contact. There are kayak launching areas and a public boat launch just upstream of the outfall, so public contact is feasible. In addition, the shoreline discharge restricts the dilution achieved within the mixing zones.

The design guidelines could be achieved if the outfall were extended into the channel of Lake River or the Columbia River mainstem. The City of Ridgefield has committed to extending the outfall to the Columbia River mainstem, and have initiated engineering and environmental studies and an EIS to obtain the necessary permits. However, the Columbia River outfall could be constructed until 2010. Therefore, the following two outfall alternatives have been established for this mixing zone study:

- Lake River through 2010. The existing outfall will be extended into Lake River on an interim basis until the Columbia River outfall is completed. For the purposes of this study, the assumed outfall will be extended to a depth of –7 feet mean lower low water (MLLW) datum. The terminus of the outfall would consist of a single 8-inch diameter nozzle discharging at a vertical angle of 30 degrees.

- Columbia River 2010 and Beyond. No outfall siting or diffuser design studies have been completed for the Columbia River alternative. For this mixing zone study we have assumed the new outfall would extend to a depth of –17 feet MLLW datum. Two discharge alternatives are evaluated:

    1. Open-ended discharge (no diffuser).
    2. 22.5 foot diffuser consisting of ten 4-inch diameter ports spaced at 2.5 feet intervals.

  These two diffuser options are modeled to bracket the anticipated dilution capabilities for the Columbia River outfall alternative. These criteria including the discharge depth will be re-evaluated as part of the Columbia River outfall siting studies that will begin in 2006.

SECTION 3:
2004 LAKE RIVER STUDIES

Various field studies were conducted in 2004 in support of this mixing zone study. The dye tracer studies were conducted in the first two weeks of September 2004. Most of the critical ambient measurements were obtained during intensive field studies on the last day of the dye injection, September 3, 2004.

3.1 TIDE

Lake River is over 70 miles from the ocean, and tidal predictions are difficult in the upper reach of the Columbia River estuary. National Oceanic and Atmospheric Administration (NOAA) has a tide station near St. Helens, OR, approximately 2.5 miles downstream of Ridgefield. Tide predictions for September 3, 2004, near St. Helens are shown in Figure 3, including the times of plume dye transects. It was noted during the field studies that the tidal elevation range was accurate, but times of high and low tides were up to two hours later than published times.

The tides occurring the week of September 3, 2004, were selected for the study because they were fairly symmetrical. That is, the highs and lows were approximately equal. These tide conditions were judged to be critical because the two flood tides maximized the time when the river reverses and flows upstream, causing effluent reflux.

3.2 RIVER DISCHARGE

As stated previously, Clark County's Salmon Creek station is the only tributary gauge currently in operation. Discharge data for Salmon Creek and the Columbia River during the week of September 3, 2004, are presented in Table 3.

Table 3 River Discharge Data for the Week of September 3, 2004

Date	Salmon Creek	Columbia River[1]
8/30/2004	36.7	189,550
8/31/2004	32.4	182,340
9/1/2004	30.6	142,970
9/2/2004	28.5	154,780
9/3/2004	37.6	128,420

NOTE: Discharge units are cubic feet per second (cfs)

[1] Sum of Columbia River at Bonneville Dam, Sandy River, and Willamette River.

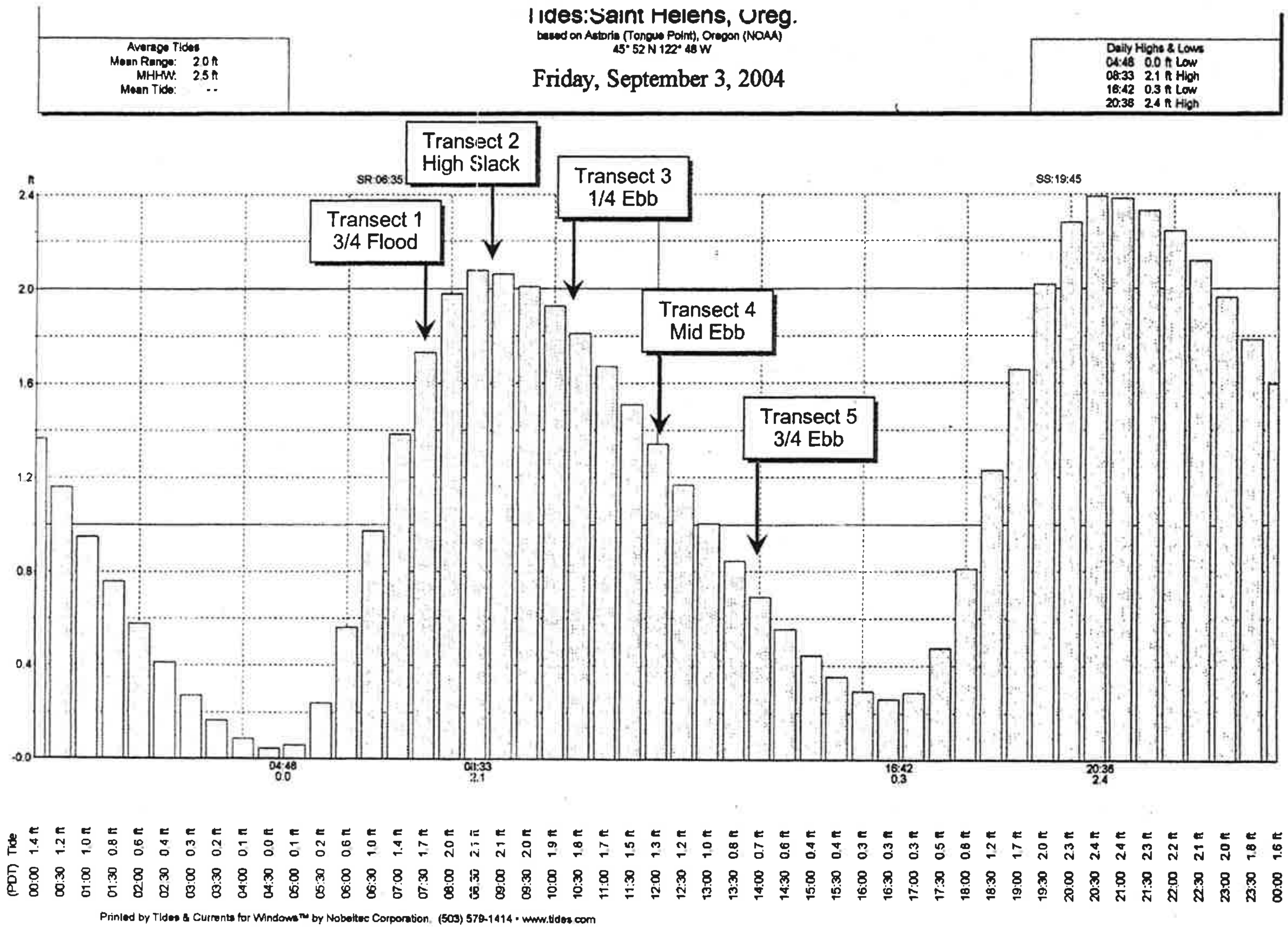

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Figure 3: Predicted Tide for St. Helens, OR, September 3, 2004

3.3 CROSS-SECTION

The cross-section of Lake River was measured at the location of the existing outfall. The section was measured during an estimated tide elevation of +1.6 feet above MLLW based on the NOAA tide predictions for St. Helens. The measured cross-section using the MLLW datum is shown in Figure 4. The injection point for the dye study discussed later is also shown in the figure. No conversion to NAVD88 or any other local datum has been assessed.

3.4 CTD PROFILES

Density is a function of salinity and temperature. Salinity is determined from the temperature and conductivity. Conductivity, temperature and depth (CTD) profiles were measured six times during the intensive field study on September 3, 2004. CTD profiles were obtained with a Seabird Instruments Model SBE19 Profiler. Temperature, conductivity, and pressure sensors were calibrated by the manufacturer in October 2004.

Fresh water was measured at the site, which is consistent with historic measurements in the Columbia River that indicate the salt wedge does not intrude past Longview. Salinity was very stable at approximately 0.07 ppt. None of the six profiles revealed any salinity stratification.

Measured temperature profiles are shown in Figure 5. Only slight thermal stratification was observed. The early morning profile revealed no stratification. Thermal stratification built to a peak from noon to 3 PM due to solar heating at the surface, then fell off in the late afternoon. The sky was cloudless during these measurements. Even during peak solar heating, temperature stratification was not significant, with a maximum temperature difference between the surface and bottom of only 0.1°C.

3.5 CURRENT SPEED

The City of Ridgefield measured nearshore current speed at the kayak dock approximately 1,000 feet upstream of the outfall as part of twice-weekly ambient monitoring conducted during summer 2004. The purpose of these measurements was to develop the 10^{th}, 50^{th}, and 90^{th} percentile current statistics necessary to model dilution for the existing outfall. Current speed was measured by the travel time of a surface drifter (orange) over a fixed distance. The results of 44 random current measurements obtained over varied and representative tidal conditions from May through October 2004 are presented in Table 4.

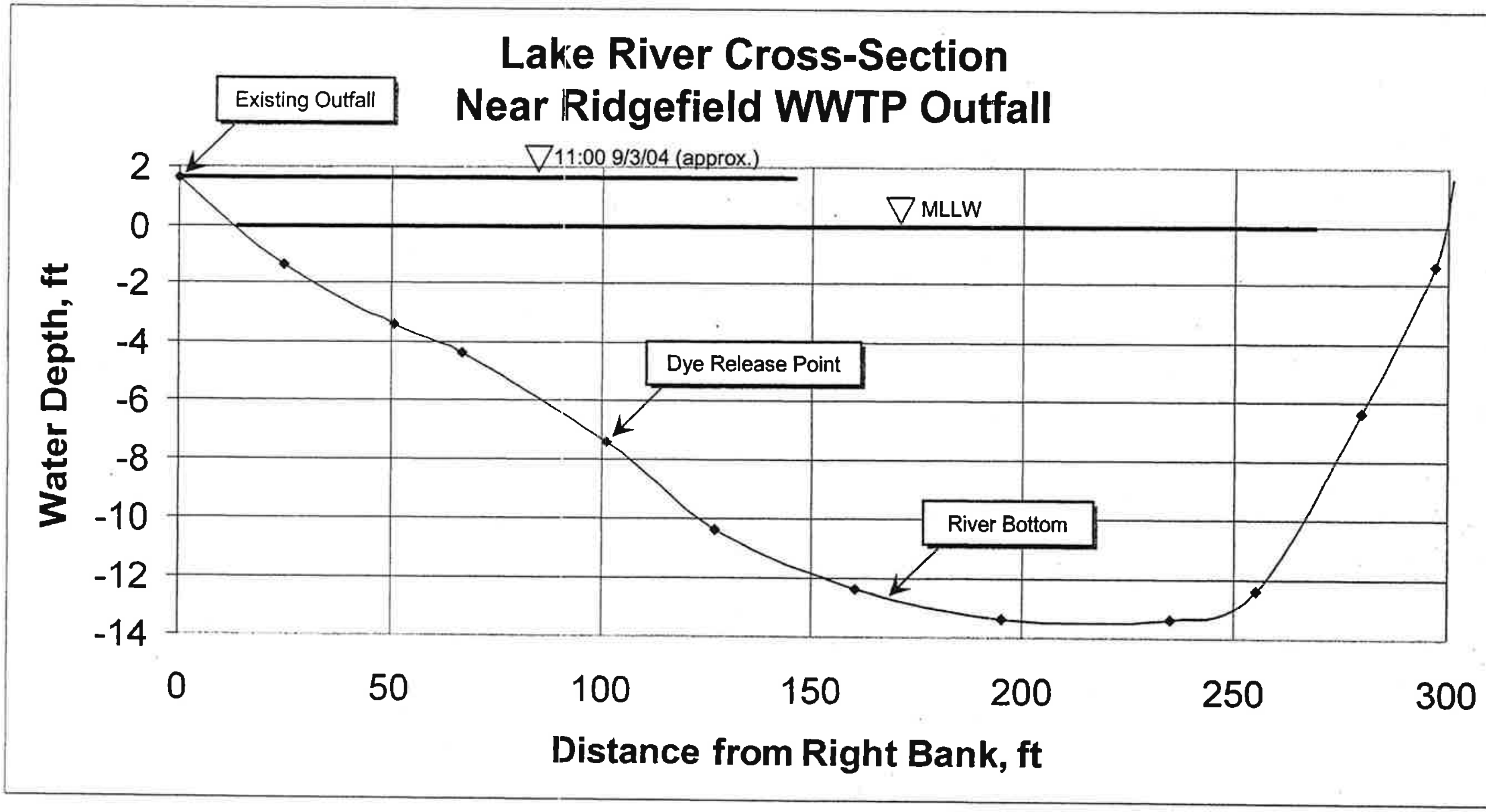

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Figure 4: **Lake River Cross-Section Near the Ridgefield Outfall**

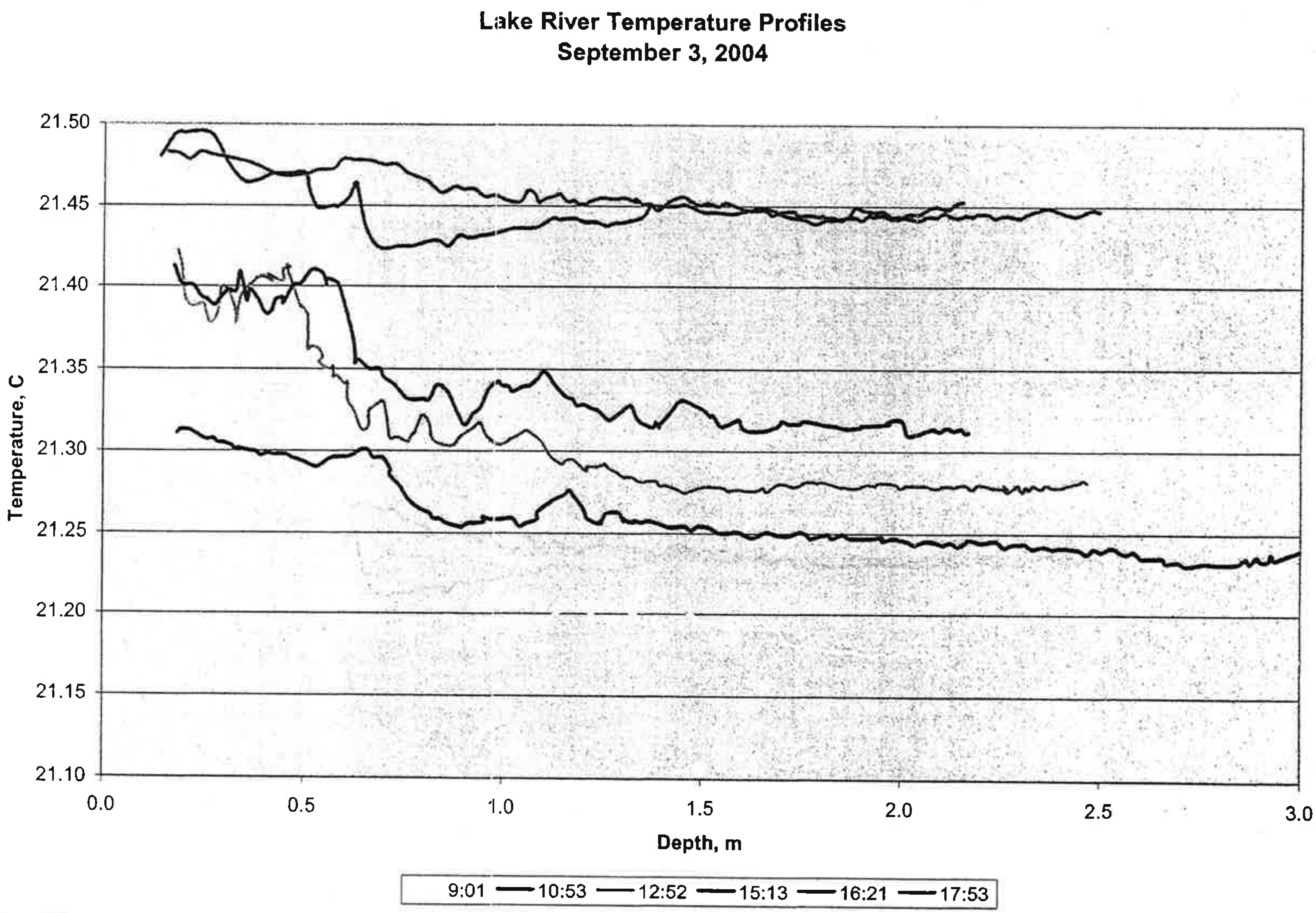

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Figure 5: Lake River Temperature Profiles, September 3, 2004

Table 4 Critical 10th and 50th Percentile Nearshore Current Statistics

10th percentile current speed	0.13 ft/sec
Median (50th percentile) current speed	0.42 ft/sec
90th percentile current speed	1.40 ft/sec

Current speed in Lake River was also measured during the intensive field study on September 3, 2004. These measurements were made near mid-channel with a Swoffer current meter. Current speed was measured at a water depth of approximately 0.6 times the water depth to estimate the depth-averaged velocity per USGS protocol. Each current speed measurement consisted of the average of three discrete measurements of 15 second durations. The purpose of these measurements was to provide concurrent speed data with the dye transects and profiles described in the next section. The mid-channel current data for five critical tide stages on September 3, 2004, are presented in Table 5. Corresponding dispersion coefficients derived from the dye transects are also shown.

Table 5 Lake River Tidal Current Speeds

Tide Stage	Speed (fps)	Direction	(1)Dispersion Coefficient (ft^2/sec)
¾ Flood	0.9	Upstream	0.09
High Slack	0.6(2)	Variable(2)	0.13
¼ Ebb	1.0	Downstream	0.08
Mid Ebb	1.6	Downstream	0.13
¾ Ebb	1.2	Downstream	0.10

(1) Dispersion coefficients based on observed plume widths and concentrations during dye study.
(2) Ambient flow broke into visible small-scale eddies with variable upstream net velocity near high slack water. Speed estimated based on model calibration to dye study.

3.6 AMBIENT WATER QUALITY DATA

The City of Ridgefield's NPDES permit Section S9 required a two-year ambient monitoring study in Lake River for the months of May through October. The complete methods and results will be published in a separate report to be submitted to Ecology in late 2006. The results of that monitoring that are relevant to this mixing zone study for the Lake River 2010 alternative are summarized in Table 6.

Table 6 Lake River Ambient Monitoring 2004

Parameter	Number of Samples (n)	Critical Condition	Measured Value
Ammonia-N	52	90th percentile	0.10 mg/L
pH	52	90th percentile	8.6
Temperature	52	90th percentile	25.4°C
Hardness	52	10th percentile	60 mg/L $CaCO_3$
Cadmium	4	90th percentile	0.04 µg/L
Copper	4	90th percentile	2.61 µg/L
Lead	4	90th percentile	0.53 µg/L
Mercury	4	90th percentile	0.00 µg/L
Nickel	4	90th percentile	2.91 µg/L
Silver	4	90th percentile	0.02 µg/L
Zinc	4	90th percentile	5.62 µg/L

Note: 90th percentile for n < 20 (metals) estimated as 1.74 x geo. mean per Ecology protocol

SECTION 4:
LAKE RIVER DYE TRACER STUDIES

4.1 OBJECTIVES AND METHODS

The principal objective of the dye tracer studies was to quantify farfield accumulation (reflux) of effluent resulting from the reversing currents in the Lake River estuary. To achieve this objective we followed the USGS superposition method (Hubbard and Stamper, *Movement and Dispersion of Soluble Pollutants in the Northeast Cape Fear Estuary, North Carolina*, USGS Water Supply Paper 1873-E, 1972), in which a conservative tracer is injected at a fixed rate and location for one tidal day (24.8 hours) and measured continuously at fixed monitoring stations until it returns to background concentrations. This is described as Method 1 under Section 6.3 of Appendix 6.1 of the *Department of Ecology's Permit Writer's Manual.*

The secondary objective of the tracer study was to provide direct field measurements of dye concentration at the proposed chronic mixing zone boundary for a submerged outfall. Lateral transects, profiles and stationary time series were measured at discrete tide phases on September 3, 2004, corresponding with critical tidal conditions (*i.e.,* flood tide followed by ebb), which were shown in Figure 3.

A final objective of the tracer studies was to provide data that may be useful in understanding macro-hydrodynamic phenomena in Lake River, such as flushing rates, residual circulation and residence time. These data may be useful in the development of a comprehensive Total Maximum Daily Load (TMDL) model for Lake River in the future.

4.2 QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance and quality control (QA/QC) measures for the tracer studies included the following:

- Field documentation procedures
- Documentation of the dye source
- Preparation of dye standards prior to conducting the field studies
- Fluorometer specifications
- Pre-calibration of the fluorometer
- Field calibration checks during the field studies
- Calibration checks during the laboratory measurements of field samples
- Raw data correction
- Dye injection setup and equipment

- Calibration and measurement of dye injection rate
- Sample positioning (horizontal and vertical)
- Sample handling and transportation protocol
- Laboratory sampling methods (including temperature correction)
- Dye loss due to photochemical decay
- Dye loss due to adsorption/sedimentation
- Background concentration and turbidity

QA/QC procedures and results as applicable are provided in Appendix B.

4.3 REFLUX MEASUREMENTS

Farfield accumulation (reflux) was determined from the second dye injection on September 2-3, 2004. A 2.6 percent solution of Rhodamine WT dye was injected into Lake River at a rate of 34 mL/min from 15:15 on September 2 through 16:00 on September 3, which is equal to one tidal day (24.8 hrs). The corresponding mass discharge rate for the fluorescent dye was 0.015 grams/sec (2.8 lbs/day). This would correspond to an effluent concentration of 680 parts per billion (ppb) for a 500,000 gallons per day (gpd) discharge.

The dye injection point was established approximately 100 feet from the shoreline, as shown in Figure 4, to simulate a proposed submerged outfall. Establishing the injection point away from the shoreline also provided a more representative injection point for assessing farfield accumulation of effluent than would have been created by injecting dye into the existing effluent.

Two fixed monitoring stations provided dye concentration data at intervals ranging from 45 minutes to 3 hours depending on the status of the dye injection. Station 1 was located approximately 2,000 feet downstream from the injection site, and Station 2 was located approximately 2,200 feet upstream (Figure 1). The samplers consisted of ISCO carousel samplers housing 24 one-liter bottles. The ISCO sample stations are shown in Figure 6.

The data from the ISCO sampling stations are shown in Figure 7. The St. Helens tide prediction and period of dye injection are also shown on each graph. The top graph shows the time series for the duration of the study, terminating on September 7. This graph clearly shows that effluent is fully flushed from the estuary and concentrations returned to background within the first few days.

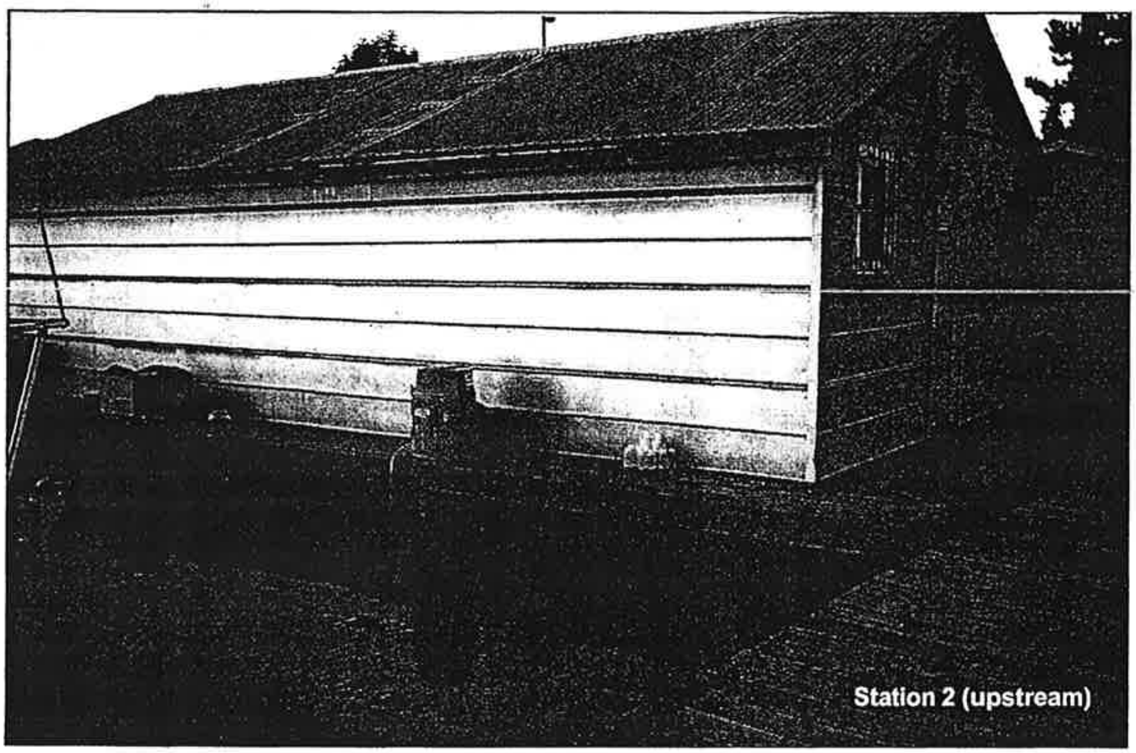

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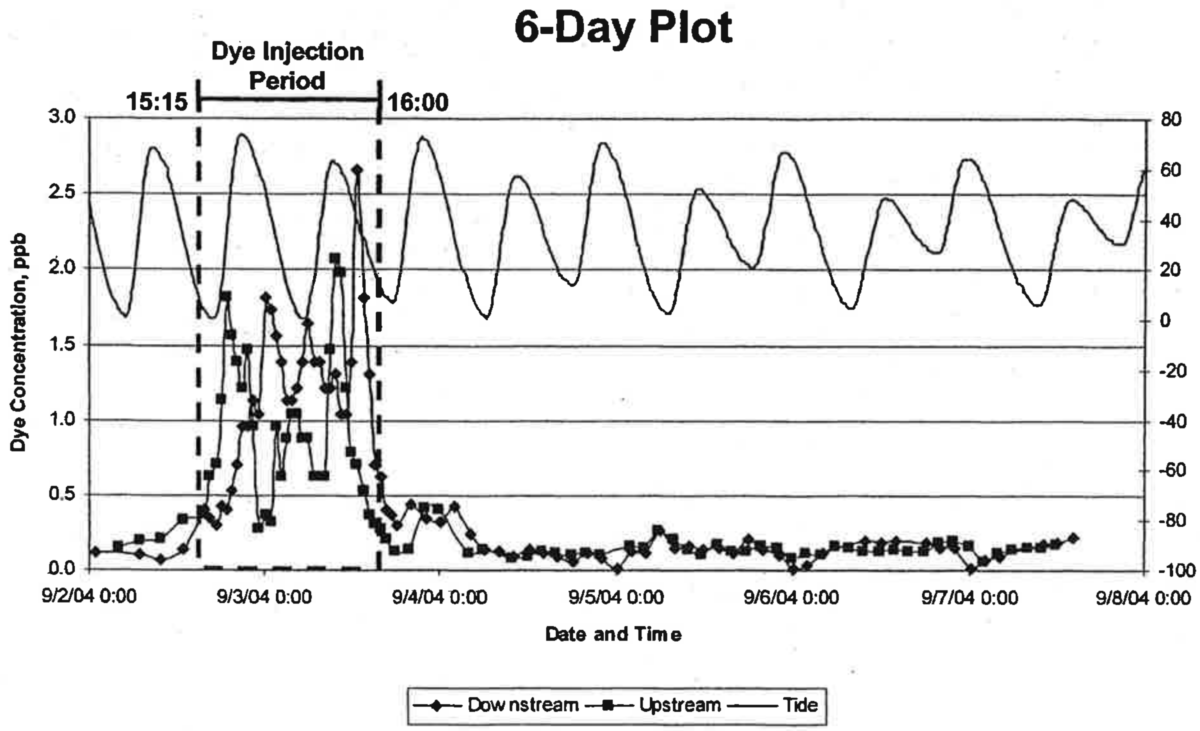
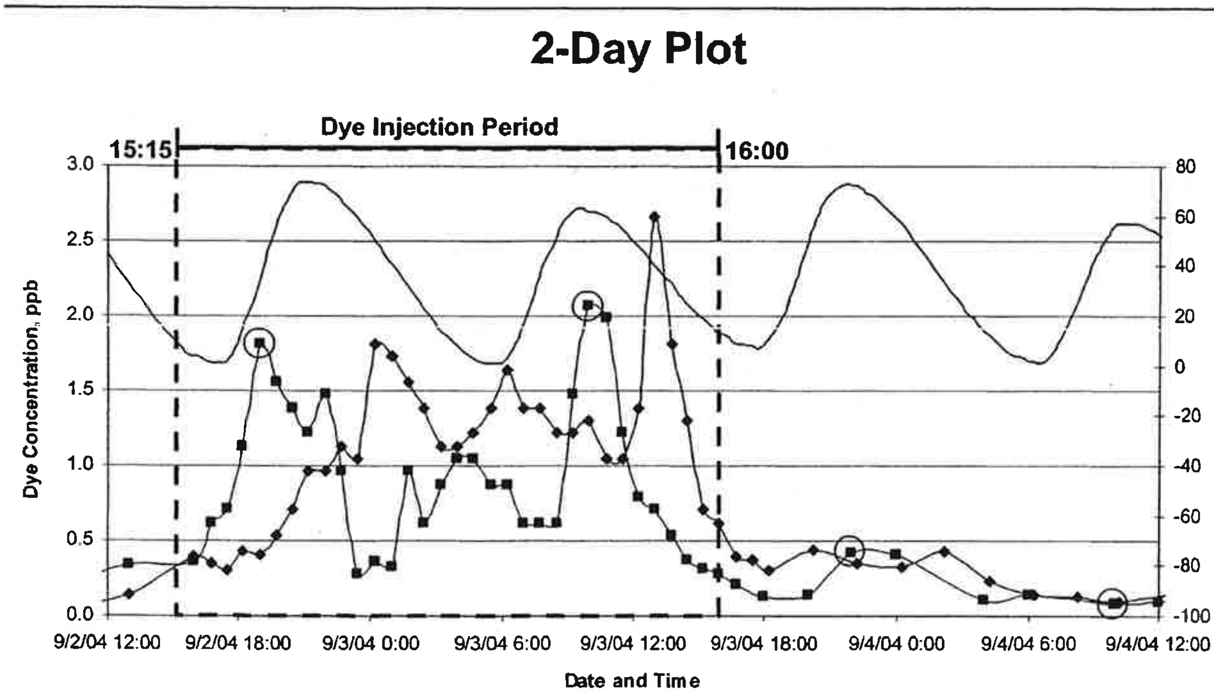
Figure 6: ISCO Sampling Stations





Note: upstream peaks used to calculate reflux are circled

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Figure 7: Farfield Dye Concentration Time Series – Release 2

The bottom graph in Figure 7 shows the 48-hour period from noon September 2 through noon September 4. This graph is more revealing of the dynamics of the plume movement as a function of tide. The upstream station reveals peaks on flood tide and near high slack water, as expected. The downstream station peaks at about mid ebb tide after the third dose of the "triple dose" phenomenon (1st dose early in flood tide as downstream flow slows, 2nd dose after current reverses and flows upstream, 3rd dose after 2nd current reversal and downstream flow resumes).

We selected the monitoring stations according to Alternative 2 as described in Section 6.3 of Appendix 6.1 of the *Permit Writer's Manual*. Following Ecology protocol for Alternative 2:

> *...tracer concentrations are measured in the farfield at some considerable distance from the effluent plume at a position that is representative of the source of dilution water for the plume...*

By method of superposition, reflux is calculated by addition of peaks from corresponding tide stages at stations up-current from the mixing zone at any time. These up-current peaks used to calculate reflux are circled on Figure 7. The first set of peaks occurred during the dye injection period. The second set of peaks are from the first full tidal day after the dye injection stopped. There were no measurable peaks in the third or subsequent tidal days. Although there was a significant mid-ebb spike at 13:00 on September 3, this station was down-current of the mixing zone and is therefore not applicable under Alternative 2.

Reflux calculations using the principal of superposition are provided in Table 7. Each tidal day included two peaks at up-current stations, each occurring mid to late in the flood tide (*i.e.*, just prior to tide reversal to resume downstream flow). The sum of peaks for the first and second both equaled 2.2 ppb, which is not surprising since the tides were nearly symmetrical. The resulting volume fraction of effluent as defined in the Ecology protocol for farfield accumulation is 0.33 percent effluent for the chronic design flow rate of 0.5 mgd, and 0.60 percent effluent for the acute design flow rate of 0.9 mgd. These reflux rates will be used in the dilution modeling for the existing outfall and all outfall improvement alternatives.

Table 7 Reflux Calculations from September 3, 2004, Dye Study using Principal of Superposition

Tide	1st Peak	2nd Peak	Total	Chronic Reflux(1)	Acute Reflux(2)
1st Ebb	1.8 ppb	0.4 ppb	2.2 ppb	0.33%	0.60%
2nd Ebb	2.1 ppb	0.1 ppb	2.2 ppb	0.33%	0.60%

(1) Based on 500,000 gpd discharge of 0.015 g/sec (2.8 lbs/day) for a simulated effluent concentration of 680 ppb.
(2) Based on 900,000 gpd discharge for a simulated effluent concentration of 370 ppb.

4.4 DIRECT PLUME MEASUREMENTS

Dye concentration was measured at the down-current mixing zone boundary at five tide stages during and after the critical "triple dosing" event. The critical tide stages were shown on the tide chart for September 3, 2004 in Figure 3. The measurements consisted of (1) horizontal transects through the plume at several depths, (2) vertical profiles at the horizontal centerline of the plume as determined during the transects, and (3) stationary time series holding the sampler at the horizontal and vertical position of maximum concentration. The results are described below.

4.4.1 3/4 Flood Tide

The first down-current transect was taken late in the flood tide (*i.e.*, flood tide was approximately ¾ of the way through). The tide had reversed and current was flowing upstream at approximately 0.9 ft/sec. Therefore, the down-current station for the transects was the upstream mixing zone boundary.

Results are shown in Figure 8. Horizontal transects through the plume at several depths are shown on the main graph, and the results of the vertical profile at the plume centerline are shown on the inset. The data logger was set at a 10-second averaging interval. The observed plume width was approximately 30 feet. Peak centerline concentration was 8 ppb. Note the accumulated background dye concentration (*i.e.* reflux) was approximately 1.5 ppb outside the plume.

4.4.2 High Slack

The second set of transects was obtained at high slack water, just as the tide was reversing a second time. As the tide reversed, the normally unidirectional current pattern dissipated into a series of small-scale eddies, which is typical of tide changes. The data were obtained at the upstream mixing zone boundary.

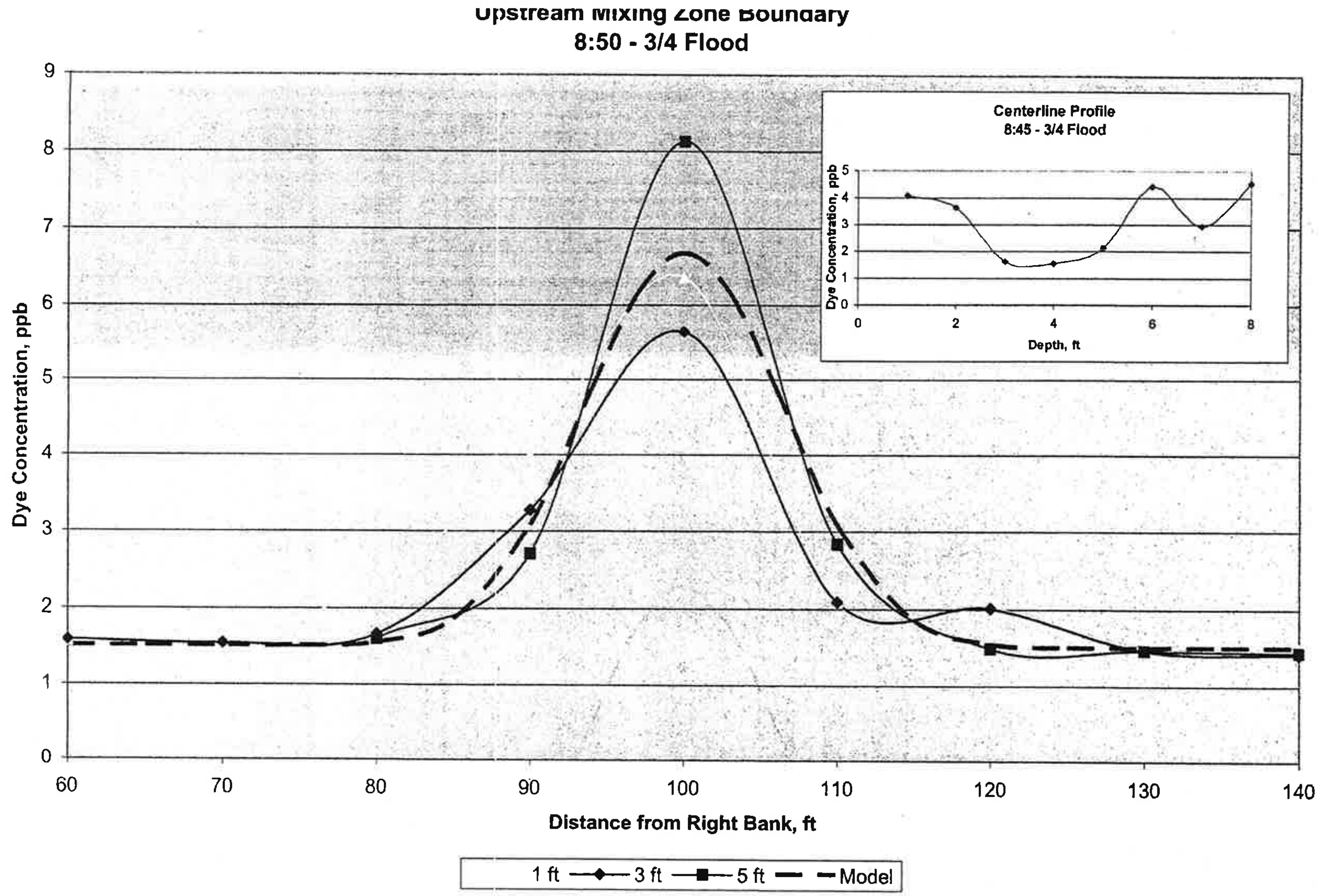

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Figure 8: Dye Transect and Profile – 3/4 Flood Tide

Results are shown in Figure 9. Four horizontal transects were obtained, but no profiles. The data acquisition period was reduced to 3 seconds to provide more detail. The plume width was approximately 50 feet, consistent with the lateral eddies observed. Peak observed concentration was approximately 6 ppb, and the reflux concentration outside the plume was 1.6 ppb.

4.4.3 1/4 Ebb Tide

The third set of transects and profiles were obtained shortly after the second tide reversal. The sampler was repositioned to the downstream mixing zone boundary, which had become the down-current boundary. The highest plume concentrations were observed during this period. This is consistent with mixing zone studies in similar estuaries. That is, the highest concentrations at any mixing zone boundary occur at the downstream boundary just after the second tide reversal (*i.e.,* after the third dose of the triple-dosing phenomenon).

Results are shown in Figure 10. The data include two horizontal transects, two profiles at the centerline, and a stationary time series at the plume centerline. The maximum observed concentration was over 13 ppb, but the time-averaged concentration at the plume centerline was approximately 7 ppb. The plume width was approximately 25 feet, and the reflux concentration outside the plume was 2.0 ppb. Note this peak reflux concentration is consistent with the upstream peak shown in Figure 7.

4.4.4 Mid Ebb Tide

The fourth set of transects and profiles were obtained around mid ebb tide. The downstream current was strongest at this stage.

Results are shown in Figure 11. Although an instantaneous peak concentration of almost 9 ppb was observed, the time and depth averaged concentration was between 4 and 5 ppb. Time-variability was observed in the data, but no significant depth stratification. The plume width was approximately 20 feet, and the reflux concentration had reduced to just less than 1 ppb.

4.4.5 3/4 Ebb Tide

The fifth set of transects and profiles were obtained at the ¾ phase of the ebb tide.

Results are shown in Figure 12. The instantaneous peak was over 7 ppb, but the time and depth average was approximately 4 ppb. No stratification of the dye was observed. The current had slowed from mid ebb, the plume width was approximately 25 feet, and the reflux concentration outside the plume had dropped to 0.7 ppb.

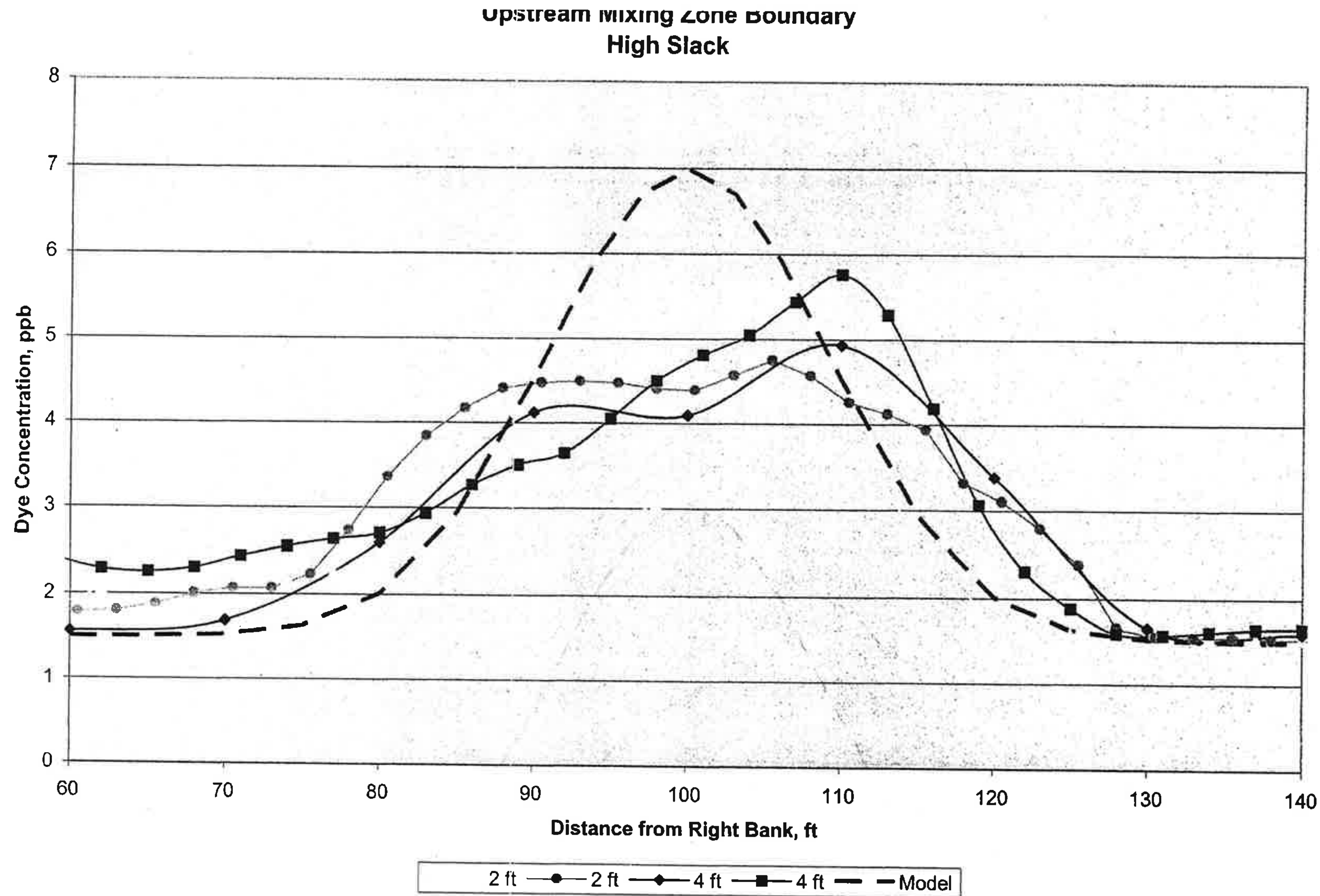

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Figure 9: Dye Transect – High Slack Tide

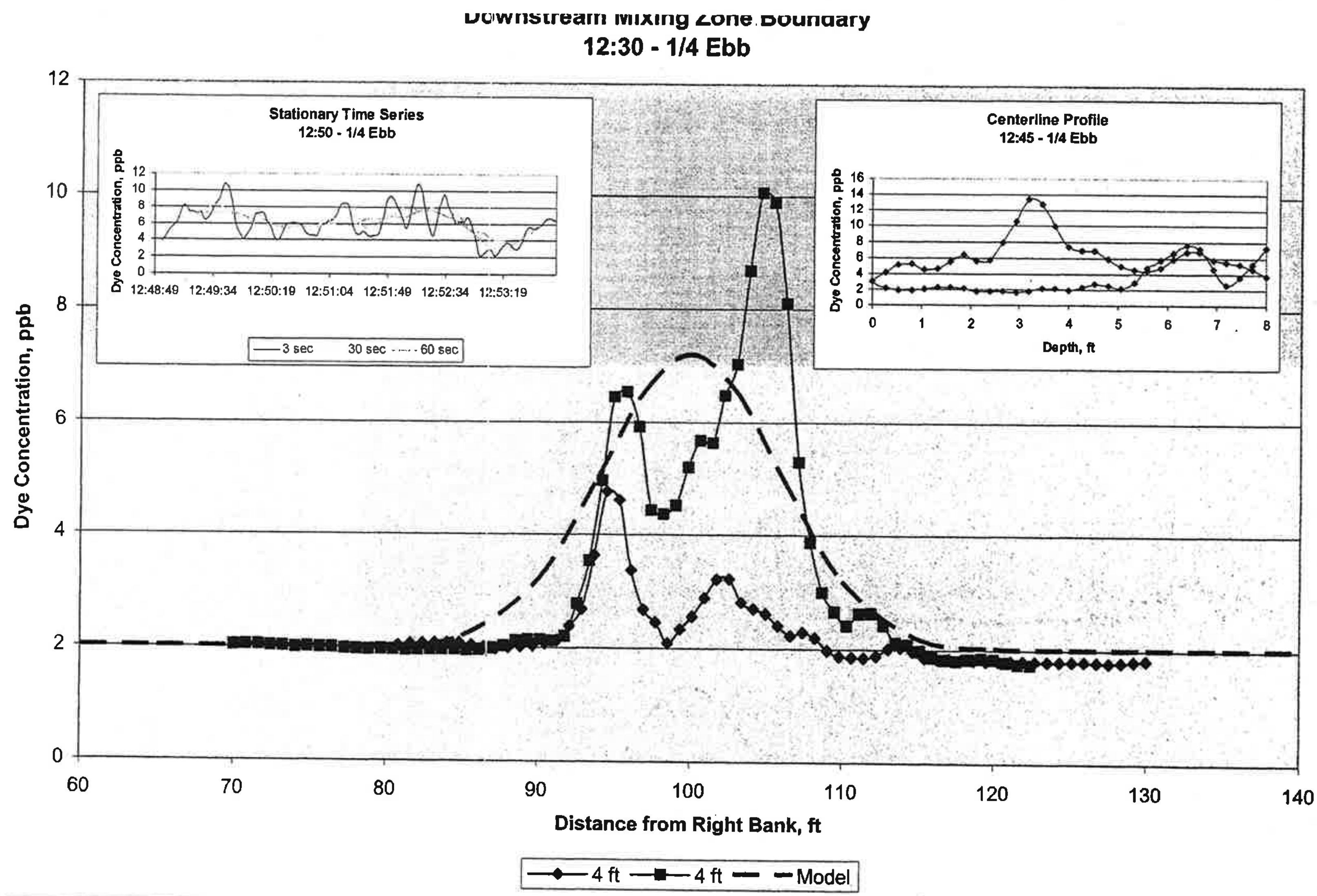

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Figure 10: Dye Transect, Profile, and Stationary Time Series – 1/4 Ebb Tide

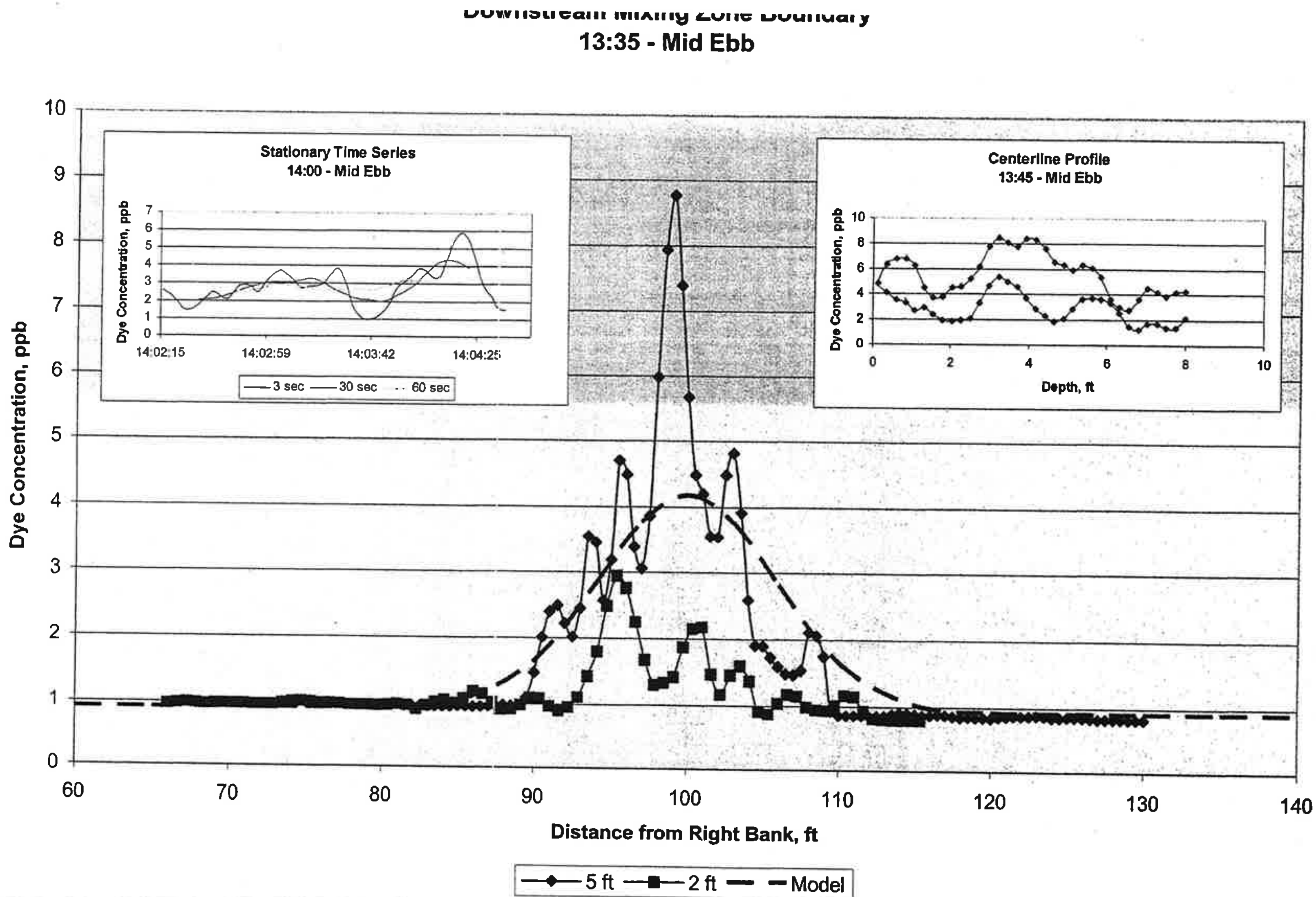

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Figure 11: Dye Transect, Profile, and Stationary Time Series – Mid Ebb Tide

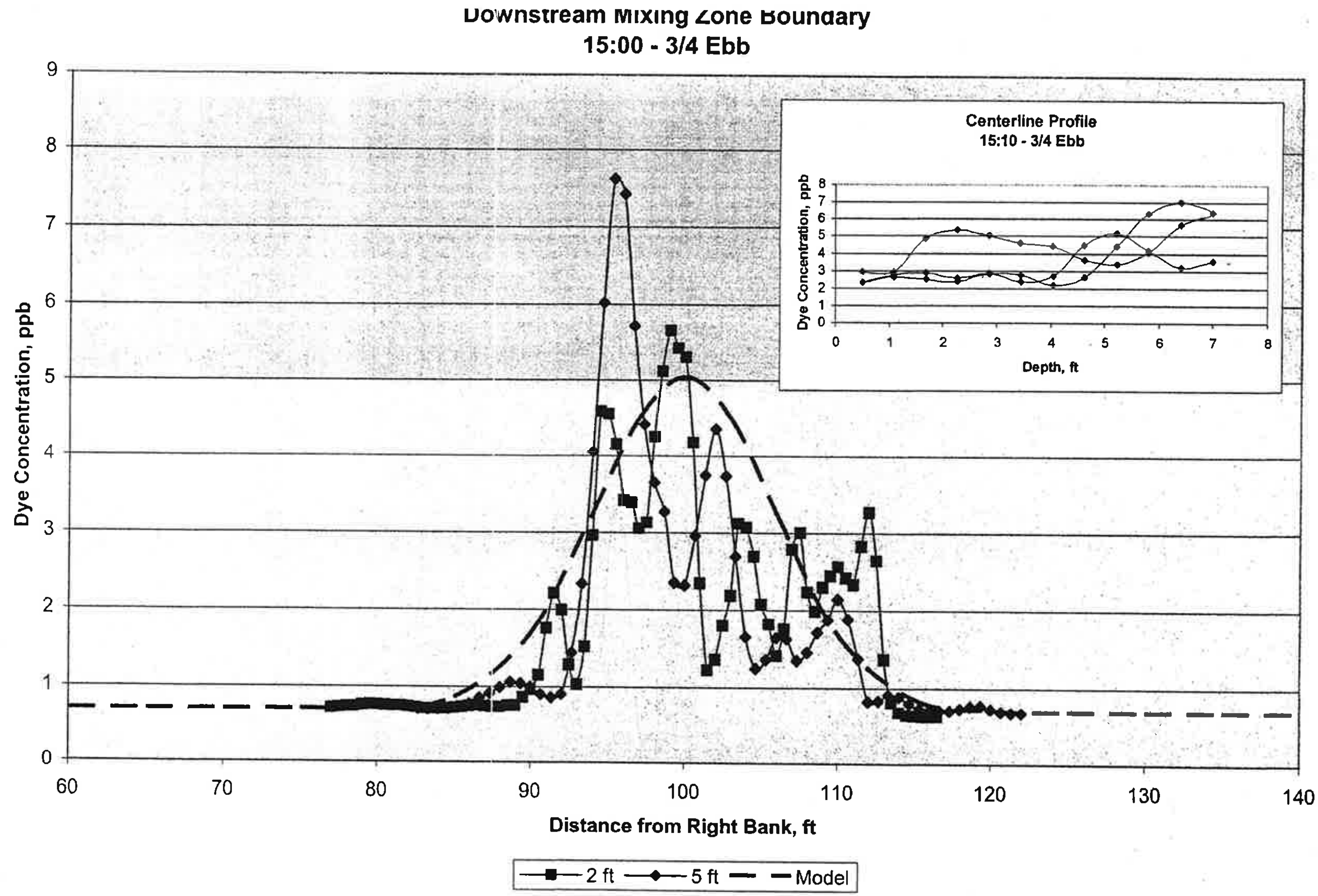

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Figure 12: Dye Transect and Profile – 3/4 Ebb Tide

4,4.6 Transverse Mixing

Also shown on Figures 8 through 12 are curves labeled "Model," which are solutions to the 2-dimensional advection-dispersion equation as presented in *Mixing in Inland and Coastal Waters* (Fischer, H.B. *et. al*, Academic Press, 1979). This equation, shown below, is the basis for Ecology's RIVPLUM5 model.

$$C = \dot{M} / du\sqrt{4\pi\varepsilon_t x / u} \quad \exp^{-\left\{\frac{y^2 u}{4\varepsilon_t x}\right\}}$$

Where:

C	=	tracer concentration
$\dot{M}$	=	mass discharge rate
d	=	local water depth
u	=	local water velocity
x	=	downstream distance to point of interest
y	=	lateral distance to point of interest
εt	=	transverse dispersion coefficient

Also,

$$W = 4\sqrt{2\varepsilon_t x / u}$$

Where:

W = plume width

Since the equation is two-dimensional, vertical mixing is implicit. We will reserve the demonstration of vertical uniformity to the Part II report if this method is selected for modeling of a submerged outfall in Lake River. For this Part I report, however, we will limit the utility of these equations to the determination of the transverse mixing coefficient (ε_t) and hence the plume width. All of the other parameters in the 2-D equation are known, so ε_t was estimated to match the observed plume widths in Figures 8 through 12. The values of the transverse mixing coefficients chosen to fit the data were listed with the current speeds in Table 5.

4.4.7 ISCO Station Transect

A single transverse transect was run across Lake River at the downstream ISCO station during mid ebb tide. This transect was run to (1) determine if the dye plume overlapped the downstream monitoring station, or if the station was outside the plume, and (2) test the 2-D equation at a distance of 2,000 feet from the source.

The results of the ISCO station transect are shown in Figure 13. The data plotted include the transect results at 14:20 (blue), the ISCO sample result from Station 1 at 14:30 (red), and the 2-D model results (yellow). The transect data near the ISCO sampler (1.46 ppb) revealed 12 percent higher concentration at the ISCO station than the corresponding bottle sample result (1.30 ppb).

The 2-D equation prediction was close to the transect data, but we had to use a much higher dispersion coefficient (0.25 ft^2/sec) than was used to calibrate at the mixing zone boundary (0.13 ft^2/sec). We also had to modify the lateral boundary of the model of the shoreline, because the 2-D cannot account for a sloping bottom. This affected the required distance to an image source used in the model. Therefore, we established the artificial lateral boundary (*i.e.,* shoreline) to 50 feet from the dye source (image = 100 feet), whereas the actual distance to shoreline at the water surface was 100 feet.

4.5 FIRST DYE RELEASE

On August 30, 2004, 16 lbs of Rhodamine dye were accidentally released approximately two hours prior to high slack tide. This slug release was used to assess the flushing time for Lake River.

4.5.1 Longitudinal Dye Distribution

The longitudinal distribution of dye concentration in Lake River is shown in Figure 14 for four time steps following the dye release. The top figure shows the data on a logarithmic scale, and the lower shows only the last three time series on an arithmetic time series. The data show the distribution of the dye cloud at the first two high and low tides following the release. Mass balance calculations based on these dye data are provided in Appendix B.

The tide was flooding at the time of the slug release, so the data reveal that almost the entirety of the cloud was found upstream of the outfall at the first high tide two hours later. The length of the plume was approximately 2,500 feet in length, and had an average concentration of approximately 50 ppb. As shown in the mass balance calculations, the entire 16 pounds of dye were accounted for within this cloud.

The concentration distribution was measured again with a second longitudinal transect at the subsequent low tide. The results reveal that the peak concentration in the dye cloud had reached the mouth of Lake River where it enters the Columbia River. The mass of dye in Lake River at low tide was calculated to be five pounds, approximately 35 percent of the dye that had been released. Approximately 65 percent of the dye had been advected by tidal currents to the Columbia River during the first ebb tide.

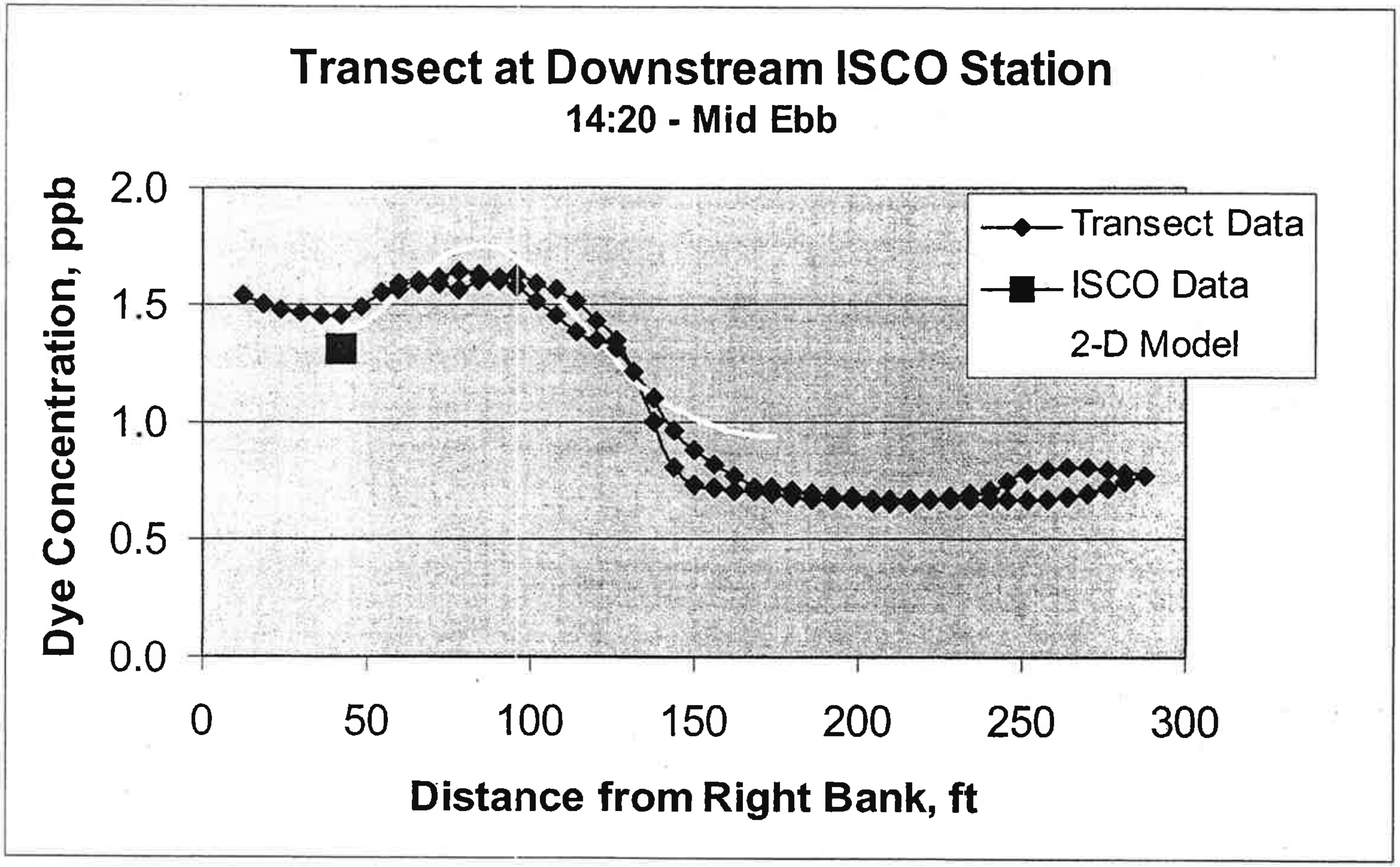

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Figure 13: Transect at Downstream ISCO Station

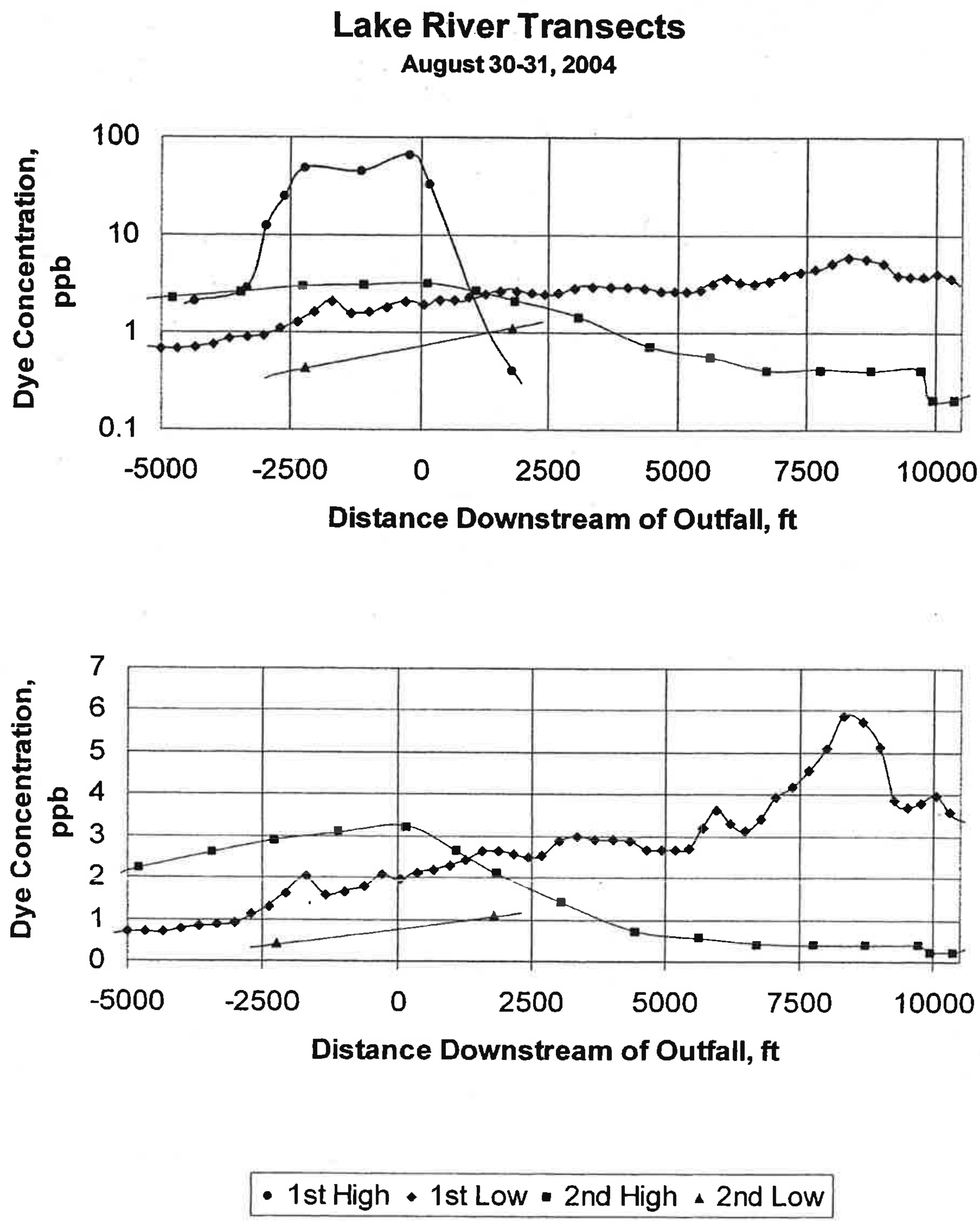

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Figure 14: Longitudinal Transects Following Release No. 1

The concentration distribution was measured again with a third longitudinal transect at the second high tide after the release. The results reveal that the peak concentration in the remaining dye cloud was upstream of the outfall. The mass of dye in Lake River at the second high tide was calculated to be approximately seven pounds, approximately 45 percent of the dye that had been released. Five of these pounds were accounted for from the low tide transect, and two more pounds were presumably refluxed into Lake River from the Columbia River during the flood tide. These mass balance calculations are imprecise and thus have a large margin for error. However, it is clear that approximately half of the discharged dye had been assimilated into the Columbia River flow and did not return to Lake River after one full tide cycle (*i.e.*, high tide to high tide).

The second low tide following release occurred during nighttime hours, so the only data shown on Figure 14 were from the ISCO sampling stations. No mass balance is possible with such little data, but the results do indicate that the higher concentrations had returned to downstream of the outfall.

4.5.2 ISCO Time Series

The time series of dye concentrations measured at the ISCO stations are shown in Figure 15. These data corroborate the other dye measurements that show rapid flushing of the dye cloud from Lake River. The estuary returned to near background concentrations within only two days following the release.

4.5.3 Flushing Time and Residual Circulation

Fischer's *Mixing in Inland and Coastal Waters* in Chapter 7 introduces the concepts of flushing time and residual circulation, also known as "tidal pumping." Flushing time is the time it takes to replace the volume of water. Residual circulation is the net flow produced by the tides in an estuary that may be superimposed on the background freshwater runoff. The equations for flushing time and residual circulation are defined below:

$$dM/dt + M(Q/V_o) = 0$$

Where:

Vo = mean volume of the estuary downstream of a tracer source
M = mass of a conservative tracer in an estuary
Q = the residual circulation
t = time

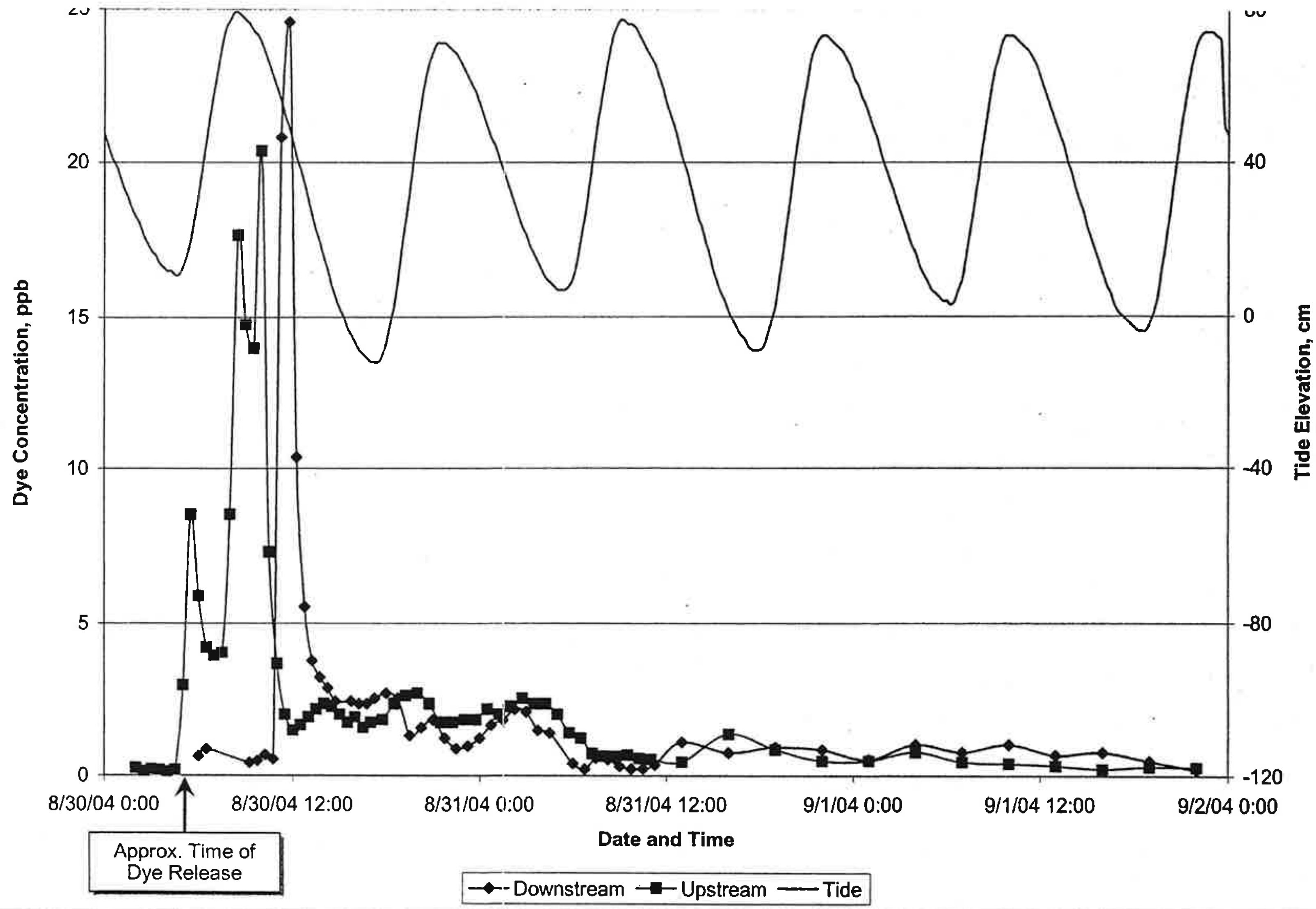

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Figure 15: Farfield Dye Concentration Time Series – Release 1

The solution of this differential equation demonstrates that the mass of tracer in an estuary (or concentration) would be inversely proportional to the residual circulation:

$$M(t) = M_o\, e^{-t/\tau}$$

Where:

τ = flushing time of the estuary = Vo/Q
t = time
M0 = initial mass of tracer discharged
M(t)= tracer mass in estuary as a function of time

The solutions to these equations are provided below and in Appendix B. The results are summarized in Table 8.

<u>1st High Tide:</u> M_o = *initial dye mass = 16 lbs*

<u>1st Low Tide:</u> M_t = *dye mass = (13,000 lf)(2,200 sf)(62.4 lb/cf)(2.7 ppb)*
= 5 lbs ±

<u>2nd High Tide:</u> M_t = *dye mass = (20,000 lf)(2,800 sf)(62.4 lb/cf)(2.0 ppb)*
= 7 lbs ±

for *t = 12.4 hrs (one tide cycle)*
M/M_o *= 7/16 = 44%*

<u>Flushing Time (τ):</u>

Approximately 50% mass remaining after one tide cycle (conservative).

$$\frac{dM}{dt} + M\frac{Q}{V_O} = 0$$

$$M = M_O e^{-t/\tau}$$

for $t = 12.4$ hrs;
$M/M_o = 0.5 = e{-}12.4/\tau$
$\ell n(0.5) = -12.4/\tau$
$\tau = 18$ hrs ±

<u>Residual Circulation:</u> $V_o = (10{,}000\ lf)(2600\ sf) = 26(10)^6\ cf$
$\tau = 18\ hrs = 64{,}800\ sec$
$Q = V_o/\tau = 26(10)^6/64{,}800$
$= 401\ cfs$

Table 8 Flushing Time and Residual Circulation

Flushing Time	18 hours
Residual Circulation	400 cfs

4.6 CUMULATIVE 7Q10 DISCHARGE

The residual circulation is a consistent net flow of fresh ambient water past the outfall that overshadows the 7Q10 total of the upstream creeks (Table 2). Therefore, 400 cfs is used in this mixing zone study for the critical ambient discharge rate stipulated in the mixing zone criteria [WAC 173-201A-100(7)(a) and -(8)(a)].

SECTION 5:
MIXING ZONE MODELING – INTERIM LAKE RIVER ALTERNATIVE

Because of the time required to permit and construct the new outfall to the Columbia River mainstem, effluent will continue to be discharged to Lake River. The existing side-bank discharge in Lake River will be extended on an interim basis until the Columbia River outfall is in operation. Therefore, this section presents mixing zone modeling for the interim Lake River outfall through the year 2010 effluent flows.

5.1 RIVERINE VS. TIDAL FLUX

One of the principal considerations in establishing critical conditions for the Ridgefield outfall is the relative importance of tidal flux vs. river discharge conditions. During low discharge conditions during warm dry summer weather, the tide is by far the principal hydrodynamic phenomenon affecting effluent mixing. As evidence we present the following simple mass balance comparisons:

A. Lake River has a mean cross-sectional area of approximately 2,500 square feet. Absent tidal flux, the upstream creek 7Q10 discharge of 23 cfs (Table 2), would result in a net velocity be 0.009 ft/sec, which would be immeasurable by any conventional means. The resulting excursion distance over one day (86,400 sec) would be only 800 feet.

B. Lake River has a main channel average tidal current speed on the order of 0.9 ft/sec. Thus the average tidal flux is approximately 2,300 cfs, which clearly masks the river net velocity and makes it impossible to directly measure the river discharge at this location. The tidal excursion distance (distance traveled each ebb or flood tide – 6.2 hour period) is on the order of 20,000 feet, or 4 miles. This tidal excursion distance was confirmed in the first dye release, as discussed in Section 4.5.

C. The residual circulation caused by the tide is approximately 400 cfs, as documented in Section 4.5.3. This is a net discharge created by tidal flows and the interaction with the Columbia River, and is superimposed on the 7Q10 discharge of the upstream creeks.

While tidal excursion produces no net transport and does cause reflux as quantified by the dye studies, it is very significant in the context of effluent mixing. The energy provided by the tide accelerates transverse and longitudinal mixing and assimilation of the waste field compared to mixing that would be provided by the river net velocity alone.

Perhaps the most significant aspect of the dominant tidal influence at Ridgefield is the interface between Lake River and the Columbia. The Ridgefield outfall is located less than two miles from the Columbia River, and about one-half mile from the Columbia Slough branch channel.

The first dye release and the excursion calculation above clearly revealed that much of the effluent was transported on ebb tide into the Columbia River, and most did not return on the following flood tide. This rapid assimilation into the much larger Columbia River flow is the dominant phenomenon influencing the mixing, assimilation and residence time of effluent discharged from the Ridgefield outfall.

In conclusion, we find that the freshwater discharge rate from tributaries to Lake River does not significantly influence nearfield dilution during critical conditions. This is consistent with the similar findings at other wastewater discharges to channelized estuaries (*e.g.*, Cowlitz, Raymond, Snohomish). Freshwater runoff to Lake River would probably become significant only at some undetermined threshold rate corresponding to flood events.

5.2 REFLUX

Reflux is proportional to the effluent flow rate. The cumulative peak dye concentration from the dye studies from Table 7 was 2.2 ppb. The reflux concentrations associated with the current and 2010 design effluent flows are shown in Table 9.

Table 9 Farfield Effluent Concentration (Reflux) as a Function of Effluent Flow Rate

Planning Year	Effluent Flow Rate (mgd)		Effluent Concentration (%)	
	Max Month	Max Day	Chronic	Acute
2006	0.5	0.9	0.33	0.59
2010	1.0	1.6	0.66	1.05

5.3 DILUTION MODEL SELECTION

The SAP for the mixing zone study specified the following models: UM3, CORMIX2 or DKHW. In addition to these three models, RIVPLUM5 was also considered during the course of this study. A discussion of each and the rationale for selection are discussed below.

5.3.1 CORMIX2

CORMIX2 was rejected for this application because it has a tendency to overestimate nearfield dilution. Due to the lack of significant stratification in Lake River, CORMIX2 immediately averaged the plume concentration over the width and depth of the diffuser alternatives, which results in significantly higher dilution predictions for the acute mixing zone boundary than any of the other mixing zone models.

5.3.2 RIVPLUM5

RIVPLUM5 was initially considered for chronic mixing zone boundary for the following reasons:

- RIVPLUM5 is applicable for neutrally-buoyant plumes, and the discharge to Lake River would nearly meet that criteria.

- RIVPLUM5 mixing equations are ambient-induced rather than discharge induced (*i.e.*, the initial buoyancy and jet momentum have little influence on mixing; mixing is based on ambient turbulence). Ignoring discharge-induced mixing is a conservative assumption.

- RIVPLUM5 assumes complete vertical mixing at the point of interest. An outfall nozzle or diffuser port with an upward trajectory would satisfy that criteria. The dye tracer study confirmed nearly complete vertical mixing at the chronic mixing zone boundary.

- RIVPLUM5 equations are based on dimensionless, mass-only discharge characteristics. The dye release using the 3/8-inch tubing matched that model assumption well (*i.e.* the initial momentum, buoyancy and volume of the dye discharge was negligible).

RIVPLUM5 was rejected for this application for the following reasons:

- RIVPLUM5 is not appropriate in the nearfield due to the assumptions regarding momentum and vertical mixing described above.

- The principal calibration factor for RIVPLUM5 is the transverse mixing coefficient. While coefficients could be selected to match the dye study data, there was no way to verify the validity or basis for the coefficients, or that they fell within literature values for this type of waterway. The presumed reason is that, while the receiving water looks like a river, it is actually a reversing estuary. Standard literature coefficients based on the shear velocity are not applicable because shear velocity is difficult to estimate in this environment. River approximations set shear velocity at 0.1 times the river velocity. However, shear velocity is more accurately calculated as $(g*d*S)^{1/2}$. The slope of the water surface is constantly varying and very subtle, requiring extensive gauging that was not conducted during the field studies.

- The equations in RIVPLUM5 are for discrete ports, and there is no merging mechanism in the current version. To use for the diffuser alternatives, the program would have to be modified using the principal of superposition to simulate a diffuser (which has been done for other outfall applications).

- Due to the limitations described above, Ecology expressed a lack of support for the use of RIVPLUM5 in this application.

Example model runs for the single-port Lake River alternative are provided in Appendix C-2.

5.3.3 UM3 and DKHW

UM3 and DKHW are both found within the Visual Plumes modeling interface. They are similar models capable of evaluating both open-ended and multi-port diffusers, and account for both momentum- and buoyancy-induced mixing. Both models were tested and run for the Lake River single-port and diffuser alternatives.

While both models were run for all of the outfall options, the selected dilution factors for each alternative are based on UM3 for the following reasons:

- UM3 has some ability to be calibrated to the observed dye results, as described in the next section.

- With few exceptions, the selected UM3 model was slightly conservative in comparison to the DKHW results.

- DKHW is not as well documented or supported in the literature as UM3.

- UM3 is generally preferred by Ecology over DKHW.

5.4 MODEL CALIBRATION

The model UM3 was calibrated to the dye study data by adjusting the dispersion coefficient in the Brooks far-field solution. The two measures used for calibration are plume width and tracer concentration. The UM3 model was run for the five tidal stages examined during the tracer study and compared to the observed dye concentration data. The model was run with Brooks far-field dispersion values of 0.001, 0.003 and 0.005 $cm^{2/3}/sec^2$. The model printouts are provided in Appendix C-1.

Model predictions versus the observed dye tracer data are presented in Table 10. A dispersion coefficient of 0.001$cm^{2/3}/sec^2$ clearly underestimates the plume width and overestimates the tracer concentration (*i.e.* underestimates dilution factor). A dispersion coefficient of 0.003 $cm^{2/3}/sec^2$ slightly underestimates the plume width, matches the observed peak tracer concentrations for the first three tidal conditions, and slightly overestimates the tracer concentration for the later ebb tide conditions. A dispersion coefficient of 0.005$cm^{2/3}/sec^2$ adequately replicates the plume width (with the exception of early ebb), but the peak plume tracer concentrations are consistently underestimated. Therefore, a dispersion coefficient of 0.003 $cm^{2/3}/sec^2$ was selected for modeling of the facility planning outfall alternatives to Lake River, and is considered appropriately slightly conservative in comparison to the dye study data.

Table 10 Plume Width and Dye Concentration as a Function of Farfield Dispersion Coefficient in Visual Plumes UM3 Model

	ε_0=0.001 $m^{2/3}/sec$	ε_0=0.003 $m^{2/3}/sec$	ε_0=0.005 $m^{2/3}/sec$	Field Study
PLUME WIDTH (ft)				
3/4 Flood	11.2	17.4	22.0	20
High Slack	14.4	23.5	30.0	30
1/4 Ebb	10.3	15.9	26.9	15
Mid Ebb	7.3	10.0	12.2	15
3/4 Ebb	9.0	13.4	16.7	20
DYE CONCENTRATION (ppb)				
3/4 Flood	15.4	8.4	4.8	8
High Slack	15.3	6.6	1.9	6
1/4 Ebb	15.2	9.2	3.7	9
Mid Ebb	14.3	10.8	8.6	8
3/4 Ebb	15.4	10.1	7.6	7

The selected dispersion coefficient of 0.003 $cm^{2/3}/sec^2$ compares favorably to dye study results in similar Western Washington estuaries. The City of Everett has two diffusers discharging into the sloughs of the Snohomish Estuary. Dye tracer studies very similar to the Ridgefield studies were conducted in 1995 on both outfalls (*Everett Water Pollution Control Facility Rerating and Effluent Mixing Zone Study*, Brown and Caldwell, 1996). The UM3 model was found to calibrate to dispersion coefficients of 0.003$cm^{2/3}/sec^2$ and 0.004$cm^{2/3}/sec^2$ for Everett's mechanical plant and lagoon outfalls, respectively. These values were used in the City's mixing zone study and are the basis for their NPDES permit. Similar results and conclusions were also observed for the City of Raymond discharge to the Willapa River estuary.

The UM3 model results with the selected dispersion coefficient are also compared to corresponding model results for RIVPLUM5 and DKHW in Table 11. These results are shown for comparison only. RIVPLUM5 and DKHW are not used in the final dilution calculations in this mixing zone study.

Table 11 Plume Width and Dye Concentration Comparison for RIVPLUM5, UM3, and DKHW

	UM3(2)	DKHW(2)	RIVPLUM5(1)	Field Study
PLUME WIDTH (ft)				
3/4 Flood	17	17	27	20
High Slack	24	23	33	30
1/4 Ebb	16	18	26	15
Mid Ebb	10	8	20	15
3/4 Ebb	13	12	23	20
DYE CONCENTRATION (ppb)				
3/4 Flood	9	7	6	8
High Slack	7	6	7	6
1/4 Ebb	9	6	7	9
Mid Ebb	11	9	4	8
3/4 Ebb	10	10	5	7

(1) RIVPLUM5 transverse dispersion coefficient (ε_L) of 0.100 ft^2/sec.
(2) DKHW and UM3 Brooks algorithm dispersion coefficient (ε_o) of 0.003 m$^{2/3}$/sec.

5.5 DILUTION MODEL RESULTS

The dilution model UM3 was run for the proposed interim 2010 Lake River outfall alternative. Critical ambient conditions included 10th and 90th percentile current speeds for acute, and median for chronic. Two of the measured ambient density profiles representing the range of conditions were run in the model. The buoyancy differences and density stratification were insignificant and did not affect the model predictions.

Model output files are provided in Appendix D. The results are summarized in Table 12, including the effect of reflux. These acute and chronic dilution factors will be used to assess compliance with water quality standards and potential effluent limitations for the 2010 Lake River interim outfall alternative.

The dilution factors are also limited by the percentage of ambient flow criteria in WAC 173-201A-100 (7)(a) and – (8)(a). Using the critical ambient discharge as described in Section 4.5.3, the dilution limitations for 2010 effluent flows are as shown below:

CHRONIC

Critical ambient discharge	400 cfs
25% critical ambient (A)	100 cfs
Effluent flow (B)	1.54 cfs
Maximum allowable dilution (DF)	65.9

DF = (A+B) / B

ACUTE

Critical ambient discharge	400 cfs
2.5% critical ambient (A)	10 cfs
Effluent flow (B)	2.47 cfs
Maximum allowable dilution (DF)	5.0

Table 12 Dilution Model Results for the Lake River Alternatives

Chronic Dilution - UM3 Model

Case #	Year	CTD Profile	Current Speed	Disch Config	DF Dilution	V Reflux	DF Eff Dil
1	2006	001	0.55	1-Port	75	0.0033	60
2	2010	001	0.55	1-Port	36	0.0066	29

Effective Dilution:
DF = DF/(1+V*(DF-1))

Acute Dilution - UM3 Model

Case #	Year	CTD Profile	Current Speed	Disch Config	DF Dilution	V Reflux	DF Eff Dil
1	2006	003	0.14	1-Port	5.7	0.0059	5.5
2	2010	003	0.14	1-Port	4.5	0.0105	4.3
9	2006	003	1.4	1-Port	17.0	0.0059	15.5
10	2010	003	1.4	1-Port	9.2	0.0105	8.4

Effective Dilution:
DF = DF/(1+V*(DF-1))

The critical dilution factors that shall be used in water quality calculations for the 2010 Lake River interim outfall alternative are 29 for chronic, and 4.3 for acute.

SECTION 6:
MIXING ZONE MODELING – COLUMBIA RIVER ALTERNATIVE

6.1 AMBIENT DATA AND MODEL SELECTION

No field studies were conducted to locate a site for a potential new outfall in the Columbia River mainstem. For this level of analysis, it is anticipated that there would be a number of potential outfall sites that would have similar ambient characteristics (*i.e.* depth, current speed, density stratification, reflux). This analysis utilizes dye tracer studies, ambient data and the dilution model selected for Clark County's *Outfall Dilution Study Report – Salmon Creek Wastewater Treatment Plant* (CH2M Hill, 2004). Outfall siting studies including site specific ambient measurements and an updated mixing zone study would be required as part of a future predesign evaluation.

6.2 DILUTION MODEL RESULTS

The Salmon Creek mixing zone study used by UM3 and DKHW, but settled on UM3 for the final dilution factors. UM3 will also be used in this study, using equivalent ambient conditions that are the basis for the Salmon Creek study.

The dilution model UM3 was run for each combination of future effluent flow rate, critical ambient conditions, and outfall improvement alternative. The UM3 model output is provided in Appendix E. The results of all dilution runs are provided in Table 13. The effective dilution factors for each outfall alternative and future effluent flow rate are in bold type.

Table 13 Dilution Model Results for the Columbia River Alternatives

Chronic Dilution - UM3 Model

Case #	Year	CTD Profile	Current Speed	Disch Config	DF Dilution	V Reflux	DF Eff Dil
2	2010	CH2M	0.24	1-Port	87	0	**87**
3	2019	CH2M	0.24	1-Port	39	0	**39**
4	2024	CH2M	0.24	1-Port	31	0	**31**
6	2010	CH2M	0.24	10-Port	78	0	**78**
7	2019	CH2M	0.24	10-Port	57	0	**57**
8	2024	CH2M	0.24	10-Port	51	0	**51**

Effective Dilution:
DF = DF/(1+V*(DF-1))

Acute Dilution - UM3 Model

Case #	Year	CTD Profile	Current Speed	Disch Config	DF Dilution	V Reflux	DF Eff Dil
2	2010	CH2M	0.17	1-Port	22.4	0	**22.4**
3	2019	CH2M	0.17	1-Port	14.8	0	**14.8**
4	2024	CH2M	0.17	1-Port	13.4	0	**13.4**
6	2010	CH2M	0.17	10-Port	38.8	0	**38.8**
7	2019	CH2M	0.17	10-Port	29.5	0	**29.5**
8	2024	CH2M	0.17	10-Port	27.3	0	**27.3**

SECTION 7:
PROJECTED EFFLUENT LIMITS

7.1 AMBIENT WATER QUALITY CRITERIA

Metals criteria are dependent on ambient hardness, and the ammonia criteria are dependent on pH and temperature. The criteria are based on critical 90th percentile values as recommended in Ecology's *Permit Writer's Manual* (Ecology Publication 92-109), which were presented in Table 6 and Appendix F-1. The criteria worksheets using critical ambient values for Lake River are presented in Appendix F-2. Criteria and ambient data for the Columbia River are taken from the Salmon Creek study.

7.2 REASONABLE POTENTIAL ANALYSIS

EPA developed, and Ecology adopted, a statistical determination of the "reasonable potential" to exceed water quality standards in the receiving water. This analysis was conducted for both the interim Lake River (up to 2010) outfall alternative and for the final Columbia River (after 2010) outfall alternatives. The determination is based on existing effluent data from 2004/5 consisting of bi-weekly ammonia data and only two effluent metals tests.

The reasonable potential spreadsheets are presented in Appendix F-3. Copper and zinc indicate a reasonable potential to exceed standards for the interim Lake River outfall. No parameters demonstrate a reasonable potential to exceed water quality standards for the Columbia River outfall alternatives.

7.3 PROJECTED EFFLUENT LIMITATIONS

Effluent discharge requirements will be established by Ecology to ensure that water quality standards are met outside of the authorized mixing zones for each outfall alternative. The future effluent limitations will be issued in NPDES permits as a function of the dilution factors and ambient water quality at the outfall location. Despite the reasonable potential analysis presented above, this report will present the effluent limits that would be applied if a reasonable potential is shown in the future. Although the current WWTP has very low effluent concentrations, copper and ammonia are considered the most likely of the toxic parameters to require effluent limits in the future.

Projected effluent ammonia and copper limitations for the interim Lake River and final Columbia River outfall alternatives are presented in Table 14. The permit limit spreadsheets for these and other key toxicants are provided in Appendix F-3. These potential future effluent limits should constitute design criteria for future WWTP improvements.

Table 14 Projected Average Monthly Effluent Limits for Ammonia and Copper

Outfall Alternative	Ammonia-N (mg/L)		Copper (µg/L)	
	Avg Monthly	Max Daily	Avg Monthly	Max Daily
Lake River 2010	2.0	4.6	25	37
Columbia River open ended 2024	14	33	58	85
Columbia River diffuser 2024	24	54	116	169

7.4 CONCLUSIONS

The City of Ridgefield has committed to extending the outfall to the Columbia River, and has begun the necessary steps to accomplish this. Anticipated completion of the extension is 2010. When the Columbia River outfall is in operation, there is no reasonable potential to exceed water quality standards, and no effluent limits for toxicants are anticipated to be necessary.

The city has committed to extending the existing outfall on an interim basis until the Columbia River outfall can be permitted and constructed. The Lake River outfall must be extended to a submerged location in order to meet design standards and water quality criteria. Ammonia removal will be required, and effluent limits for copper, zinc and other toxic metals may be included in the NPDES permit for the interim discharge.

COSMOPOLITAN ENGINEERING GROUP

Appendix A

Sampling and Analysis Plan and Ecology Response Email

Civil, Environmental, and Recreational Consulting

COSMOPOLITAN ENGINEERING GROUP

Appendix A-1

Sampling and Analysis Plan for the Ridgefield Mixing Zone Study

Civil, Environmental, and Recreational Consulting

RIDGEFIELD NPDES PERMIT SECTIONS S8 AND S9

SAMPLING AND ANALYSIS PLANS

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SECTION 1: INTRODUCTION

1.1 BACKGROUND

In December 2003, the Washington State Department of Ecology (Ecology) issued National Pollutant Discharge Elimination System (NPDES) permit #WA0023272 to the City of Ridgefield wastewater treatment plant (WWTP). The Ridgefield WWTP discharges secondary-treated effluent to Lake River, which is downstream of Salmon Creek and a tributary of the Columbia River.

Permit condition S8 requires the City of Ridgefield to conduct a mixing zone study to determine the degree of mixing and the acute and chronic mixing zone boundaries authorized in Section S1B of the NPDES permit. Due to the tidal influence on Lake River and occasional reversal of flow, Ecology has required Ridgefield to determine dilution factors using dye or other tracers that will quantify the reflux, or long-term accumulation, of effluent near the outfall. The permit requires Ridgefield to submit a Sampling and Analysis Plan (SAP) for the tracer study to Ecology by May 15, 2004.

Permit condition S9 requires the City to conduct certain effluent and ambient water quality testing, including conventional water quality parameters and metals. The permit requires Ridgefield to submit a Sampling and Analysis Plan (SAP) for the effluent and ambient monitoring to Ecology by February 15, 2005.

1.2 PURPOSE AND OBJECTIVES

The purpose of this document is to satisfy the SAP requirements of both S8 and S9 of the NPDES permit. The objectives for the study are to develop a database of effluent and ambient data and conduct modeling that will determine compliance with water quality criteria in Lake River for current discharge conditions. The data will also support future mixing zone and water quality modeling in support of facility planning that will determine wasteload capacity of Lake River and effluent treatment requirements for upcoming WWTP expansions.

1.3 GUIDANCE DOCUMENTS

This SAP outlines sampling, analysis, and quality assurance and quality control (QA/QC) measures for the receiving water study in accordance with the following guidance documents:

Guidelines for Preparing Quality Assurance Projects Plans for Environmental Studies (Ecology Publication 91-16, February 2001)

Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels, EPA Publication No. 821-R-95-034, April 1995.

Permit Writer's Manual (Ecology Publication 92-109, rev. July 1998). (Note: includes Appendix 6.1 *Guidance for Conducting Mixing Zone Analyses).*

Fluorometric Procedures for Dye Tracing, Wilson, J.F. et al, USGS, Department of the Interior, Reston, VA 1986.

Technical Support Document for Water Quality-based Toxic Control, EPA Publication No. EPA/505/2-90-001.

1.4 SUBMITTAL SCHEDULE

The NPDES permit specifies January 15, 2005 for submittal of the mixing zone study (S8) and November 15, 2006 for the receiving water and effluent study (S9). In a meeting between Ecology and Ridgefield April 9, 2004, it was agreed that these two studies are interrelated and it would be appropriate to combine them into a single report. Permit condition S12 also requires an inspection of the existing outfall, which is relevant to the mixing zone study. The revised submittal date for the combined report that will satisfy S8, S9 and S12 shall be November 15, 2006.

SECTION 2:
CONVENTIONAL WATER QUALITY PARAMETERS

2.1 PARAMETERS

The conventional water quality parameters covered in this section include total suspended solids, ammonia nitrogen, pH, alkalinity, hardness, dissolved oxygen, BOD_5, $CBOD_5$, salinity and temperature. Both effluent and ambient sampling is included. Alkalinity and $CBOD_5$ are not required in the effluent sampling.

2.2 PERSONNEL

City of Ridgefield staff shall be responsible for this sampling. The task manager is Fred Crippen of the City of Ridgefield (phone 360-887-3897). City personnel shall collect all effluent and ambient samples, calibrate all field equipment, transport all samples to certified analytical laboratories, and submit periodic data reports and DMRs. Cosmopolitan Engineering shall be responsible for the final reporting of this data including QA/QC assessment.

2.3 SCHEDULE

S9 requires the City to conduct effluent and ambient sampling twice per week over two summer seasons (May through October). The City has elected to begin this sampling in May 2004 and repeat it in summer 2005. Sampling may be continued through 2006 if required.

S9 requires sampling during critical conditions. In the receiving water, critical conditions occur at different times of the day for different parameters. Dissolved oxygen is at its minimum early in the morning due to diurnal cycling of algal photosynthesis and respiration. Temperature and pH are at critical conditions in early afternoon at the peak of algal photosynthesis. Therefore, the twice-weekly sampling will be split between the early morning and early afternoon times in order to assess the diurnal ranges of the water quality parameters. The target times for the samples are 7:30 AM and 2:30 PM.

Samples shall not be collected when the river is flowing upstream due to tidal reversal.

2.4 SAMPLING STATION

All collected samples shall be grab samples. Effluent samples shall be taken by the usual method and at the usual location at the WWTP. Ambient samples shall be collected approximately 1,100 feet upstream of the outfall from a dock extending into Lake River at the location shown below:

Latitude N45° 49' 13"
Longitude W122° 45' 18"

2.5 BOTTLE SAMPLES

Ambient samples shall be obtained by hand approximately 0.5 meters below the water surface. Pre-labeled sample bottles meeting laboratory and method specifications will remain capped until the samples are collected. The bottles shall be placed inverted into the river and then turned upright to fill the bottle. Samplers shall wear latex gloves and handle the bottles and lids to prevent cross-contamination. Samples shall immediately be capped and placed in cool storage or as otherwise specified by the analytical laboratory. All laboratory analysis shall be conducted by a laboratory certified by Ecology for those analytes.

2.6 FIELD PARAMETERS

Parameters measured in the field shall include temperature, current speed, salinity (or conductivity), dissolved oxygen and pH. The City shall maintain and calibrate the sensors for each of these parameters. Current speed, conductivity, dissolved oxygen and pH shall be single measurements at the critical times specified above. Ambient temperature shall be measured continuously (*i.e.,* approximately 30 minute intervals) using an Onset Computer Products TidbiT® in-situ data logger, which was recommended by Ecology.

Field parameters shall be measured approximately 0.5 meters below the water surface in Lake River.

2.7 DUPLICATE SAMPLES

Ten percent of field samples shall be collected in duplicate for quality assessment. Therefore, every fifth week duplicate samples shall be collected for all ambient samples only. The primary and duplicate samples shall be labeled appropriately and transported to the laboratory for analysis. Conductivity, dissolved oxygen and pH duplicate analysis shall be conducted in the field by immediately repeating sample collection and measurements.

2.8 FIELD NOTEBOOK

City staff shall maintain a notebook describing the sampling date and times, bottle numbers, field results and meteorological conditions for each event. Any deviations from this SAP shall be noted in the field notebook.

2.9 AMENDMENTS

During the course of this sampling program, it may become apparent that certain ambient or effluent water quality parameters are not critical or do not vary sufficiently to require the specified frequency of sampling. Ridgefield may petition Ecology to modify the list of analytes, frequencies/times of required samples, or other provisions of this section in writing. This SAP may only be amended by written approval of Ecology.

SECTION 3: METALS

3.1 SAMPLING SCHEDULE

The frequencies for metals sampling are stipulated in the NPDES permits. S2 requires influent, effluent and sludge sampling twice during the permit, once during winter and once during summer. S9 recommends a minimum of four ambient samples. Therefore, the following target schedule is established for effluent and ambient metals sampling:

- January 2005 – effluent and ambient samples
- July 2005 – ambient samples
- August 2005 – effluent and ambient samples
- September 2005 – ambient samples

Effluent samples will be coordinated with the required influent samples to include a delay approximating the detention time in the WWTP plant. Sludge samples will be taken independently by City staff. All effluent and ambient samples shall be tested for both total and dissolved metals.

Ambient samples should not be collected when the river flow is excessively high or when the water appears excessively turbid. No samples will be collected following a rainfall event greater than ½ inch in the preceding 24 hours. Precipitation data and weather forecasts will be checked prior to departing for the sampling event.

3.2 SAMPLING LOCATIONS

Effluent and ambient sampling stations for metals analysis shall be the same as for the conventional parameters.

3.3 LABORATORY

Columbia Analytical Services (CAS) in Kelso, Washington, is anticipated to be the laboratory contracted to conduct metals analysis. The laboratory will perform all the contracted analyses throughout the duration of the study and CAS is accredited by the state of Washington for these analyses. Because excessive handling can increase the chances of field contamination, all samples requiring filtration shall be filtered by CAS.

3.4 PREPARATION

Prior to arrival at Ridgefield, the field notebook shall be filled out with the appropriate fields for all parameters that require recording. All sample containers shall be labeled, all coolers and containers that are not laboratory supplied shall be cleaned and appropriately prepared.

CAS will provide clean HDPE sample bottles for each sampling event. These containers will be cleaned and prepared before delivery to Cosmopolitan Engineering Group according to the laboratory's protocol. All sampling containers will be prepared and bagged as appropriate for the analysis to be completed. Sampling containers shall be stored in a clean cooler to prevent contamination, and delivered to Cosmopolitan Engineering Group prior to sampling.

3.5 FIELD PROCEDURES

Metals sampling methods will follow EPA Method 1669. Grab samples will be collected by hand into the laboratory-supplied pre-cleaned high-density polyethylene (HDPE) containers. The river sampling will require a minimum of two technicians. The sampler will be responsible for all sample bottle handling. The sampler will wear clean non-talc latex gloves at all times and will avoid contacting any surface other than the sample bottles during the entire sampling event. The field technician shall also wear non-talc latex gloves during metals sampling. The field technician shall also aid in opening and closing the metals sample storage cooler. The field technician shall take notes in the field notebook as needed during sampling.

The sample bottles or outer baggies will be pre-labeled prior to sampling. The sampler will remove the appropriate sample bottle from the cleaned cooler at the sampling location. The sample bottle will be placed under water upstream of the sampler and away from any water disturbance caused by the samplers or sampling platform. The sampler will remove the lid, fill the bottle, and replace the lid while the bottle is under water. The sampler will immediately place the bottle in the cooler. All samples for laboratory analysis will be immediately placed on ice for transport to the laboratory. Ice shall be provided either by frozen ice substitutes or ice placed in the coolers, double bagged in zip-loc bags.

3.6 FIELD RECORDS

Field notations and other support activities shall be performed by the field technician. The field technician is also responsible for safety of the sampler and recording routine sampling information in the field. All sampling events will be documented in a bound field notebook, such as a Rite In the Rain® notebook. The date, sampling personnel, weather conditions, and deviations from normal sampling procedures will be noted. At a minimum, the field notebook will contain the following information:

- Sample location and depth (river depth and depth of sample)
- Date and time
- Sample container number or name for each parameter and sampling station

3.7 CHAIN OF CUSTODY AND ANALYSIS REQUEST

A chain of custody and analysis request form will be completed for each sampling event for samples to be sent to the analytical laboratory. The sampler will complete and sign the form indicating the requested laboratory analyses. The sampler will retain a copy and then enclose the chain of custody form in a sealed, waterproof bag. The chain of custody form will be placed inside the cooler with the samples for transport to the analytical laboratory. The form provides a record tracking the possession and handling of the sample from collection to analysis and provides a list of analyses requested to the laboratory. Custody seals shall be placed over the opening portion of the cooler. The cooler will be sealed with packing tape and delivered to an overnight courier for transport to the laboratory or transported directly to the laboratory.

3.8 METHOD QUALITY OBJECTIVES

3.8.1 Laboratory Reporting Limits, Precision, and Accuracy

Table 1 outlines the laboratory analytes, analysis method and reporting and detection limits including precision and accuracy. The analytical laboratory provided this information and it complies with the EPA methods utilized for each analyte.

Table 1 Laboratory Reporting and Detection Limits, Precision, and Accuracy

Analyte	Method	NPDES Permit Condition S8 Required Detection Limit	Laboratory's Method Reporting Limit	Laboratory's Method Detection Limit	Precision (RPD)	Accuracy (Percent)
Arsenic	200.8 (ICP/MS)	1.0 µg/L	0.5 µg/L	0.2 µg/L	20	85-115
Cadmium		0.1 µg/L	0.05 µg/L	0.05 µg/L	20	85-115
Chromium		1.0 µg/L	0.2 µg/L	0.05 µg/L	20	85-115
Copper		1.0 µg/L	0.1 µg/L	0.05 µg/L	20	85-115
Lead		1.0 µg/L	0.02 µg/L	0.006 µg/L	20	85-115
Nickel		1.0 µg/L	0.2 µg/L	0.03 µg/L	20	85-115
Silver		0.2 µg/L	0.02 µg/L	0.007 µg/L	20	85-115
Zinc		4.0 µg/L	0.5 µg/L	0.08 µg/L	20	85-115
Mercury	245.1 (CVAA)	0.2 µg/L	0.2 µg/L	0.1 µg/L	20	85-115

3.8.2 Duplicates and Precision

Duplicate samples will be obtained at the August 2005 event at the ambient station and analyzed for both total and dissolved metals. Precision is a measure of variation duplicate samples and is often described as "scatter". Scatter is commonly attributed to random error in procedures during sampling execution and laboratory testing executions. Precision is expressed as relative percent difference (RPD) between duplicate analyses or between a matrix-spiked sample and duplicate matrix spiked sample and is calculated according to the following equation:

$$RPD = (S1 - S2) \times 100 \div S_{ave}$$

Where: S1 and S2 = The observed concentrations of analyte in the sample and its duplicate, or in the matrix spike and its duplicate matrix spike, and

S_{ave} = The average of observed analyte concentrations in the sample and its duplicate, or in the matrix spike and its duplicate matrix spike

A value of RPD of 20 percent or less will be considered acceptable for this project.

The potential for sample collection, transport, or storage to affect precision is minimized by using proper collection methods, transporting the samples from the collection site to the testing laboratory in an iced cooler, and minimizing sample storage time. The sampling team has training and experience and will be involved in all sample collection events throughout the sampling program.

3.8.3 Bias

Bias, commonly referred to as "accuracy", is the measure of systematic error between reported test results and true sample concentrations. Because true sample concentrations are not known, bias is usually inferred from recovery data as measured by spiking the sample with a known amount of analyte and/or analyzing a certified standard reference material. The samples are prepared and analyzed in the same analytical batch. The spike recovery measures the effect of interferences caused by the sample matrix and reflects the accuracy of the method for that particular matrix. Bias, or accuracy, is often expressed as percent spike recovery and is calculated according to the following equation:

$$Recovery = (S - A)\ 100 \div T$$

Where: Recovery = recovery of the sample (percent)

S = Observed concentration of analyte in the spiked sample

A = Analyte concentration in the original sample, and

T = Theoretical concentration of analyte added to the spiked sample

When common contaminants, such as lead and zinc, are present in the method blank, the sample concentration must be at least 10 times the concentration of the blank to be considered valid. If uncommon contaminants are present in the method blank, then the concentration must be at least five times the concentration of the blank to be considered valid.

3.8.4 Representativeness

Four ambient sampling events are scheduled, including winter and summer seasons, to obtain representative data.

3.8.5 Completeness

Completeness is the measure of the valid data obtained from the analytical testing. Data completeness is assessed by ensuring that all method quality objectives are met and that the data are suitable for deriving conclusions that have statistical and scientific basis. Useable data will be maximized by careful planning of fieldwork and by following EPA Method 1669 sampling guidance. The laboratory will be asked to save the excess sample material until the data can be reviewed by the project lead.

Completeness of data is calculated by the following equation:

$$C = 100 \times (V/n)$$

Where: C = Completeness (percent)

V = Number of valid measurements

n = Total number of measurements necessary for a complete data set, 12 samples

3.8.6 Blank Analysis

Transfer blanks will be prepared for metals analysis at each sampling event by filling sample containers, in the field, with deionized water obtained from the analytical laboratory. Laboratory testing may not be performed on all of the blanks, however; the analytical laboratory will test at least two transfer blanks for metals analysis.

The transfer blank obtained during the first sampling event will be analyzed. If the first blank is within expected parameters, then the next blank analyzed will be the blank obtained during the third sampling event. If that blank is also within expected parameters, no further blanks will be analyzed unless the actual river samples indicate higher then expected levels. If that occurs, then the blank obtained with that particular set of samples will be analyzed.

If the first transfer blank is not within expected parameters, the field procedures and deionized water supply will be reviewed and adjustments will be made as necessary. If the laboratory results indicate a blank exceeds the expected parameter concentrations, then the laboratory will also test the next sampling event's transfer blank. All collected but unanalyzed field blanks shall be held be the laboratory until the analysis report is reviewed by the project lead.

In addition to field sampling quality control, the analytical laboratory will provide Tier II quality control for the laboratory analyses. Tier II quality control will consist of method blanks, matrix spikes, and laboratory duplicates.

3.9 DATA MANAGEMENT

3.9.1 Data management procedures

Upon completion of all sampling events, data will be summarized and statistical values, such as the mean, minimum, maximum, and 90th percentile values will be determined using EXCEL® spreadsheets. All laboratory reports, including quality control results and narrative information, and field data will be included in the final report as appendices.

3.9.2 Data Quality Assessment

The laboratory will prepare a standard laboratory report for each sampling event. The task manager will review the laboratory data for reasonableness and consistency and will confirm the data meets the measurement quality objectives. Blanks, spike recoveries, and check standards will be reviewed and compared to the acceptance limits. Sampling and analytical precision will be assessed by calculating RPDs for field replicates and laboratory duplicates. The check standards will indicate laboratory precision while the spike and laboratory control samples will measure bias.

3.10 PERSONNEL

All effluent and ambient metals sampling shall be conducted by Cosmopolitan Engineering Group. The task manager and lead sampler is Merita Trohimovich (phone 253-857-5621).

SECTION 4: TRACER STUDY

4.1 STUDY OBJECTIVE

Lake River is a complex hydrodynamic system where summer low runoff from Lake Vancouver, Salmon Creek and other tributaries combined with tidal influence from the ocean causes the flow to periodically and temporarily reverse direction. This creates a potential for "reflux," which is the recycling of effluent back to the outfall to be re-entrained into the mixing zone. A dye tracer study is required under permit condition S8 to determine the reflux concentration in the vicinity of the Ridgefield outfall.

This study is similar to tracer studies conducted in the Snohomish River, Willapa River, Gig Harbor, Shelton and Longview to assess tidal reflux.

4.2 METHOD

Rhodamine WT dye will be injected continuously into the Ridgefield WWTP effluent for one tidal day (24.8 hours). The tracer concentration will be directly measured for up to five days at three locations in the estuary:

- Approximately 2,000 feet upstream
- Approximately 5,000 feet downstream
- Approximately 12,000 feet downstream

The three sample stations will consist of ISCO autosamplers (furnished by Ecology) obtaining bottle samples at initial fixed intervals of 1 hour. More frequent samples will be manually obtained at the upstream station during the daytime period of tidal reversal.

Profiles and transects will also be obtained from a boat on the day of the injection to determine the spread of the dye cloud and extent of upstream transport. The fluorometer intake will be towed along the axis of the estuary and at three cross-sections. The intake will be raised and lowered in the water column to assess spatial uniformity. Dispersion coefficients will be determined from the observed dye distribution downstream of the outfall.

4.3 SCHEDULE

The tracer study will be conducted during the 2005 annual low discharge period for Lake River, which occurs in late summer. The dye injection will also occur during critical tidal conditions, which are large flood tides that produce the reversing currents. The target late-summer dates with acceptable tidal conditions are August 17-19 and September 15-17, 2005.

4.4 DYE INJECTION

Liquid Rhodamine WT dye (23.8 percent solution) will be injected at a constant rate of approximately 21 lbs/day. The peak concentrations measured at the monitoring stations are expected to be on the order of two decades above anticipated background fluorescence.

4.5 ANCILLARY MEASUREMENTS

Current velocity will be measured at hourly intervals during the dye injection daylight period. Conductivity, temperature and depth (CTD) profiles will be obtained at least eight times spread out over the tidal day. More frequent measurements will be obtained during the period of tidal influence.

4.6 DECAY

Photochemical decay will be assessed by placing dye standards of known concentration in light and dark bottles and suspending them at several fixed depths from the port dock for the duration of the field study, and measuring decay versus time. The effect of turbidity or suspended solids adsorption will be determined by filtering several ambient samples and measuring the differential impact on dye concentration. Sediment losses over the duration of the study will be determined indirectly from the mass balance.

4.7 MASS BALANCE

A mass balance will be conducted at the middle monitoring station. Advection of Rhodamine WT mass will be calculated from fluorometer concentrations and concurrent current measurements. Non-uniform dye distributions will be determined by dye concentrations as profiles and cross-sectional transects. The dye concentrations will be integrated over time and space at the middle monitoring station to quantify the dye loss, reflux, retention and losses (decay and adsorption).

4.8 EQUIPMENT SPECIFICATIONS

4.8.1 Dye Injection

Graduated cylinders and pipettes will be used to serial dilute the Rhodamine WT fluorescent dye in plastic pails to the desired concentration. The dye will be injected into Ridgefield WWTP effluent at a constant rate by an FMI metering pump and small diameter plastic tubing. Injection rate shall be set at approximately 21 lbs/day (23.8 percent liquid solution) for a period of 24.8 hours.

4.8.2 Boat

Field stations will be established and maintained from a 17-foot Boston Whaler. Longitudinal and cross-sectional transects will also be obtained from this boat.

4.8.3 Fluorometer

A Turner Designs Model 10-AU fluorometer set up in the flow-through mode will be used for all dye measurements. The quantification limit is expected to be approximately 0.02 to 0.04 ppb, which is less than anticipated background fluorescence. Sensitivity can be adjusted to track the dye plume over a wide range of concentrations. The fluorometer will be pre-calibrated to dye standards, and post-calibrated to the same standards at the conclusion of the study. Instrument drift will also be checked with dye standards run each day.

4.8.4 Navigation

Positions will be recorded with an E-Trex Legend differential GPS system manufactured by Garmin. Positions will be recorded approximately every two minutes during the dispersion transects and assigned to the fluorometer by time stamps.

4.8.5 Current Meter

The current meter shall be a Swoffer current meter. Surface drogues may be substituted for the current meter.

4.8.6 CTD Profiles

CTD profiles shall be obtained with a Seabird Seacat SBE19 profiler. Calibration shall be provided by the manufacturer.

4.9 PERSONNEL

The task manager and field manager shall be Bill Fox of Cosmopolitan Engineering Group (phone 253-265-2958). Field assistance shall be provided by the staff of Cosmopolitan Engineering, City of Ridgefield, Wallis Engineering and/or Ecology. Ecology personnel shall be notified several weeks prior to the study and invited to participate.

SECTION 5: MIXING ZONE STUDY

5.1 REFLUX

Ecology protocol allows two methods of calculating reflux from the tracer study data (*Permit Writer's Manual*, Appendix 6.1, Section 6.3). The selected method will be the method of superposition as developed by USGS (Alternative 1). The farfield station method representing the source of ambient water for the plume modeling shall also be used (Alternative 2).

Reflux shall be adjusted to critical effluent flows. A correction factor for effluent flow will be applied, equal to the ratio of historic maximum dry season flow to the flow rate observed during the tracer study. Five years of data from DMRs in July through September shall be used for this determination. Peak day flow statistics shall be used for acute mixing zone modeling, and maximum month for chronic.

Reflux shall also be adjusted to critical ambient flow. The correction factor shall be the ratio of the mean current velocity measured during the 2005 conventional parameter sampling to the mean (non-tidal) current speed measured during the tracer study. Since tidal reversal is expected to be a two- to three-hour phenomenon, this approach will be conservative relative to the chronic mixing ratio.

5.2 DILUTION MODELING

With the ambient information described above and utilizing Ecology approved mixing zone models (PLUMES, CORMIX or UDKHDEN), Cosmopolitan shall establish the dilution factors at Ridgefield's acute and chronic mixing zone boundaries, which are described in Section S1B of the NPDES permit. The required effluent flows are maximum monthly average and maximum day for the critical periods from the last five years of DMRs. The two seasonal periods that will be considered are dry season (June through September) and wet season (October through May).

The modeling shall be conducted for the existing open-ended outfall configuration and two diffuser alternatives, which is required under permit condition S8. The diffuser criteria (number, size and spacing of ports) for this modeling shall be established during the course of the study.

Determination of the acute and chronic dilution factors shall follow the protocol established in the *Permit Writer's Manual,* Chapter VI. These protocol include 10^{th} and 90^{th} percentile current speeds for acute modeling and 50^{th} percentile for chronic. Reflux is a dry weather seasonal phenomenon, thus will be factored into only the dry season dilution modeling.

SECTION 6: REPORT

All of the results of the tasks above shall be included in a single report submitted to Ecology by November 15, 2006, which shall satisfy NPDES permit conditions S8, S9 and S12. The report shall include the following:

- The data, trends and conclusions of the ambient monitoring for conventional parameters conducted by the City.
- Effluent monitoring for metals.
- Ambient monitoring for metals.
- Data quality assessment for all of the data.
- Results of the outfall evaluation.
- Results of the fluorescent tracer studies, CTD profiling and current measurements.
- Mixing zone modeling results.

COSMOPOLITAN ENGINEERING GROUP

Appendix A-2

Ecology Response Email

Civil, Environmental, and Recreational Consulting

Bill Fox

From: Knight, David J. (SWRO) [dakn461@ECY.WA.GOV]
Sent: Tuesday, June 01, 2004 3:04 PM
To: 'BFox@cosmogrp.com'
Cc: Schrieve, Garin; Schlorff, Eric
Subject: FW: Ridgefield SAP

Ridgefield Draft SAP.doc

Bill, thank you for your patience in developing this Sampling and Analysis Plan.

The plan for sampling appeared quite well considered, and I found no flaws related to the important data collection, analysis, or QA/QC aspects of the plan. Good job.

As I related somewhat emphatically during our meeting, please understand that we are not asking the Permittee to assess whether the effluent has a "reasonable potential" to violate water quality standards. The sampling and analysis plan addresses two things we are asking the Permittee to do. One task is the dye study, which we ask to be performed during as close to the critical time of year as possible, and that an effort be made to correlate this dye study to a mixing zone model (if possible - if not we will do this). We hope to obtain mixing zone ratios which represent the mixing at the edge of the acute (1-hour) and chronic mixing zones during the critical period. The City is well advised by Cosmopolitan Engineering that they have a need to predict whether their effluent poses a threat to violate water quality criteria, and what limits would be appropriate at various flow rates and performance levels. The City may well need to adjust their plans based on the best information available, and to the extent that Cosmopolitan Engineering's analysis of anticipated limits required to protect water quality serves this purpose, it fulfills a valuable function for the City. However, conducting a "reasonable potential" analysis to project whether Ecology will include limits in a future permit is outside of the scope of what Ecology is requesting, and is not an analysis that Ecology would "approve". Therefore, I recommend the "Reasonable Potential" analysis in the sampling and analysis plan's section 5.3 therefore be removed from the plan. It is not something which Ecology is either requesting or desiring the Permittee to accomplish for us.

As a separate requirement, we have also included monitoring on the effluent and receiving waters as relayed in the permit. Our intention in including permit conditions for evaluating mixing and pollutant parameters is to allow Ecology to model the mixing under the range of effluent and river flow scenarios envisions, and evaluate the potential posed by the effluent to violate water quality criteria at the critical conditions. While you clearly understand the inter-relationship between these tasks, I purposely did not ask they be woven together in submittals provided to Ecology. As I relayed in the meeting, we do not find it beneficial for the Permittee to use ambient and effluent data to determine the mixing zone ratios necessary to avoid having a "reasonable potential to exceed water quality criteria" and therefore no permit limits. This type of gaming is intrinsically detrimental to the unbiased assessment of mixing and collection of unbiased data on concentrations of pollutants in the receiving water.

To continue the discussion about the "reasonable potential" analysis, I would like to reinforce that Ecology preserves the ability to use the best information available when evaluating whether permit limits are needed, and what such limits should be. The use of the "reasonable potential" spreadsheet tool that Ecology has developed, and a "no" in the reasonable potential column has unfortunately been viewed by some permittees as a "free pass" to not have permit limits. I believe consulting engineers would best serve their clients by reflecting that Ecology is authorized to impose permit limits on any pollutant reasonably expected in the effluent. Ecology's reliance on a "reasonable potential" assessment is entirely discretionary, and in fact inappropriate for parameters for which operational decisions dictate performance. The "reasonable potential" spreadsheet evaluates whether permit limits are needed solely on the basis of the historical concentrations of a pollutant pose a reasonable potential to violate water quality criteria. The permit writer must evaluate whether historical performance is an indicator of future performance, and must weigh the value served by permit limits as appropriate safeguards, and as an incentive to continuing providing a high level of treatment. While the "reasonable potential" analysis presumes that past performance is an indicator of future performance, we have often found this is not true. As a higher proportion of the available capacity at the treatment works is utilized, performance will naturally drop. Because loadings to POTWs almost universally increase over time, one might speculate that there are very few cases in which it is appropriate to conclude that the historical performance of a POTW is an indicator of future performance. We strive to evaluate the need for permit limits on the basis of reasonable "worst case" scenarios and the best information available at the time of permit writing with respect to anticipated changes in loadings during the permit cycle, mixing zone ratios, ambient pollutant concentrations, reliability of the POTW, and the level of treatment provided.

Therefore, for various reasons our analysis of whether limits are necessary to ensure protection of the receiving waters during the critical period could be different than what Cosmopolitan Engineering might deliver. Also, Calculating a "reasonable potential" at some intermediate period could well provide a different answer than calculations done using data available at the time of permit issuance or reissuance. That is why Ecology calculates the reasonable potential at the time of permit issuance based on the best data available and we are not asking the City to do this for us. I would greatly appreciate if the advice provided by Cosmopolitan Engineering to POTWs would take the form of projecting the effluent concentrations that the POTW would have to meet under various scenarios, not of whether limits would likely be included in the permit in order to ensure that these required levels of performance are met.

Sincerely, Dave

David J. Knight P.E.
Environmental Engineer
Southwest Regional Office
Water Quality Program
PO Box 47775, Olympia WA 98504-7775
Phone (360) 407-6277

-----Original Message-----
From: Knight, David T. (ERO)
Sent: Wednesday, April 21, 2004 2:48 PM
To: Knight, David J. (SWRO)
Subject: FW: Ridgefield SAP

Hmmmmmm. Yours?

-----Original Message-----
From: Bill Fox [mailto:BFox@cosmogrp.com]
Sent: Wednesday, April 21, 2004 2:47 PM
To: Knight, David T. (ERO)
Cc: Ahmed, Anise; Dean Hergesheimer (E-mail)
Subject: Ridgefield SAP

David,

attached is the draft SAP for the Ridgefield studies. The SAP is intended to be comprehensive, covering the requirements of S8 and S9. It includes separate sections for the twice-weekly conventionals, metals, and dye studies. We would appreciate your quick review of the conventionals section because the city is planning to begin this sampling the first of May. The other sections are not time-critical, so at least your partial approval of only section 2 would be sufficient for the short-term.

You will note that the figures have not been completed. The sampling station for the conventional sampling is described pretty well in the text, and I thought it best to expedite this into your hands.

Please call with any questions.

Bill Fox
Cosmopolitan Engineering Group
117 S 8th Street
Tacoma, WA 98402
(253) 265-2958
(253) 265-6041 fax
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Appendix B

QA/QC Report

COSMOPOLITAN ENGINEERING GROUP

Civil, Environmental, and Recreational Consulting

Printed on Recycled Paper

APPENDIX B
QA/QC REPORT

This report documents the field and laboratory methods employed during the Ridgefield dye studies and the results of quality assurance/quality control (QA/QC) measurements.

GUIDANCE DOCUMENTS

Field methods for the tracer study followed guidance from the following sources:

- Section 6.3 of Appendix 6.1 of Ecology's *Permit Writer's Manual* (Ecology Publication 92-109)
- *Movement and Dispersion of Soluble Pollutants in the Northeast Cape Fear Estuary, North Carolina* (E.F. Hubbard and W.G. Stamper, USGS Water Supply Paper 1873-E, 1972)
- *Simulation of Soluble Waste Transport and Buildup in Surface Waters Using Tracers* (F.A. Kilpatrick, in Techniques of Water Resources Investigation of the U.S. Geological Survey, Book 3, Chapter A20)

LABORATORY AND FIELD NOTES

All work conducted in the laboratory and field was documented in field notebooks that are retained on file at Cosmopolitan Engineering Group. The Ridgefield dye studies are documented in three different books.

DYE SOURCE

The dye used in the Ridgefield tracer studies was Rhodamine WT liquid fluorescent dye manufactured by Keystone Industries of Compton, California. The dye was shipped in 2002 in 33-gallon sealed HDPE drums at 23.8 percent solution, with a specific gravity of 1.13. MSDS for this lot are available from Cosmopolitan Engineering Group.

PREPARATION OF DYE STANDARDS

Dye standards were prepared for this project on August 25, 2004 using serial dilution techniques presented in *Fluorometric Facts – Preparation of Standards for Dye Studies Using Rhodamine WT* by Turner Designs, document 998-5111 (11/28/95). Two liters each of 30 ppb and 0.6 ppb standard were prepared and used throughout the study. Standards were stored in a cooler, non-iced, at ambient temperatures at all times.

FLUOROMETER

The fluorometer used in the study was a Turner Designs Model 10-AU-005 field fluorometer. Limits of detectability are 0.01 ppb in deionized water. Features included internal data logging, continuous-flow cuvettes, full auto-ranging and temperature compensation. Field measurements were accomplished in the flow-through mode with a bilge pump and garden hose. Bench top measurements of bottle-collected samples were accomplished by injection of discrete samples into the flow-through cuvette with a syringe. Both the syringe and cuvette were twice-rinsed with sample before each measurement.

FLUOROMETER CALIBRATION

The fluorometer was calibrated to the dye standards and a DI blank in a laboratory on August 29, 2004 following the instructions in Section 3 of Turner Designs *Model 10-AU-005 Field Fluorometer User's Manual.* The ranges were set zero to 10.7 ppb for low-range, high-sensitivity and zero to 107 ppb for mid-range. Blank measurements were not deducted from readings.

POST-CALIBRATION CHECKS

Post-calibration was checked with the 30 ppb and 0.6 ppb standards routinely throughout the dye study. Checks were performed by inserting the standard into the flow-through cell as described above for bench top measurements, including the rinses. For a reason we have been unable to confirm (we suspect the temperature compensation may not have been on during initial calibration), the calibration slipped almost immediately, so that all subsequent readings of the standards were greater than the initial calibration.

The post-calibration check data were relatively consistent, as shown in Table B-1:

Table B-1. Fluorometer Calibration Check Data

Date	Location	30 ppb standard	0.6 ppb standard
30-Aug-04	Field	35.5	0.79
1-Sep-04	Laboratory	34.3	0.79
3-Sep-04	Field	35.3	0.79
5-Sep-04	Laboratory	35.3	0.81
13-Sep-04	Laboratory	38.0	0.80

RAW DATA CORRECTION

The raw concentration data were temperature corrected internally by the fluorometer (see Turner manual for further discussion). The daily data were adjusted to be consistent with the calibration checks by linear functions (*i.e.,* $y = ax + b$) with intersects at both checkpoints shown in the table above.

FLUOROMETER DATA ARCHIVE

Fluorometer data are archived on a project CD available from Cosmopolitan Engineering Group, including the raw and corrected data. Data are also reduced into excel spreadsheets that include graphs, many of which are provided in the January 2005 mixing zone study report.

DYE INJECTION SETUP

Dye injection was accomplished with a FMI model RHSY1CKC sample pump. The pump ran on 120 VAC power delivered from a 12 VDC car battery routed through an 800W inverter. The dye pump was secured on the lid of the 33-gallon dye barrel. The pump intake consisted of ¼-inch PVC tubing with a weight on the end inserted through a cutout on the barrel lid and resting on the bottom. The exhaust side of the injection pump consisted of 145 feet of ⅜-inch polyethylene tubing. The tubing was weighted every 20 feet with dive weights and extended 100 feet into Lake River to the point shown in Figure 3 of the mixing zone study report. The outlet was suspended approximately 18 inches above the bottom at the outlet with a subsurface float.

DYE INJECTION RATES

As discussed in the mixing zone study report, two dye releases were conducted. In the first, the dye barrel was upended and a slug dose was discharged shortly before dawn on August 30, 2004. As a result, a second dye injection was conducted later that week after ambient concentrations had returned to background. The second dye injection was at a continuous rate over a 24.8 hour period, which is equal to one tidal day (*i.e.* two ebb and two flood tide cycles). The dye pump was set and checked prior to the study to a rate of 35 mL/min. Actual dye delivery rate was confirmed by measuring down from the barrel rim at the beginning and end of the injection.

Dye release data are shown in Table B-2.

Table B-2 Dye Release Data

Release No.	Date / Time	Total Discharged			Discharge Rate	
		Volume (gal)	Conc (%)	Weight (lbs)	Pump Rate (mL/min)	Mass Rate (g/sec)
1	30 Aug / 5:30	16	12	16	NA	NA
2	2 Sep / 15:15 to 3 Sep / 16:00	13	2.6	2.9	34	0.015

SAMPLE POSITIONING AND NAVIGATION

All navigation data was determined with a Garmin eTrex Legend dGPS, including the existing outfall, dye injection point, ISCO station sites, and all in-water sample sites.

The continuous fluorometric measurements were obtained from a boat. The sample depths were determined by 1-ft marks on the sample inlet hose and logged into the field book. Sample depth was matched to logged fluorometer data by time stamp. The horizontal position of the sampler was determined by GPS and indexed to fluorometer data by time stamp. A twelve-second lag was measured between the sample pump and the fluorometer, and the time stamp was adjusted accordingly.

The ISCO stations included fixed inlet hoses to the sampler. The downstream station (No. 1) was fixed to pilings, so the inlet was set at a fixed elevation of approximately 2 feet above the bottom. Water depths at that site varied between approximately 4 and 6 feet depending on tide stage. The upstream ISCO station (No. 2) was fixed on a dock that rose and dropped with the tide. The mean water depth at that site was about 6 feet, and the sampler was suspended at a constant depth of 3 feet below the water surface.

For the mixing zone boundary data, anchors were set 200 feet down-current of the dye injection site on both sides of the river. The sampler was towed across the mixing zone boundary by towing the sample vessel back and forth along a line marked at 10-ft intervals. Each 10-ft interval was then time stamped to the corresponding fluorometer data that was internally logged.

For the longitudinal transects, the intake was held at a constant depth while the vessel trolled at slow speed from one end of the estuary to the other. Positions were recorded by dGPS every five minutes and indexed to fluorometer data by time stamp.

SAMPLE HANDLING, TRANSPORTATION AND STORAGE

Bottle samples taken either directly or from the ISCO stations were handled within strict guidelines. ISCO samples were transferred from carousel bottles to 250 mL bottles on a batch basis near the end of each cycle. Bottle numbers were recorded for later determination of sample time based on the ISCO program settings, which were recorded in the field books. All sample bottles were immediately transferred to storage boxes and stored in the dark. Sample boxes were transported by car and stored in a laboratory until measured by the fluorometer. The samples were allowed to acclimate to the room temperature before concentrations were read.

DYE LOSS

Dye loss during extended tracer studies results from (1) photochemical decay and (2) adherence, adsorption or other interferences associated with suspended matter in the water column. Both loss mechanisms were quantified in this study.

Photochemical decay was determined by holding standards in the water column throughout the study in light and dark bottles. Light and dark bottles were filled with 30 ppb standards and suspended two feet below the water surface at the Station 2 dock for the duration of the field studies. The results of the light and dark bottle tests are shown in Table B-3. The measured photochemical decay was equal to 2.3 percent per day (*i.e.* kinetic rate constant $k = 0.023\ day^{-1}$).

Dye loss due to adsorption and settling of suspended matter in the water column was tested by decanting several of the ambient samples that had higher concentrations and visible sediment at the bottom. Dye concentration was measured first from a well-mixed aliquot of the sample, and then again after approximately two hours of decanting. The decant samples were withdrawn carefully and slowly from near the water surface to avoid resuspension. The results are shown in Table B-3, and indicate that this potential interference is not significant.

F.A. Kilpatrick's *Simulation of Soluble Waste Transport and Buildup in Surface Waters Using Tracers* cited several studies that have measured Rhodamine WT dye loss in tracer studies that have ranged from 2 to 4 percent per day, which is consistent with our photochemical decay measurements. Kilpatrick recommends a dye loss or decay rate of 3.4 percent per day. Since dye was mostly flushed from Lake River after two days, photochemical decay was not believed to be significant in this study.

Table B-3 Dye Loss Data

PHOTOCHEMICAL DECAY					
Bottle	Date	Conc (ppb)	Decay (%)	Duration	Decay Rate "K" (day^{-1})
Light/Dark	Aug 25	30			
Light/Dark	Aug 29	29.7	1.0	4	0.002
Light	Sep 7	24.2	18.5	9	0.023
Dark	Sep 7	29.0	2.4	9	0.003

ALGAE/TSS ADSORPTION		
Sample No.	Decant Conc (ppb)	Mixed Conc (ppb)
H41	24.2	24.3
H45	18.9	19.0
H4	8.2	8.2

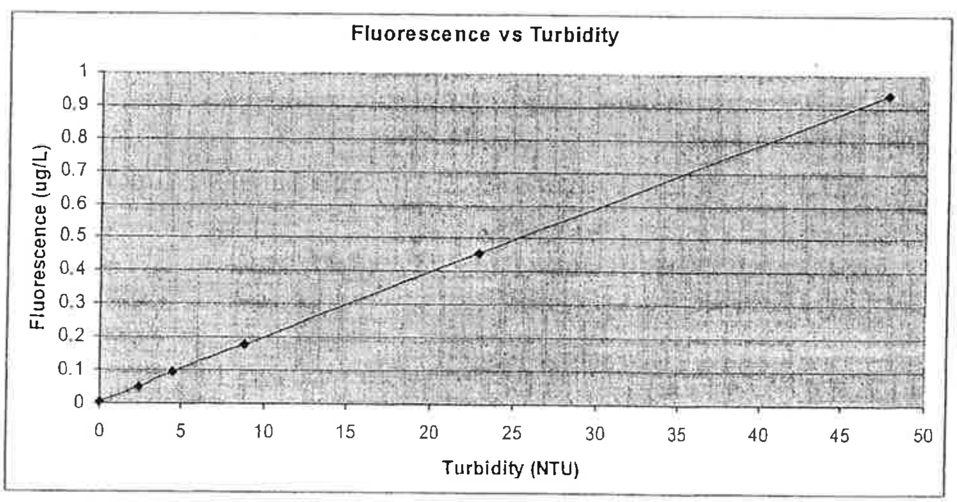
RELEVANT KING COUNTY QA/QC DATA

King County conducted extensive laboratory QA/QC tests on Rhodamine WT as part of dye studies performed for the Brightwater outfall, including effects of turbidity on fluorometer readings. These QA/QC results are relevant to this study. Excerpts from that study are presented below (*Appendix 2 – Dye Studies, Brightwater Oceanographic Studies Report*, Cosmopolitan Engineering, 2002):

<u>TURBIDITY STANDARDS</u>

The King County lab prepared a series of turbidity standards in the absence of Rhodamine dye and measured fluorescence with a Turner Model 10-AU fluorometer. The results are shown in Figure 2-3. There was a clear linear relationship between turbidity and fluorescence in the range of 2 to 50 NTU.

The turbidity standards were then spiked with 0.092 ppb Rhodamine WT dye and analyzed without filtration. A linear regression analysis was used to correlate the expected fluorescence associated with turbidity and subtract that out leaving the response associated with the detection of dye. There was good (>90%) recovery of dye for turbidity concentrations less than 8.76 NTU. Recovery was poor at turbidity concentrations greater than 8.76 NTU.



LIVE CONTROL SAMPLES

King County prepared Rhodamine WT standards at concentrations of 92 ppb, 0.92 ppb and 0.092 ppb. The 0.92 standard was used for the live control sample (LCS) for the entire duration of the study. The LCS was measured several times each day that fluorescent measurements were made in the laboratory. The LCS was sealed with Para film and stored in a dark and dry environment at all other times. Over the four-month duration of the study, there was no degradation of the LCS.

FILTERED VS. UNFILTERED SAMPLES

The dye standards were filtered through 0.45 micron filters to assess whether filtration captured any of the tracer. After several replicates of this test, a statistically significant effect on the 92 ppb standard was concluded. There was a statistically significant difference at the 0.92 ppb level, but the difference was less than the RDL of 0.04 ppb and thus considered negligible. There was no statistically significant difference on the 0.092 ppb standard.

BACKGROUND TURBIDITY AND FLUORESCENCE CONCENTRATION

Background samples were collected from Lake River on September 29 prior to dye release. The measured background concentrations were 0.30 and 0.34 ppb. This is consistent with the lowest concentrations measured several days following the dye releases. Background concentration in the Columbia River was approximately 0.2 ppb, indicating lower turbidity there.

The King County study revealed a strong linear correlation between turbidity and fluorescence in the range of 0 to 50 NTU, as shown on the table above. Turbidity was not measured during the Ridgefield dye study, but was measured by Ecology in Lake River near Ridgefield in Water Year 1992 (Ecology Station 28F070). Turbidity ranged from 6 to 18 NTU, with a mean of 12. This range would correspond to a fluorescence background concentration of 0.2 to 0.4 ppb, which is consistent with the background concentration measured during this field study.

CALCULATION OF FLUSHING TIME

1st High Tide

$$M_o = \textit{initial dye mass} = 16\ lbs$$

1st Low Tide

$$\begin{aligned} M_t = \textit{dye mass} &= (13{,}000\ lf)(2{,}200\ sf)(62.4\ lb/cf)(2.7\ ppb) \\ &= 5\ lbs \pm \end{aligned}$$

2nd High Tide

$$\begin{aligned} M_t = \textit{dye mass} &= (20{,}000\ lf)(2{,}800\ sf)(62.4\ lb/cf)(2.0\ ppb) \\ &= 7\ lbs \pm \end{aligned}$$

for $t = 12.4$ *hrs (one tide cycle)*

$$M/M_o = 7/16 = 44\%$$

Flushing Time (τ)

Approximately 50% mass remaining after one tide cycle (conservative).

$$\frac{dM}{dt} + M\frac{Q}{V_o} = 0$$

$$M = M_o e^{-t/\tau}$$

for

$$\begin{aligned} t &= 12.4\ hrs; \\ M/M_o &= 0.5 = e\text{-}12.4/\tau \\ \ell n(0.5) &= -12.4/\tau \\ \tau &= 18\ hrs \pm \end{aligned}$$

Appendix C

Model Calibration Results

Civil, Environmental,

and Recreational

Consulting

COSMOPOLITAN ENGINEERING GROUP

Appendix C-1

UM3 Model Calibration Runs for Dispersion Coefficient Values (ε) of 0.001, 0.003, and 0.005 cm$^{2/3}$/sec

Civil, Environmental, and Recreational Consulting

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3/4 Flood Tia-
$\mathcal{E} = 0.001 \ cm^{2/3}/sec^2$

/ UM3. 1/19/2005 4:24:55 PM
Case 1; ambient file C:\Plumes\Ridgefield.001.db; Diffuser table record 1: -----------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.274	0.0	0.065	21.19	1.5000E-9	0.0	0.274	0.0	0.001	-1.937
0.61	0.274	0.0	0.065	21.19	1.5000E-9	0.0	0.274	0.0	0.001	-1.937
1.219	0.274	0.0	0.065	21.18	1.5000E-9	0.0	0.274	0.0	0.001	-1.934
1.829	0.274	0.0	0.065	21.17	1.5000E-9	0.0	0.274	0.0	0.001	-1.932
2.438	0.274	0.0	0.065	21.16	1.5000E-9	0.0	0.274	0.0	0.001	-1.93

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(m)	(m)	(deg)	(deg)	()	(m)	(m)	(m)	(MGD)	(psu)	(C)	(ppb)
0.254	0.3048	0.0	0.0	1.0	6.3094	63.094	1.8288	0.5	0.05	24.0	670.0

Simulation:
Froude number: 10.56; effleunt density (sigma-T) -2.603; effleunt velocity 0.432(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	CL-diln	x-posn	y-posn	
	(m)	(m/s)	(m)	(ppb)	()	()	(m)	(m)	
0	1.829	0.274	0.254	670.0	1.0	1.0	0.0	0.0;	
100	1.587	0.274	0.825	93.78	7.24	2.03	5.951	0.0;	
104	1.563	0.274	0.86	86.75	7.837	2.189	6.388	0.0;	acute zone;
176	0.885	0.274	1.804	21.99	32.61	9.004	19.94	0.0;	surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 1.80 m

conc	dilutn	width	distnce	time				
(ppb)		(m)	(m)	(hrs)	(ppb)	(s-1)	(m/s)	(m0.67/s2)
15.3994	45.16	3.398	63.09	0.0437	1.5	0.0	0.274	0.001

count: 1

11.2'

High Slack
$\varepsilon = 0.001$

/ UM3.
Case 2; ambient file C:\Plumes\Ridgefield.002.db; Diffuser table record 1: ---------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.183	0.0	0.066	21.32	1.6000E-9	0.0	0.183	0.0	0.001	-1.964
0.61	0.183	0.0	0.066	21.3	1.6000E-9	0.0	0.183	0.0	0.001	-1.96
1.219	0.183	0.0	0.066	21.26	1.6000E-9	0.0	0.183	0.0	0.001	-1.951
1.829	0.183	0.0	0.066	21.25	1.6000E-9	0.0	0.183	0.0	0.001	-1.949
2.438	0.183	0.0	0.066	21.24	1.6000E-9	0.0	0.183	0.0	0.001	-1.947

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(m)	(m)	(deg)	(deg)	()	(m)	(m)	(m)	(MGD)	(psu)	(C)	(ppb)
0.254	0.3048	0.0	0.0	1.0	6.3094	63.094	1.8288	0.5	0.05	24.0	670.0

Simulation:
Froude number: 10.7; effleunt density (sigma-T) -2.603; effleunt velocity 0.432(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	CL-diln	x-posn	y-posn	
	(m)	(ft/s)	(m)	(ppb)	()	()	(m)	(m)	
0	1.829	0.6	0.254	670.0	1.0	1.0	0.0	0.0;	
100	1.611	0.6	0.961	93.86	7.241	2.197	4.668	0.0;	
117	1.485	0.6	1.164	67.49	10.14	2.986	6.354	0.0;	acute zone;
165	0.946	0.6	1.946	27.07	26.23	7.438	13.45	0.0;	surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 1.95 m

conc	dilutn	width	distnce	time				
(ppb)		(m)	(m)	(hrs)	(ppb)	(s-1)	(ft/s)	(m0.67/s2)
15.3417	43.49	4.43	63.09	0.0754	1.6	0.0	0.6	0.001

count: 1

14.4'

1/4 Ebb
$\mathcal{E} = 0.001$

/ UM3.
Case 3; ambient file C:\Plumes\Ridgefield.003.db; Diffuser table record 1: -----------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.305	0.0	0.066	21.43	1.0000E-9	0.0	0.305	0.0	0.001	-1.989
0.61	0.305	0.0	0.066	21.35	1.0000E-9	0.0	0.305	0.0	0.001	-1.971
1.219	0.305	0.0	0.066	21.29	1.0000E-9	0.0	0.305	0.0	0.001	-1.958
1.829	0.305	0.0	0.066	21.28	1.0000E-9	0.0	0.305	0.0	0.001	-1.956
2.438	0.305	0.0	0.066	21.28	1.0000E-9	0.0	0.305	0.0	0.001	-1.956

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(m)	(m)	(deg)	(deg)	()	(m)	(m)	(m)	(MGD)	(psu)	(C)	(ppb)
0.254	0.3048	0.0	0.0	1.0	6.3094	63.094	1.8288	0.5	0.05	24.0	670.0

Simulation:
Froude number: 10.75; effleunt density (sigma-T) -2.603; effleunt velocity 0.432(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	CL-diln	x-posn	y-posn	
	(m)	(ft/s)	(m)	(ppb)	()	()	(m)	(m)	
0	1.829	1.0	0.254	670.0	1.0	1.0	0.0	0.0;	
98	1.585	1.0	0.774	97.07	6.959	1.911	6.31	0.0;	acute zone;
100	1.574	1.0	0.791	93.34	7.241	1.985	6.535	0.0;	
179	0.863	1.0	1.768	20.32	34.61	9.36	22.84	0.0;	surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 1.77 m

conc	dilutn	width	distnce	time				
(ppb)		(m)	(m)	(hrs)	(ppb)	(s-1)	(ft/s)	(m0.67/s2)
15.2031	45.5	3.147	63.09	0.0367	1.0	0.0	1.0	0.001

count: 1

10.3'

Mid Ebb
$\varepsilon = 0.001$

/ UM3.
Case 4; ambient file C:\Plumes\Ridgefield.004.db; Diffuser table record 1: ---------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.488	0.0	0.066	21.43	0.0	0.0	0.488	0.0	0.001	-1.989
0.61	0.488	0.0	0.066	21.4	0.0	0.0	0.488	0.0	0.001	-1.982
1.219	0.488	0.0	0.066	21.33	0.0	0.0	0.488	0.0	0.001	-1.967
1.829	0.488	0.0	0.066	21.32	0.0	0.0	0.488	0.0	0.001	-1.964
2.438	0.488	0.0	0.066	21.32	0.0	0.0	0.488	0.0	0.001	-1.964

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(m)	(m)	(deg)	(deg)	()	(m)	(m)	(m)	(MGD)	(psu)	(C)	(ppb)
0.254	0.3048	0.0	0.0	1.0	6.3094	63.094	1.8288	0.5	0.05	24.0	670.0

Simulation:
Froude number: 10.82; effleunt density (sigma-T) -2.603; effleunt velocity 0.432(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	CL-diln	x-posn	y-posn	
	(m)	(ft/s)	(m)	(ppb)	()	()	(m)	(m)	
0	1.829	1.6	0.254	670.0	1.0	1.0	0.0	0.0;	
84	1.637	1.6	0.555	127.7	5.275	1.335	6.398	0.0;	acute zone;
100	1.568	1.6	0.649	93.26	7.241	1.847	8.519	0.0;	
194	0.815	1.6	1.634	15.26	46.58	12.5	39.52	0.0;	surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 1.63 m

conc	dilutn	width	distnce	time				
(ppb)		(m)	(m)	(hrs)	(ppb)	(s-1)	(ft/s)	(m0.67/s2)
14.3297	49.46	2.214	63.09	0.0134	0.9	0.0	1.6	0.001

count: 1

7.3'

3/4 Ebb
$\varepsilon = 0.001$

/ UM3.
Case 5; ambient file C:\Plumes\Ridgefield.005.db; Diffuser table record 1: ----------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.366	0.0	0.066	21.43	0.0	0.0	0.366	0.0	0.001	-1.989
0.61	0.366	0.0	0.066	21.4	0.0	0.0	0.366	0.0	0.001	-1.982
1.219	0.366	0.0	0.066	21.33	0.0	0.0	0.366	0.0	0.001	-1.967
1.829	0.366	0.0	0.066	21.32	0.0	0.0	0.366	0.0	0.001	-1.964
2.438	0.366	0.0	0.066	21.32	0.0	0.0	0.366	0.0	0.001	-1.964

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(m)	(m)	(deg)	(deg)	()	(m)	(m)	(m)	(MGD)	(psu)	(C)	(ppb)
0.254	0.3048	0.0	0.0	1.0	6.3094	63.094	1.8288	0.5	0.05	24.0	670.0

Simulation:
Froude number: 10.82; effleunt density (sigma-T) -2.603; effleunt velocity 0.432(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	CL-diln	x-posn	y-posn	
	(m)	(ft/s)	(m)	(ppb)	()	()	(m)	(m)	
0	1.829	1.2	0.254	670.0	1.0	1.0	0.0	0.0;	
89	1.59	1.2	0.656	115.6	5.823	1.554	6.363	0.0;	acute zone;
100	1.533	1.2	0.733	93.09	7.241	1.923	7.641	0.0;	
182	0.828	1.2	1.669	18.91	36.73	9.767	27.38	0.0;	surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 1.67 m

conc	dilutn	width	distnce	time				
(ppb)		(m)	(m)	(hrs)	(ppb)	(s-1)	(ft/s)	(m
15.401	44.77	2.725	63.09	0.0271	0.7	0.0	1.2	0.001

9.0'

3/4 Flood

$\varepsilon = 0.003 \ cm^{2/3}/sec^2$

```
/ UM3. 1/19/2005 4:23:36 PM
Case 1; ambient file C:\Plumes\Ridgefield.001.db; Diffuser table record 1: -----------------------------------

Ambient Table:
   Depth  Amb-cur  Amb-dir  Amb-sal  Amb-tem   Amb-pol    Decay  Far-spd  Far-dir  Disprsn   Density
       m      m/s      deg      psu        C     kg/kg      s-1      m/s      deg  m0.67/s2  sigma-T
     0.0    0.274      0.0    0.065    21.19 1.5000E-9      0.0    0.274      0.0    0.003    -1.937
    0.61    0.274      0.0    0.065    21.19 1.5000E-9      0.0    0.274      0.0    0.003    -1.937
   1.219    0.274      0.0    0.065    21.18 1.5000E-9      0.0    0.274      0.0    0.003    -1.934
   1.829    0.274      0.0    0.065    21.17 1.5000E-9      0.0    0.274      0.0    0.003    -1.932
   2.438    0.274      0.0    0.065    21.16 1.5000E-9      0.0    0.274      0.0    0.003     -1.93

Diffuser table:
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
     (m)     (m)   (deg)   (deg)      ()     (m)     (m)     (m)   (MGD)   (psu)     (C)   (ppb)
   0.254  0.3048     0.0     0.0     1.0  6.3094  63.094  1.8288     0.5    0.05    24.0   670.0

Simulation:
Froude number:      10.56; effleunt density (sigma-T)    -2.603; effleunt velocity     0.432(m/s);
          Depth  Amb-cur    P-dia  Polutnt   Dilutn  CL-diln   x-posn   y-posn
Step        (m)    (m/s)      (m)    (ppb)       ()       ()      (m)      (m)
   0      1.829    0.274    0.254    670.0      1.0      1.0      0.0      0.0;
 100      1.587    0.274    0.825    93.78     7.24     2.03    5.951      0.0;
 104      1.563    0.274     0.86    86.75    7.837    2.189    6.388      0.0; acute zone;
 176      0.885    0.274    1.804    21.99    32.61    9.004    19.94      0.0; surface;
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of       1.80 m
    conc   dilutn    width distnce     time
   (ppb)               (m)     (m)    (hrs)    (ppb)    (s-1)    (m/s)(m0.67/s2)
  8.4128    69.54    5.303   63.09   0.0437      1.5      0.0    0.274    0.003
count: 1
```

17.4'

High Slack
$\varepsilon = 0.003 \; cm^{2/3}/sec^2$

/ UM3.
Case 2; ambient file C:\Plumes\Ridgefield.002.db; Diffuser table record 1: ---------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.183	0.0	0.066	21.32	1.6000E-9	0.0	0.183	0.0	0.003	-1.964
0.61	0.183	0.0	0.066	21.3	1.6000E-9	0.0	0.183	0.0	0.003	-1.96
1.219	0.183	0.0	0.066	21.26	1.6000E-9	0.0	0.183	0.0	0.003	-1.951
1.829	0.183	0.0	0.066	21.25	1.6000E-9	0.0	0.183	0.0	0.003	-1.949
2.438	0.183	0.0	0.066	21.24	1.6000E-9	0.0	0.183	0.0	0.003	-1.947

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(m)	(m)	(deg)	(deg)	()	(m)	(m)	(m)	(MGD)	(psu)	(C)	(ppb)
0.254	0.3048	0.0	0.0	1.0	6.3094	63.094	1.8288	0.5	0.05	24.0	670.0

Simulation:
Froude number: 10.7; effleunt density (sigma-T) -2.603; effleunt velocity 0.432(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	CL-diln	x-posn	y-posn	
	(m)	(ft/s)	(m)	(ppb)	()	()	(m)	(m)	
0	1.829	0.6	0.254	670.0	1.0	1.0	0.0	0.0;	
100	1.611	0.6	0.961	93.86	7.241	2.197	4.668	0.0;	
117	1.485	0.6	1.164	67.49	10.14	2.986	6.354	0.0;	acute zone;
165	0.946	0.6	1.946	27.07	26.23	7.438	13.45	0.0;	surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 1.95 m

conc	dilutn	width	distnce	time				
(ppb)		(m)	(m)	(hrs)	(ppb)	(s-1)	(ft/s)	(m0.67/s2)
6.64248	69.9	7.162	63.09	0.0754	1.6	0.0	0.6	0.003

count: 1

23.5'

1/4 Ebb
$\varepsilon = 0.003$

/ UM3.
Case 3; ambient file C:\Plumes\Ridgefield.003.db; Diffuser table record 1: ---------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.305	0.0	0.066	21.43	1.0000E-9	0.0	0.305	0.0	0.003	-1.989
0.61	0.305	0.0	0.066	21.35	1.0000E-9	0.0	0.305	0.0	0.003	-1.971
1.219	0.305	0.0	0.066	21.29	1.0000E-9	0.0	0.305	0.0	0.003	-1.958
1.829	0.305	0.0	0.066	21.28	1.0000E-9	0.0	0.305	0.0	0.003	-1.956
2.438	0.305	0.0	0.066	21.28	1.0000E-9	0.0	0.305	0.0	0.003	-1.956

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(m)	(m)	(deg)	(deg)	()	(m)	(m)	(m)	(MGD)	(psu)	(C)	(ppb)
0.254	0.3048	0.0	0.0	1.0	6.3094	63.094	1.8288	0.5	0.05	24.0	670.0

Simulation:
Froude number: 10.75; effleunt density (sigma-T) -2.603; effleunt velocity 0.432(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	CL-diln	x-posn	y-posn	
	(m)	(ft/s)	(m)	(ppb)	()	()	(m)	(m)	
0	1.829	1.0	0.254	670.0	1.0	1.0	0.0	0.0;	
98	1.585	1.0	0.774	97.07	6.959	1.911	6.31	0.0;	acute zone;
100	1.574	1.0	0.791	93.34	7.241	1.985	6.535	0.0;	
179	0.863	1.0	1.768	20.32	34.61	9.36	22.84	0.0;	surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 1.77 m

conc	dilutn	width	distnce	time				
(ppb)		(m)	(m)	(hrs)	(ppb)	(s-1)	(ft/s)	(m0.67/s2)
9.17127	68.8	4.843	63.09	0.0367	1.0	0.0	1.0	0.003

count: 1

15.9'

Mid Ebb
ε = 0.003

```
/ UM3.
Case 4; ambient file C:\Plumes\Ridgefield.004.db; Diffuser table record 1: ----------------------------------

Ambient Table:
     Depth    Amb-cur    Amb-dir    Amb-sal    Amb-tem    Amb-pol      Decay    Far-spd    Far-dir    Disprsn    Density
         m        m/s        deg        psu          C      kg/kg        s-1        m/s        deg  m0.67/s2    sigma-T
       0.0      0.488        0.0      0.066      21.43        0.0        0.0      0.488        0.0      0.003     -1.989
      0.61      0.488        0.0      0.066       21.4        0.0        0.0      0.488        0.0      0.003     -1.982
     1.219      0.488        0.0      0.066      21.33        0.0        0.0      0.488        0.0      0.003     -1.967
     1.829      0.488        0.0      0.066      21.32        0.0        0.0      0.488        0.0      0.003     -1.964
     2.438      0.488        0.0      0.066      21.32        0.0        0.0      0.488        0.0      0.003     -1.964

Diffuser table:
   P-dia  P-elev V-angle H-angle    Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal     Temp Polutnt
     (m)     (m)   (deg)   (deg)       ()     (m)     (m)     (m)   (MGD)   (psu)      (C)   (ppb)
   0.254  0.3048     0.0     0.0      1.0  6.3094  63.094  1.8288     0.5    0.05     24.0   670.0

Simulation:
Froude number:      10.82; effleunt density (sigma-T)    -2.603; effleunt velocity     0.432(m/s);
         Depth  Amb-cur     P-dia  Polutnt    Dilutn  CL-diln   x-posn    y-posn
Step       (m)   (ft/s)       (m)    (ppb)        ()       ()      (m)       (m)
   0     1.829      1.6     0.254    670.0       1.0      1.0      0.0       0.0;
  84     1.637      1.6     0.555    127.7     5.275    1.335    6.398       0.0; acute zone;
 100     1.568      1.6     0.649    93.26     7.241    1.847    8.519       0.0;
 194     0.815      1.6     1.634    15.26     46.58     12.5    39.52       0.0; surface;
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of      1.63 m
    conc  dilutn    width distnce    time
   (ppb)              (m)     (m)   (hrs)     (ppb)    (s-1)    (ft/s)(m0.67/s2)
  10.794   64.17    3.061   63.09  0.0134       0.9      0.0       1.6  0.003
count: 1
```

16.0′

3/4 Ebb
$\varepsilon = 0.003$

/ UM3.
Case 5; ambient file C:\Plumes\Ridgefield.005.db; Diffuser table record 1: ------------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.366	0.0	0.066	21.43	0.0	0.0	0.366	0.0	0.003	-1.989
0.61	0.366	0.0	0.066	21.4	0.0	0.0	0.366	0.0	0.003	-1.982
1.219	0.366	0.0	0.066	21.33	0.0	0.0	0.366	0.0	0.003	-1.967
1.829	0.366	0.0	0.066	21.32	0.0	0.0	0.366	0.0	0.003	-1.964
2.438	0.366	0.0	0.066	21.32	0.0	0.0	0.366	0.0	0.003	-1.964

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(m)	(m)	(deg)	(deg)	()	(m)	(m)	(m)	(MGD)	(psu)	(C)	(ppb)
0.254	0.3048	0.0	0.0	1.0	6.3094	63.094	1.8288	0.5	0.05	24.0	670.0

Simulation:
Froude number: 10.82; effleunt density (sigma-T) -2.603; effleunt velocity 0.432(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	CL-diln	x-posn	y-posn	
	(m)	(ft/s)	(m)	(ppb)	()	()	(m)	(m)	
0	1.829	1.2	0.254	670.0	1.0	1.0	0.0	0.0;	
89	1.59	1.2	0.656	115.6	5.823	1.554	6.363	0.0;	acute zone;
100	1.533	1.2	0.733	93.09	7.241	1.923	7.641	0.0;	
182	0.828	1.2	1.669	18.91	36.73	9.767	27.38	0.0;	surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 1.67 m

conc	dilutn	width	distnce	time				
(ppb)		(m)	(m)	(hrs)	(ppb)	(s-1)	(ft/s)	(m
10.0854	65.4	4.087	63.09	0.0271	0.7	0.0	1.2	0.063

13.4'

3/4 Flood
$\varepsilon = 0.005 \ cm^{2/3}/s^2$

/ UM3. 3/25/2005 10:59:45 AM
Case 1; ambient file C:\Plumes\Ridgefield.001.db; Diffuser table record 1: ---------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.274	0.0	0.065	21.19	1.5000E-9	0.0	0.274	0.0	0.005	-1.937
0.61	0.274	0.0	0.065	21.19	1.5000E-9	0.0	0.274	0.0	0.005	-1.937
1.219	0.274	0.0	0.065	21.18	1.5000E-9	0.0	0.274	0.0	0.005	-1.934
1.829	0.274	0.0	0.065	21.17	1.5000E-9	0.0	0.274	0.0	0.005	-1.932
2.438	0.274	0.0	0.065	21.16	1.5000E-9	0.0	0.274	0.0	0.005	-1.93

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(m)	(m)	(deg)	(deg)	()	(m)	(m)	(m)	(MGD)	(psu)	(C)	(ppb)
0.254	0.3048	0.0	0.0	1.0	6.3094	63.094	1.8288	0.5	0.05	24.0	670.0

Simulation:
Froude number: 10.56; effleunt density (sigma-T) -2.603; effleunt velocity 0.432(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	x-posn	y-posn
	(m)	(m/s)	(m)	(ppb)	()	(m)	(m)
0	1.829	0.274	0.254	670.0	1.0	0.0	0.0;
100	1.587	0.274	0.825	93.78	7.24	5.951	0.0;
104	1.563	0.274	0.86	86.75	7.837	6.388	0.0; acute zone;
176	0.885	0.274	1.804	21.99	32.61	19.94	0.0; surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 1.80 m

conc	dilutn	width	distnce	time				
(ppb)		(m)	(m)	(hrs)	(ppb)	(s-1)	(m/s)	(m0.67/s2)
4.83614	87.56	6.686	63.09	0.0437	1.5	0.0	0.274	0.005

count: 1

22.0'

High Slack
$\varepsilon = 0.005$

/ UM3.

Case 9; ambient file C:\Plumes\Ridgefield.002.db; Diffuser table record 1: ----------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.183	0.0	0.066	21.32	1.6000E-9	0.0	0.183	0.0	0.005	-1.964
0.61	0.183	0.0	0.066	21.3	1.6000E-9	0.0	0.183	0.0	0.005	-1.96
1.219	0.183	0.0	0.066	21.26	1.6000E-9	0.0	0.183	0.0	0.005	-1.951
1.829	0.183	0.0	0.066	21.25	1.6000E-9	0.0	0.183	0.0	0.005	-1.949
2.438	0.183	0.0	0.066	21.24	1.6000E-9	0.0	0.183	0.0	0.005	-1.947

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(m)	(m)	(deg)	(deg)	()	(m)	(m)	(m)	(MGD)	(psu)	(C)	(ppb)
0.254	0.3048	0.0	0.0	1.0	6.3094	63.094	1.8288	0.5	0.05	24.0	670.0

Simulation:

Froude number: 10.7; effluent density (sigma-T) -2.603; effluent velocity 0.432(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	x-posn	y-posn	
	(m)	(ft/s)	(m)	(ppb)	()	(m)	(m)	
0	1.829	0.6	0.254	670.0	1.0	0.0	0.0;	
100	1.611	0.6	0.961	93.86	7.241	4.668	0.0;	
117	1.485	0.6	1.164	67.49	10.14	6.354	0.0;	acute zone;
165	0.946	0.6	1.946	27.07	26.23	13.45	0.0;	surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 1.95 m

conc	dilutn	width	distnce	time				
(ppb)		(m)	(m)	(hrs)	(ppb)	(s-1)	(ft/s)	(m0.67/s2)
1.91544	88.85	9.108	63.09	0.0754	1.6	0.0	0.6	0.005

count: 1

30.0'

1/4 Ebb
ε = 0.005

/ UM3. 3/25/2005 11:28:23 AM
Case 1; ambient file C:\Plumes\Ridgefield.003.db; Diffuser table record 1: ------------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.305	90.0	0.08	20.3	0.0	0.0	0.305	90.0	0.005	-1.734
1.0	0.305	90.0	0.08	21.35	0.0	0.0	0.305	90.0	0.005	-1.96
2.0	0.305	90.0	0.08	21.29	0.0	0.0	0.305	90.0	0.005	-1.947
3.0	0.305	90.0	0.08	21.28	0.0	0.0	0.305	90.0	0.005	-1.945
4.0	0.305	90.0	0.08	21.28	0.0	0.0	0.305	90.0	0.005	-1.945
5.0	0.305	90.0	0.08	21.28	0.0	0.0	0.305	90.0	0.005	-1.945
6.0	0.305	90.0	0.08	21.28	0.0	0.0	0.305	90.0	0.005	-1.945

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(m)	(m)	(deg)	(deg)	()	(m)	(m)	(m)	(MGD)	(psu)	(C)	(ppb)
0.254	0.3048	0.0	0.0	1.0	6.3094	63.094	1.8288	0.5	0.05	24.0	670.0

Simulation:
Froude number: 10.7; effleunt density (sigma-T) -2.603; effleunt velocity 0.432(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	x-posn	y-posn	
	(m)	(m/s)	(m)	(ppb)	()	(m)	(m)	
0	1.829	0.305	0.254	670.0	1.0	0.0	0.0;	
5	1.829	0.305	0.272	622.4	1.076	0.0144	0.000465;	begin overlap;
100	1.827	0.305	0.614	198.1	3.38	0.274	0.186;	bottom hit;
103	1.827	0.305	0.629	188.8	3.547	0.284	0.202;	end overlap;
200	1.771	0.305	1.505	28.19	23.75	0.844	4.561;	
211	1.745	0.305	1.672	22.67	29.53	0.937	6.263;	acute zone;
266	1.401	0.305	2.85	7.629	87.76	1.46	26.01;	surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 2.85 m

conc	dilutn	width	distnce	time			
(ppb)		(m)	(m)	(hrs)	(kg/kg)	(s-1)	(m/s)(m0.67/s2)
3.66148	182.9						

8.19 m

26.9'

Mid Ebb
$\mathcal{E} = 0.005$

/ UM3.
Case 25; ambient file C:\Plumes\Ridgefield.004.db; Diffuser table record 1: ----------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.488	0.0	0.066	21.43	0.0	0.0	0.488	0.0	0.005	-1.989
0.61	0.488	0.0	0.066	21.4	0.0	0.0	0.488	0.0	0.005	-1.982
1.219	0.488	0.0	0.066	21.33	0.0	0.0	0.488	0.0	0.005	-1.967
1.829	0.488	0.0	0.066	21.32	0.0	0.0	0.488	0.0	0.005	-1.964
2.438	0.488	0.0	0.066	21.32	0.0	0.0	0.488	0.0	0.005	-1.964

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(m)	(m)	(deg)	(deg)	()	(m)	(m)	(m)	(MGD)	(psu)	(C)	(ppb)
0.254	0.3048	0.0	0.0	1.0	6.3094	63.094	1.8288	0.5	0.05	24.0	670.0

Simulation:
Froude number: 10.82; effleunt density (sigma-T) -2.603; effleunt velocity 0.432(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	x-posn	y-posn	
	(m)	(ft/s)	(m)	(ppb)	()	(m)	(m)	
0	1.829	1.6	0.254	670.0	1.0	0.0	0.0;	
84	1.637	1.6	0.555	127.7	5.275	6.398	0.0;	acute zone;
100	1.568	1.6	0.649	93.26	7.241	8.519	0.0;	
194	0.815	1.6	1.634	15.26	46.58	39.52	0.0;	surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 1.63 m

conc	dilutn	width	distnce	time				
(ppb)		(m)	(m)	(hrs)	(ppb)	(s-1)	(ft/s)	(m0.67/s2)
8.64612	77.24	3.719	63.09	0.0134	0.9	0.0	1.6	0.005

count: 1

12.2'

3/4 Ebb
$\varepsilon = 0.005$

/ UM3.
Case 33; ambient file C:\Plumes\Ridgefield.005.db; Diffuser table record 1: ------------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.366	0.0	0.066	21.43	0.0	0.0	0.366	0.0	0.005	-1.989
0.61	0.366	0.0	0.066	21.4	0.0	0.0	0.366	0.0	0.005	-1.982
1.219	0.366	0.0	0.066	21.33	0.0	0.0	0.366	0.0	0.005	-1.967
1.829	0.366	0.0	0.066	21.32	0.0	0.0	0.366	0.0	0.005	-1.964
2.438	0.366	0.0	0.066	21.32	0.0	0.0	0.366	0.0	0.005	-1.964

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(m)	(m)	(deg)	(deg)	()	(m)	(m)	(m)	(MGD)	(psu)	(C)	(ppb)
0.254	0.3048	0.0	0.0	1.0	6.3094	63.094	1.8288	0.5	0.05	24.0	670.0

Simulation:
Froude number: 10.82; effleunt density (sigma-T) -2.603; effleunt velocity 0.432(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	x-posn	y-posn
	(m)	(m/s)	(m)	(ppb)	()	(m)	(m)
0	1.829	0.366	0.254	670.0	1.0	0.0	0.0;
89	1.59	0.366	0.656	115.6	5.823	6.362	0.0; acute zone;
100	1.533	0.366	0.733	93.09	7.241	7.641	0.0;
182	0.828	0.366	1.669	18.91	36.73	27.38	0.0; surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 1.67 m

conc	dilutn	width	distnce	time				
(ppb)		(m)	(m)	(hrs)	(ppb)	(s-1)	(ft/s)	(m0.67/s2)
7.56673	81.31	5.097	63.09	0.0271	0.7	0.0	1.2	0.005

count: 1

16.7'

COSMOPOLITAN ENGINEERING GROUP

Appendix C-2

RIVPLUM5 Model Calibration Runs for a Transverse Mixing Coefficient of 0.100 ft^2/sec

Civil, Environmental, and Recreational Consulting

Printed on Recycled Paper

0.5 MGD WWTP

Spread of a plume from a point source in a river with boundary effects from the shoreline based on the method of Fischer *et al.* (1979) with correction for the effective origin of effluent.

Revised 22-Feb-96

INPUT

	Acute	Chronic
1. Effluent Discharge Rate (cfs):	1.39	0.77
2. Receiving Water Characteristics Downstream From Waste Input		
Stream Depth (ft):	7.00	7.00
Stream Velocity (fps):	0.26	0.84
Channel Width (ft):	300	300
Stream Slope (ft/ft) or Manning roughness "n":	0.03	0.03
0 if slope or 1 if Manning "n" in previous cell:	1	1
3. Discharge Distance From Nearest Shoreline (ft):	100	100
4. Location of Point of Interest to Estimate Dilution		
Distance Downstream to Point of Interest (ft):	20.7	207
Distance From Nearest Shoreline (ft):	100	100
5. Transverse Mixing Coefficient Constant (usually 0.6):	NA	NA
6. Original Fischer Method (enter 0) or *Effective Origin* Modification (enter 1)	0	0

OUTPUT

	Acute	Chronic
1. Source Conservative Mass Input Rate		
Concentration of Conservative Substance (%):	100.00	100.00
Source Conservative Mass Input Rate (cfs*%):	139.00	77.00
2. Shear Velocity		
Shear Velocity based on slope (ft/sec):	#N/A	#N/A
Shear Velocity based on Manning "n":		
using Prasuhn equations 8-26 and 8-54 assuming		
hydraulic radius equals depth for wide channel		
Darcy-Weisbach friction factor "f":	0.055	0.055
Shear Velocity from Darcy-Weisbach "f" (ft/sec):	0.021	0.069
Selected Shear Velocity for next step (ft/sec):	0.021	0.069
3. Transverse Mixing Coefficient (ft2/sec):	0.100	0.100
4. Plume Characteristics Accounting for Shoreline Effect (Fischer *et al.*, 1979)		
Co	2.55E-01	4.37E-02
x'	8.85E-05	2.74E-04
y'o	3.33E-01	3.33E-01
y' at point of interest	3.33E-01	3.33E-01
Solution using superposition equation (Fischer eqn 5.9)		
Term for n= -2	0.00E+00	0.00E+00
Term for n= -1	0.00E+00	0.00E+00
Term for n= 0	1.00E+00	1.00E+00
Term for n= 1	0.00E+00	0.00E+00
Term for n= 2	0.00E+00	0.00E+00
Upstream Distance from Outfall to *Effective Origin* of Effluent Source (ft)	#N/A	#N/A
Effective Distance Downstream from Effluent to Point of Interest (ft)	20.70	207.00
x' Adjusted for *Effective Origin*	8.85E-05	2.74E-04
C/Co (dimensionless)	3.00E+01	1.70E+01
Concentration at Point of Interest (Fischer Eqn 5.9)	7.64E+00	7.44E-01
Unbounded Plume Width at Point of Interest (ft)	15.961	28.082
Unbounded Plume half-width (ft)	7.981	14.041
Distance from near shore to discharge point (ft)	100.00	100.00
Distance from far shore to discharge point (ft)	200.00	200.00
Plume width bounded by shoreline (ft)	15.96	28.08
Approximate Downstream Distance to Complete Mix (ft):	41,600	134,400
Theoretical Dilution Factor at Complete Mix:	392.806	2,290.909
Calculated Flux-Average Dilution Factor Across Entire Plume Width:	20.899	214.441
Calculated Dilution Factor at Point of Interest:	13.097	134.381

0.7 MGD WWTP

Spread of a plume from a point source in a river with boundary effects from the shoreline based on the method of Fischer *et al.* (1979) with correction for the effective origin of effluent.

Revised 22-Feb-96

INPUT	Acute	Chronic
1. Effluent Discharge Rate (cfs):	2.28	1.08
2. Receiving Water Characteristics Downstream From Waste Input		
Stream Depth (ft):	7.00	7.00
Stream Velocity (fps):	0.26	0.84
Channel Width (ft):	300	300
Stream Slope (ft/ft) or Manning roughness "n":	0.03	0.03
0 if slope or 1 if Manning "n" in previous cell:	1	1
3. Discharge Distance From Nearest Shoreline (ft):	100	100
4. Location of Point of Interest to Estimate Dilution		
Distance Downstream to Point of Interest (ft):	20.7	207
Distance From Nearest Shoreline (ft):	100	100
5. Transverse Mixing Coefficient Constant (usually 0.6):	NA	NA
6. Original Fischer Method (enter 0) or *Effective Origin* Modification (enter 1)	0	0

OUTPUT		
1. Source Conservative Mass Input Rate		
Concentration of Conservative Substance (%):	100.00	100.00
Source Conservative Mass Input Rate (cfs*%):	228.00	108.00
2. Shear Velocity		
Shear Velocity based on slope (ft/sec):	#N/A	#N/A
Shear Velocity based on Manning "n":		
using Prasuhn equations 8-26 and 8-54 assuming		
hydraulic radius equals depth for wide channel		
Darcy-Weisbach friction factor "f":	0.055	0.055
Shear Velocity from Darcy-Weisbach "f" (ft/sec):	0.021	0.069
Selected Shear Velocity for next step (ft/sec):	0.021	0.069
3. Transverse Mixing Coefficient (ft2/sec):	0.100	0.100
4. Plume Characteristics Accounting for Shoreline Effect (Fischer *et al.*, 1979)		
Co	4.18E-01	6.12E-02
x'	8.85E-05	2.74E-04
y'o	3.33E-01	3.33E-01
y' at point of interest	3.33E-01	3.33E-01
Solution using superposition equation (Fischer eqn 5.9)		
Term for n= -2	0.00E+00	0.00E+00
Term for n= -1	0.00E+00	0.00E+00
Term for n= 0	1.00E+00	1.00E+00
Term for n= 1	0.00E+00	0.00E+00
Term for n= 2	0.00E+00	0.00E+00
Upstream Distance from Outfall to *Effective Origin* of Effluent Source (ft)	#N/A	#N/A
Effective Distance Downstream from Effluent to Point of Interest (ft)	20.70	207.00
x' Adjusted for *Effective Origin*	8.85E-05	2.74E-04
C/Co (dimensionless)	3.00E+01	1.70E+01
Concentration at Point of Interest (Fischer Eqn 5.9)	1.25E+01	1.04E+00
Unbounded Plume Width at Point of Interest (ft)	15.961	28.082
Unbounded Plume half-width (ft)	7.981	14.041
Distance from near shore to discharge point (ft)	100.00	100.00
Distance from far shore to discharge point (ft)	200.00	200.00
Plume width bounded by shoreline (ft)	15.96	28.08
Approximate Downstream Distance to Complete Mix (ft):	41,600	134,400
Theoretical Dilution Factor at Complete Mix:	239.474	1,633.333
Calculated Flux-Average Dilution Factor Across Entire Plume Width:	12.741	152.888
Calculated Dilution Factor at Point of Interest:	7.984	95.808

1.7 MGD WWTP

Spread of a plume from a point source in a river with boundary effects from the shoreline based on the method of Fischer *et al.* (1979) with correction for the effective origin of effluent.

Revised 22-Feb-96

INPUT	Acute	Chronic
1. Effluent Discharge Rate (cfs):	3.85	2.62
2. Receiving Water Characteristics Downstream From Waste Input		
Stream Depth (ft):	7.00	7.00
Stream Velocity (fps):	0.26	0.84
Channel Width (ft):	300	300
Stream Slope (ft/ft) or Manning roughness "n":	0.03	0.03
0 if slope or 1 if Manning "n" in previous cell:	1	1
3. Discharge Distance From Nearest Shoreline (ft):	100	100
4. Location of Point of Interest to Estimate Dilution		
Distance Downstream to Point of Interest (ft):	20.7	207
Distance From Nearest Shoreline (ft):	100	100
5. Transverse Mixing Coefficient Constant (usually 0.6):	NA	NA
6. Original Fischer Method (enter 0) or *Effective Origin* Modification (enter 1)	0	0

OUTPUT	Acute	Chronic
1. Source Conservative Mass Input Rate		
Concentration of Conservative Substance (%):	100.00	100.00
Source Conservative Mass Input Rate (cfs*%):	385.00	262.00
2. Shear Velocity		
Shear Velocity based on slope (ft/sec):	#N/A	#N/A
Shear Velocity based on Manning "n":		
using Prasuhn equations 8-26 and 8-54 assuming		
hydraulic radius equals depth for wide channel		
Darcy-Weisbach friction factor "f":	0.055	0.055
Shear Velocity from Darcy-Weisbach "f" (ft/sec):	0.021	0.069
Selected Shear Velocity for next step (ft/sec):	0.021	0.069
3. Transverse Mixing Coefficient (ft2/sec):	0.100	0.100
4. Plume Characteristics Accounting for Shoreline Effect (Fischer *et al.*, 1979)		
Co	7.05E-01	1.49E-01
x'	8.85E-05	2.74E-04
y'o	3.33E-01	3.33E-01
y' at point of interest	3.33E-01	3.33E-01
Solution using superposition equation (Fischer eqn 5.9)		
Term for n= -2	0.00E+00	0.00E+00
Term for n= -1	0.00E+00	0.00E+00
Term for n= 0	1.00E+00	1.00E+00
Term for n= 1	0.00E+00	0.00E+00
Term for n= 2	0.00E+00	0.00E+00
Upstream Distance from Outfall to *Effective Origin* of Effluent Source (ft)	#N/A	#N/A
Effective Distance Downstream from Effluent to Point of Interest (ft)	20.70	207.00
x' Adjusted for *Effective Origin*	8.85E-05	2.74E-04
C/Co (dimensionless)	3.00E+01	1.70E+01
Concentration at Point of Interest (Fischer Eqn 5.9)	2.11E+01	2.53E+00
Unbounded Plume Width at Point of Interest (ft)	15.961	28.082
Unbounded Plume half-width (ft)	7.981	14.041
Distance from near shore to discharge point (ft)	100.00	100.00
Distance from far shore to discharge point (ft)	200.00	200.00
Plume width bounded by shoreline (ft)	15.96	28.08
Approximate Downstream Distance to Complete Mix (ft):	41,600	134,400
Theoretical Dilution Factor at Complete Mix:	141.818	673.282
Calculated Flux-Average Dilution Factor Across Entire Plume Width:	7.545	63.023
Calculated Dilution Factor at Point of Interest:	4.728	39.494

2.7 MGD WWTP

Spread of a plume from a point source in a river with boundary effects from the shoreline based on the method of Fischer *et al.* (1979) with correction for the effective origin of effluent.

Revised 22-Feb-96

INPUT	Acute	Chronic
1. Effluent Discharge Rate (cfs):	5.70	4.16
2. Receiving Water Characteristics Downstream From Waste Input		
Stream Depth (ft):	7.00	7.00
Stream Velocity (fps):	0.26	0.84
Channel Width (ft):	300	300
Stream Slope (ft/ft) or Manning roughness "n":	0.03	0.03
0 if slope or 1 if Manning "n" in previous cell:	1	1
3. Discharge Distance From Nearest Shoreline (ft):	100	100
4. Location of Point of Interest to Estimate Dilution		
Distance Downstream to Point of Interest (ft):	20.7	207
Distance From Nearest Shoreline (ft):	100	100
5. Transverse Mixing Coefficient Constant (usually 0.6):	NA	NA
6. Original Fischer Method (enter 0) or *Effective Origin* Modification (enter 1)	0	0

OUTPUT	Acute	Chronic
1. Source Conservative Mass Input Rate		
Concentration of Conservative Substance (%):	100.00	100.00
Source Conservative Mass Input Rate (cfs*%):	570.00	416.00
2. Shear Velocity		
Shear Velocity based on slope (ft/sec):	#N/A	#N/A
Shear Velocity based on Manning "n":		
using Prasuhn equations 8-26 and 8-54 assuming		
hydraulic radius equals depth for wide channel		
Darcy-Weisbach friction factor "f":	0.055	0.055
Shear Velocity from Darcy-Weisbach "f" (ft/sec):	0.021	0.069
Selected Shear Velocity for next step (ft/sec):	0.021	0.069
3. Transverse Mixing Coefficient (ft2/sec):	0.100	0.100
4. Plume Characteristics Accounting for Shoreline Effect (Fischer *et al.*, 1979)		
Co	1.04E+00	2.36E-01
x'	8.85E-05	2.74E-04
y'o	3.33E-01	3.33E-01
y' at point of interest	3.33E-01	3.33E-01
Solution using superposition equation (Fischer eqn 5.9)		
Term for n= -2	0.00E+00	0.00E+00
Term for n= -1	0.00E+00	0.00E+00
Term for n= 0	1.00E+00	1.00E+00
Term for n= 1	0.00E+00	0.00E+00
Term for n= 2	0.00E+00	0.00E+00
Upstream Distance from Outfall to *Effective Origin* of Effluent Source (ft)	#N/A	#N/A
Effective Distance Downstream from Effluent to Point of Interest (ft)	20.70	207.00
x' Adjusted for *Effective Origin*	8.85E-05	2.74E-04
C/Co (dimensionless)	3.00E+01	1.70E+01
Concentration at Point of Interest (Fischer Eqn 5.9)	3.13E+01	4.02E+00
Unbounded Plume Width at Point of Interest (ft)	15.961	28.082
Unbounded Plume half-width (ft)	7.981	14.041
Distance from near shore to discharge point (ft)	100.00	100.00
Distance from far shore to discharge point (ft)	200.00	200.00
Plume width bounded by shoreline (ft)	15.96	28.08
Approximate Downstream Distance to Complete Mix (ft):	41,600	134,400
Theoretical Dilution Factor at Complete Mix:	95.789	424.038
Calculated Flux-Average Dilution Factor Across Entire Plume Width:	5.096	39.692
Calculated Dilution Factor at Point of Interest:	3.194	24.873

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Appendix D

UM3 Model Results for Lake River Alternatives

Civil, Environmental,
and Recreational
Consulting

LAKE RIVER INTERIM OUTFALL EXTENSION - ACUTE (1.6 MGD, 10% CURRENT SPEED)

/ Windows UM3. 10/28/2005 2:10:55 PM

Case 1; ambient file c:\plumes\VP plume 0.001.db; Diffuser table record 1: ----------------------------------

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2
0.0	0.0427	0.0	0.066	21.43	0.0033	0.0	0.427	0.0	0.003
0.61	0.0427	0.0	0.066	21.35	0.0033	0.0	0.427	0.0	0.003
1.219	0.0427	0.0	0.066	21.29	0.0033	0.0	0.427	0.0	0.003
1.829	0.0427	0.0	0.066	21.28	0.0033	0.0	0.427	0.0	0.003
2.438	0.0427	0.0	0.066	21.28	0.0033	0.0	0.427	0.0	0.003

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(in)	(in)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
8.0	6.0	30.0	90.0	1.0	20.7	207.0	7.0	1.6	0.05	24.0	1.0

Froude number: 68.56

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	CL-diln	x-posn	y-posn	
	(ft)	(m/s)	(in)	(kg/kg)	()	()	(ft)	(ft)	
0	7.0	0.0427	7.589	1.0	1.0	1.0	0.0	0.0;	
25	6.533	0.0427	12.33	0.611	1.64	1.0	0.0055	0.808;	
50	5.799	0.0427	20.21	0.374	2.69	1.402	0.0363	2.077;	
75	4.671	0.0427	33.11	0.229	4.414	2.302	0.139	4.02;	
100	2.994	0.0427	54.14	0.141	7.241	3.776	0.425	6.886;	
109	2.224	0.0427	64.55	0.118	8.653	$\boxed{4.508}$	0.613	8.188;	surface,

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 1.64 m

conc	dilutn	width	distnce	time				
(kg/kg)		(m)	(m)	(hrs)	(kg/kg)	(s-1)	(m/s)	(m0.67/s2)
8.69E-3	18.14	4.737	63.09	0.0394	0.0033	0.0	0.427	0.003

count: 1

;

2:10:55 PM. amb fills: 2

LAKE RIVER INTERIM OUTFALL EXTENSION - ACUTE (1.6 MGD, 90% CURRENT SPEED)

```
/ Windows UM3. 10/28/2005 2:11:14 PM
Case 1; ambient file c:\plumes\VP plume 0.001.db; Diffuser table record 1: ----------------------------------
      Depth    Amb-cur    Amb-dir    Amb-sal    Amb-tem    Amb-pol      Decay    Far-spd    Far-dir    Disprsn
          m        m/s        deg        psu          C      kg/kg        s-1        m/s        deg   m0.67/s2
        0.0      0.427        0.0      0.066      21.43     0.0033        0.0      0.427        0.0      0.003
       0.61      0.427        0.0      0.066      21.35     0.0033        0.0      0.427        0.0      0.003
      1.219      0.427        0.0      0.066      21.29     0.0033        0.0      0.427        0.0      0.003
      1.829      0.427        0.0      0.066      21.28     0.0033        0.0      0.427        0.0      0.003
      2.438      0.427        0.0      0.066      21.28     0.0033        0.0      0.427        0.0      0.003
   P-dia  P-elev V-angle H-angle    Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (in)   (deg)   (deg)       ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     8.0     6.0    30.0    90.0      1.0    20.7   207.0     7.0     1.6    0.05    24.0     1.0
Froude number:      68.56
        Depth  Amb-cur     P-dia  Polutnt    Dilutn   CL-diln    x-posn    y-posn
Step     (ft)    (m/s)      (in)  (kg/kg)        ()        ()      (ft)      (ft)
   0      7.0    0.427     7.589      1.0       1.0       1.0       0.0      0.0;
  25    6.713    0.427     12.29    0.611      1.64       1.0    0.0328    0.497;
  50    6.355    0.427     19.81    0.374      2.69      1.31      0.18    1.117;
  75    5.983    0.427     30.29    0.234     4.327      1.88     0.506    1.759;
  91    5.786    0.427     37.57    0.179     5.668     2.233     0.786    2.099; begin overlap,
 100    5.679    0.427     41.91    0.155     6.578     2.441     0.981    2.283;
 115    5.497    0.427      49.9     0.12     8.518     2.855     1.404    2.597; end overlap,
 117    5.472    0.427     51.06    0.116     8.832     2.921     1.472    2.639; bottom hit,
 125    5.367    0.427     56.03      0.1     10.27     3.229     1.794    2.821;
 150    4.983    0.427     73.91   0.0624     16.85     4.767     3.486    3.478;
 175    4.498    0.427     95.34   0.0393     27.65     7.637     7.071      4.3;
 184    4.291    0.427     104.3   0.0334     33.04      9.17      9.19    4.648; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of       2.65 m
   conc   dilutn    width  distnce     time
 (kg/kg)              (m)      (m)    (hrs)  (kg/kg)     (s-1)     (m/s)(m0.67/s2)
-0.11907    60.19    6.637    63.09    0.039   0.0033       0.0     0.427    0.003
count: 1
 ;
2:11:14 PM. amb fills: 2
```

LAKE RIVER INTERIM OUTFALL EXTENSION - CHRONIC (1.0 MGD, 50% CURRENT SPEED)

/ Windows UM3. 10/28/2005 2:12:04 PM
Case 1; ambient file c:\plumes\VP plume 0.001.db; Diffuser table record 1: ------------------------------------

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2
0.0	0.168	0.0	0.066	21.43	0.0033	0.0	0.427	0.0	0.003
0.61	0.168	0.0	0.066	21.35	0.0033	0.0	0.427	0.0	0.003
1.219	0.168	0.0	0.066	21.29	0.0033	0.0	0.427	0.0	0.003
1.829	0.168	0.0	0.066	21.28	0.0033	0.0	0.427	0.0	0.003
2.438	0.168	0.0	0.066	21.28	0.0033	0.0	0.427	0.0	0.003

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(in)	(in)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
8.0	6.0	30.0	90.0	1.0	20.7	207.0	7.0	1.0	0.05	24.0	1.0

Froude number: 42.85

Step	Depth (ft)	Amb-cur (m/s)	P-dia (in)	Polutnt (kg/kg)	Dilutn ()	CL-diln ()	x-posn (ft)	y-posn (ft)	
0	7.0	0.168	7.589	1.0	1.0	1.0	0.0	0.0;	
25	6.658	0.168	12.31	0.611	1.64	1.0	0.0248	0.592;	
50	6.197	0.168	20.04	0.374	2.69	1.364	0.145	1.388;	
75	5.627	0.168	32.08	0.229	4.414	2.118	0.466	2.367;	
100	5.029	0.168	49.03	0.142	7.177	3.066	1.089	3.386;	
125	4.513	0.168	68.78	0.092	11.24	4.108	2.0	4.254;	
140	4.191	0.168	82.88	0.0701	14.92	4.959	2.838	4.789;	bottom hit,
150	3.955	0.168	93.44	0.0581	18.19	5.726	3.619	5.175;	
153	3.882	0.168	96.73	0.0549	19.3	5.994	3.896	5.294;	surface,

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 2.46 m

conc (kg/kg)	dilutn	width (m)	distnce (m)	time (hrs)	(kg/kg)	(s-1)	(m/s)	(m0.67/s2)
-5.58E-2	$\boxed{36.18}$	6.34	63.09	0.0397	0.0033	0.0	0.427	0.003

count: 1
;
2:12:04 PM. amb fills: 2

Appendix E

UM3 Model Results for Columbia River Alternatives

Civil, Environmental, and Recreational Consulting

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Civil, Environmental, and Recreational Consulting

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Appendix E-1

Columbia River Alternatives – Acute Dilution Model Results

NOTE: Ambient conditions for these model runs are taken from Memorandum dated April 7, 2004, from Anise Ahmed to David Knight titled, "Salmon Creek WWTP Outfall Dilution Study: final dilution factors."

Open-ended
0.9 mgd (2005)

/ UM3. 1/27/2005 4:50:26 PM
Case 1; ambient file C:\Plumes\Ridge Columbia.001.db; Diffuser table record 1: ----------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
1.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
2.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
3.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
4.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
5.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
6.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(ft)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
0.8333	2.0	45.0	169.0	1.0	21.7	217.0	17.0	0.9	0.05	24.0	1.0

Simulation:
Froude number: 16.71; effleunt density (sigma-T) -2.603; effleunt velocity 0.778(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	x-posn	y-posn	
	(ft)	(m/s)	(ft)	(kg/kg)	()	(ft)	(ft)	
0	17.0	0.051	0.833	1.0	1.0	0.0	0.0;	
25	16.27	0.051	1.347	0.61	1.64	-0.718	0.162;	
50	15.21	0.051	2.185	0.372	2.69	-1.739	0.473;	
75	13.76	0.051	3.5	0.226	4.413	-3.1	1.066;	
100	11.92	0.051	5.476	0.138	7.239	-4.735	2.123;	
125	9.878	0.051	8.268	0.0841	11.88	-6.397	3.773;	
150	7.685	0.051	11.94	0.0513	19.48	-7.973	6.236;	
166	6.139	0.051	14.75	0.0374	26.75	-8.944	8.458;	surface;

Open-ended
1.1 mgd (2009)

/ UM3.
Case 2; ambient file C:\Plumes\Ridge Columbia.001.db; Diffuser table record 2: ----------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
1.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
2.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
3.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
4.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
5.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
6.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(ft)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
0.8333	2.0	45.0	169.0	1.0	21.7	217.0	17.0	1.1	0.05	24.0	1.0

Simulation:
Froude number: 20.42; effleunt density (sigma-T) -2.603; effleunt velocity 0.951(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	x-posn	y-posn	
	(ft)	(m/s)	(ft)	(kg/kg)	()	(ft)	(ft)	
0	17.0	0.051	0.833	1.0	1.0	0.0	0.0;	
25	16.24	0.051	1.348	0.61	1.64	-0.748	0.164;	
50	15.12	0.051	2.193	0.372	2.69	-1.834	0.474;	
75	13.55	0.051	3.534	0.226	4.413	-3.323	1.058;	
100	11.48	0.051	5.59	0.138	7.239	-5.211	2.127;	
125	9.067	0.051	8.572	0.0841	11.88	-7.254	3.859;	
150	6.47	0.051	12.61	0.0513	19.48	-9.225	6.45;	
157	5.704	0.051	13.93	0.0446	22.38	-9.757	7.381;	surface;

Open-ended
2.5 mgd (2019)

/ UM3.
Case 3; ambient file C:\Plumes\Ridge Columbia.001.db; Diffuser table record 3: ----------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
1.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
2.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
3.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
4.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
5.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
6.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(ft)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
0.8333	2.0	45.0	169.0	1.0	21.7	217.0	17.0	2.5	0.05	24.0	1.0

Simulation:
Froude number: 46.41; effleunt density (sigma-T) -2.603; effleunt velocity 2.162(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	x-posn	y-posn
	(ft)	(m/s)	(ft)	(kg/kg)	()	(ft)	(ft)
0	17.0	0.051	0.833	1.0	1.0	0.0	0.0;
25	16.15	0.051	1.352	0.61	1.64	-0.834	0.172;
50	14.83	0.051	2.211	0.372	2.69	-2.124	0.474;
75	12.85	0.051	3.608	0.226	4.413	-4.053	1.018;
100	9.993	0.051	5.851	0.138	7.239	-6.805	2.006;
125	6.058	0.051	9.372	0.0841	11.88	-10.5	3.798;
136	3.957	0.051	11.46	0.0677	14.77	-12.4	4.976; surface, matched energy radial vel = 0.12m/s;

Open-ende
3.7 mgd (2024)

/ UM3.
Case 4; ambient file C:\Plumes\Ridge Columbia.001.db; Diffuser table record 4: ---------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
1.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
2.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
3.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
4.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
5.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
6.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(ft)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
0.8333	2.0	45.0	169.0	1.0	21.7	217.0	17.0	3.7	0.05	24.0	1.0

Simulation:
Froude number: 68.68; effleunt density (sigma-T) -2.603; effleunt velocity 3.199(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	x-posn	y-posn	
	(ft)	(m/s)	(ft)	(kg/kg)	()	(ft)	(ft)	
0	17.0	0.051	0.833	1.0	1.0	0.0	0.0;	
25	16.12	0.051	1.352	0.61	1.64	-0.859	0.174;	
50	14.74	0.051	2.215	0.372	2.69	-2.212	0.473;	
75	12.62	0.051	3.622	0.226	4.413	-4.291	1.0;	
100	9.448	0.051	5.903	0.138	7.239	-7.373	1.943;	
125	4.913	0.051	9.554	0.0841	11.88	-11.72	3.646;	
131	3.589	0.051	10.7	0.0747	13.37	-12.97	4.227;	surface, matched energy radial vel = 0.19m/s;

10-port diff ser
0.9 mgd (2005)

/ UM3.
Case 5; ambient file C:\Plumes\Ridge Columbia.001.db; Diffuser table record 5: ----------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
1.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
2.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
3.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
4.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
5.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
6.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	Spacing	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(ft)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
0.25	2.0	30.0	169.0	10.0	2.5	21.7	217.0	17.0	0.9	0.05	24.0	1.0

Simulation:
Froude number: 33.89; effleunt density (sigma-T) -2.603; effleunt velocity 0.865(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	x-posn	y-posn	
	(ft)	(m/s)	(ft)	(kg/kg)	()	(ft)	(ft)	
0	17.0	0.051	0.25	1.0	1.0	0.0	0.0;	
25	16.84	0.051	0.405	0.61	1.64	-0.27	0.0586;	
50	16.61	0.051	0.659	0.372	2.69	-0.658	0.166;	
75	16.3	0.051	1.063	0.226	4.413	-1.185	0.361;	
100	15.89	0.051	1.687	0.138	7.239	-1.845	0.71;	
116	15.6	0.051	2.231	0.101	9.937	-2.311	1.047;	merging;
125	15.19	0.051	2.718	0.0846	11.81	-2.932	1.599;	
150	13.65	0.051	6.039	0.0516	19.38	-5.028	4.114;	
175	11.8	0.051	14.45	0.0314	31.79	-7.037	7.88;	
179	11.48	0.051	16.58	0.029	34.41	-7.333	8.603;	bottom hit;
189	10.68	0.051	23.27	0.0238	41.94	-8.039	10.57;	surface;

10-port diffuser
1.1 mgd (2009)

/ UM3.
Case 6; ambient file C:\Plumes\Ridge Columbia.001.db; Diffuser table record 6: ----------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
1.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
2.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
3.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
4.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
5.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
6.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(ft)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
0.25	2.0	30.0	169.0	10.0	21.7	217.0	17.0	1.1	0.05	24.0	1.0

Simulation:
Froude number: 41.42; effleunt density (sigma-T) -2.603; effleunt velocity 1.057(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	x-posn	y-posn	
	(ft)	(m/s)	(ft)	(kg/kg)	()	(ft)	(ft)	
0	17.0	0.051	0.25	1.0	1.0	0.0	0.0;	
25	16.84	0.051	0.405	0.61	1.64	-0.28	0.0597;	
50	16.59	0.051	0.66	0.372	2.69	-0.691	0.167;	
75	16.25	0.051	1.07	0.226	4.413	-1.264	0.361;	
100	15.8	0.051	1.712	0.138	7.239	-2.006	0.709;	
117	15.43	0.051	2.32	0.0989	10.1	-2.607	1.091;	merging;
125	14.98	0.051	2.787	0.0844	11.84	-3.308	1.629;	
150	13.06	0.051	6.218	0.0514	19.42	-6.012	4.391;	
175	10.74	0.051	15.08	0.0314	31.86	-8.674	8.573;	
183	9.968	0.051	19.97	0.0268	37.33	-9.431	10.18;	bottom hit;
185	9.775	0.051	21.41	0.0257	38.84	-9.612	10.6;	surface;

10-port diffuser
2.5 mgd (2019)

/ UM3.
Case 7; ambient file C:\Plumes\Ridge Columbia.001.db; Diffuser table record 7: ---------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
1.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
2.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
3.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
4.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
5.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
6.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(ft)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
0.25	2.0	30.0	169.0	10.0	21.7	217.0	17.0	2.5	0.05	24.0	1.0

Simulation:
Froude number: 94.13; effleunt density (sigma-T) -2.603; effleunt velocity 2.402(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	x-posn	y-posn	
	(ft)	(m/s)	(ft)	(kg/kg)	()	(ft)	(ft)	
0	17.0	0.051	0.25	1.0	1.0	0.0	0.0;	
25	16.82	0.051	0.406	0.61	1.64	-0.309	0.0627;	
50	16.54	0.051	0.664	0.372	2.69	-0.79	0.17;	
75	16.11	0.051	1.085	0.226	4.413	-1.515	0.358;	
100	15.49	0.051	1.765	0.138	7.239	-2.562	0.688;	
118	14.88	0.051	2.494	0.0966	10.34	-3.579	1.086;	merging;
125	14.35	0.051	2.954	0.0841	11.88	-4.462	1.484;	
150	10.84	0.051	6.731	0.0513	19.48	-10.03	4.642;	
171	6.328	0.051	14.52	0.0338	29.53	-16.47	9.672;	surface;

10-port diff @
3.7 mgd (2024)

/ UM3.
Case 8; ambient file C:\Plumes\Ridge Columbia.001.db; Diffuser table record 8: ---------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
1.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
2.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
3.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
4.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
5.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734
6.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007	-1.734

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(ft)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
0.25	2.0	30.0	169.0	10.0	21.7	217.0	17.0	3.7	0.05	24.0	1.0

Simulation:
Froude number: 139.3; effleunt density (sigma-T) -2.603; effleunt velocity 3.555(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	x-posn	y-posn	
	(ft)	(m/s)	(ft)	(kg/kg)	()	(ft)	(ft)	
0	17.0	0.051	0.25	1.0	1.0	0.0	0.0;	
25	16.81	0.051	0.406	0.61	1.64	-0.318	0.0635;	
50	16.52	0.051	0.665	0.372	2.69	-0.82	0.171;	
75	16.06	0.051	1.088	0.226	4.413	-1.596	0.356;	
100	15.38	0.051	1.776	0.138	7.239	-2.756	0.677;	
118	14.7	0.051	2.52	0.0966	10.34	-3.895	1.049;	merging;
125	14.14	0.051	2.991	0.0841	11.88	-4.841	1.397;	
150	10.16	0.051	6.884	0.0513	19.48	-11.36	4.318;	
167	5.55	0.051	12.93	0.0366	27.28	-18.5	8.422;	surface;

COSMOPOLITAN ENGINEERING GROUP

Appendix E-2

Columbia River Alternatives –
Chronic Dilution Model Results

NOTE: Ambient conditions for these model runs are taken from Memorandum dated April 7, 2004, from Anise Ahmed to David Knight titled, "Salmon Creek WWTP Outfall Dilution Study: final dilution factors."

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/ UM3. 1/27/2005 4:54:26 PM

Case 1; ambient file C:\Plumes\Ridge Columbia.001.db; Diffuser table record 1: -----------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
1.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
2.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
3.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
4.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
5.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
6.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(ft)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
0.8333	2.0	45.0	169.0	1.0	21.7	217.0	17.0	0.5	0.05	24.0	1.0

Simulation:

Froude number: 9.281; effleunt density (sigma-T) -2.603; effleunt velocity 0.432(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	x-posn	y-posn	
	(ft)	(m/s)	(ft)	(kg/kg)	()	(ft)	(ft)	
0	17.0	0.074	0.833	1.0	1.0	0.0	0.0;	
25	16.46	0.074	1.335	0.61	1.64	-0.529	0.145;	
50	15.77	0.074	2.116	0.372	2.69	-1.181	0.457;	
75	15.03	0.074	3.237	0.226	4.413	-1.848	1.0;	
100	14.29	0.074	4.703	0.138	7.239	-2.468	1.848;	
125	13.5	0.074	6.48	0.0841	11.88	-3.071	3.223;	
150	12.53	0.074	8.596	0.0513	19.48	-3.709	5.645;	
175	11.23	0.074	11.18	0.0313	31.96	-4.403	9.979;	
200	9.403	0.074	14.41	0.0191	52.44	-5.127	17.41;	
209	8.582	0.074	15.77	0.0159	62.67	-5.387	21.12;	acute zone;
214	8.082	0.074	16.58	0.0144	69.19	-5.531	23.47;	surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 5.05 m

conc	dilutn	width	distnce	time				
(kg/kg)		(m)	(m)	(hrs)	(kg/kg)	(s-1)	(m/s)	(m0.67/s2)
8.44E-3	118.5	11.89	66.14	0.221	0.0	0.0	0.074	7.00E-4

count: 1

/ UM3.

Case 2; ambient file C:\Plumes\Ridge Columbia.001.db; Diffuser table record 2: ----------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
1.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
2.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
3.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
4.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
5.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
6.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(ft)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
0.8333	2.0	45.0	169.0	1.0	21.7	217.0	17.0	0.7	0.05	24.0	1.0

Simulation:

Froude number: 12.99; effleunt density (sigma-T) -2.603; effleunt velocity 0.605(m/s);

Step	Depth (ft)	Amb-cur (m/s)	P-dia (ft)	Polutnt (kg/kg)	Dilutn ()	x-posn (ft)	y-posn (ft)
0	17.0	0.074	0.833	1.0	1.0	0.0	0.0;
25	16.38	0.074	1.341	0.61	1.64	-0.604	0.152;
50	15.55	0.074	2.154	0.372	2.69	-1.399	0.469;
75	14.56	0.074	3.375	0.226	4.413	-2.323	1.06;
100	13.53	0.074	5.079	0.138	7.239	-3.231	1.997;
125	12.48	0.074	7.255	0.0841	11.88	-4.086	3.437;
150	11.3	0.074	9.879	0.0513	19.48	-4.945	5.806;
175	9.811	0.074	13.03	0.0313	31.96	-5.867	9.979;
198	7.963	0.074	16.58	0.0198	50.4	-6.777	16.57; surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 5.05 m

conc	dilutn	width	distnce	time				
(kg/kg)		(m)	(m)	(hrs)	(kg/kg)	(s-1)	(m/s)	(m0.67/s2)
1.14E-2	87.41	12.04	66.14	0.228	0.0	0.0	0.074	7.00E-4

count: 1

/ UM3.
Case 3; ambient file C:\Plumes\Ridge Columbia.001.db; Diffuser table record 3: ---------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
1.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
2.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
3.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
4.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
5.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
6.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(ft)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
0.8333	2.0	45.0	169.0	1.0	21.7	217.0	17.0	1.7	0.05	24.0	1.0

Simulation:
Froude number: 31.56; effleunt density (sigma-T) -2.603; effleunt velocity 1.47(m/s);

Step	Depth (ft)	Amb-cur (m/s)	P-dia (ft)	Polutnt (kg/kg)	Dilutn ()	x-posn (ft)	y-posn (ft)
0	17.0	0.074	0.833	1.0	1.0	0.0	0.0;
25	16.23	0.074	1.35	0.61	1.64	-0.757	0.165;
50	15.09	0.074	2.2	0.372	2.69	-1.866	0.475;
75	13.5	0.074	3.562	0.226	4.413	-3.407	1.061;
100	11.4	0.074	5.681	0.138	7.239	-5.399	2.144;
125	8.988	0.074	8.815	0.0841	11.88	-7.614	3.937;
150	6.49	0.074	13.12	0.0513	19.48	-9.781	6.637;
155	5.983	0.074	14.12	0.0464	21.51	-10.2	7.319; surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 4.30 m

conc	dilutn	width	distnce	time				
(kg/kg)		(m)	(m)	(hrs)	(kg/kg)	(s-1)	(m/s)	(m0.67/s2)
2.54E-2	39.39	10.84	66.14	0.234	0.0	0.0	0.074	7.00E-4

count: 1

/ UM3.
Case 4; ambient file C:\Plumes\Ridge Columbia.001.db; Diffuser table record 4: ------------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
1.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
2.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
3.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
4.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
5.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
6.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(ft)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
0.8333	2.0	45.0	169.0	1.0	21.7	217.0	17.0	2.7	0.05	24.0	1.0

Simulation:
Froude number: 50.12; effleunt density (sigma-T) -2.603; effleunt velocity 2.335(m/s);

	Depth	Amb-cur	P-dia	Polutnt	Dilutn	x-posn	y-posn
Step	(ft)	(m/s)	(ft)	(kg/kg)	()	(ft)	(ft)
0	17.0	0.074	0.833	1.0	1.0	0.0	0.0;
25	16.17	0.074	1.351	0.61	1.64	-0.809	0.17;
50	14.92	0.074	2.209	0.372	2.69	-2.04	0.475;
75	13.08	0.074	3.599	0.226	4.413	-3.836	1.035;
100	10.51	0.074	5.819	0.138	7.239	-6.322	2.067;
125	7.137	0.074	9.262	0.0841	11.88	-9.514	3.933;
141	4.706	0.074	12.3	0.0613	16.3	-11.76	5.713; surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 3.75 m

conc	dilutn	width	distnce	time				
(kg/kg)		(m)	(m)	(hrs)	(kg/kg)	(s-1)	(m/s)	(m0.67/s2)
3.23E-2	30.99	9.809	66.14	0.233	0.0	0.0	0.074	7.00E-4

count: 1

```
/ UM3.
Case 5; ambient file C:\Plumes\Ridge Columbia.001.db; Diffuser table record 5: ----------------------------------

Ambient Table:
     Depth   Amb-cur   Amb-dir   Amb-sal   Amb-tem   Amb-pol     Decay   Far-spd   Far-dir   Disprsn   Density
         m       m/s       deg       psu         C     kg/kg       s-1       m/s       deg  m0.67/s2   sigma-T
       0.0     0.074      90.0      0.08      20.3       0.0       0.0     0.074      90.0    0.0007    -1.734
       1.0     0.074      90.0      0.08      20.3       0.0       0.0     0.074      90.0    0.0007    -1.734
       2.0     0.074      90.0      0.08      20.3       0.0       0.0     0.074      90.0    0.0007    -1.734
       3.0     0.074      90.0      0.08      20.3       0.0       0.0     0.074      90.0    0.0007    -1.734
       4.0     0.074      90.0      0.08      20.3       0.0       0.0     0.074      90.0    0.0007    -1.734
       5.0     0.074      90.0      0.08      20.3       0.0       0.0     0.074      90.0    0.0007    -1.734
       6.0     0.074      90.0      0.08      20.3       0.0       0.0     0.074      90.0    0.0007    -1.734

Diffuser table:
   P-dia  P-elev V-angle H-angle   Ports Spacing AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (ft)    (ft)   (deg)   (deg)      ()    (ft)    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
    0.25     2.0    30.0   169.0    10.0     2.5    21.7   217.0    17.0     0.5    0.05    24.0     1.0

Simulation:
Froude number:      18.83; effleunt density (sigma-T)    -2.603; effleunt velocity      0.48(m/s);
         Depth  Amb-cur    P-dia  Polutnt   Dilutn   x-posn   y-posn
Step      (ft)    (m/s)     (ft)  (kg/kg)       ()     (ft)     (ft)
   0      17.0    0.074     0.25      1.0      1.0      0.0      0.0;
  25     16.88    0.074    0.402     0.61     1.64   -0.203   0.0513;
  50     16.73    0.074    0.642    0.372     2.69   -0.459    0.155;
  75     16.55    0.074    0.995    0.226    4.413   -0.745    0.341;
 100     16.38    0.074    1.466    0.138    7.239    -1.02    0.631;
 111     16.31    0.074    1.706    0.111    9.001   -1.137    0.806; merging;
 125     16.09    0.074    2.299   0.0849    11.77   -1.462    1.427;
 150      15.6    0.074    4.915   0.0517    19.31    -2.09    3.195;
 165     15.22    0.074    7.821   0.0384    25.99   -2.507    4.923; bottom hit;
 175     14.91    0.074    10.55   0.0315    31.68   -2.809    6.518;
 200     13.35    0.074    18.54   0.0192    51.98   -3.902    14.93;
 212     12.13    0.074    23.55   0.0152    65.93   -4.501    21.37; acute zone;
 214     11.89    0.074    24.51   0.0146    68.59   -4.601     22.6; surface;
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of       9.82 m
    conc  dilutn   width distnce    time
 (kg/kg)             (m)     (m)   (hrs) (kg/kg)    (s-1)   (m/s)(m0.67/s2)
 1.00E-2    99.6   19.45   66.14   0.222     0.0      0.0   0.074 7.00E-4
count: 1
```

/ UM3.

Case 6; ambient file C:\Plumes\Ridge Columbia.001.db; Diffuser table record 6: -----------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
1.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
2.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
3.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
4.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
5.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
6.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(ft)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
0.25	2.0	30.0	169.0	10.0	21.7	217.0	17.0	0.7	0.05	24.0	1.0

Simulation:

Froude number: 26.36; effleunt density (sigma-T) -2.603; effleunt velocity 0.672(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	x-posn	y-posn	
	(ft)	(m/s)	(ft)	(kg/kg)	()	(ft)	(ft)	
0	17.0	0.074	0.25	1.0	1.0	0.0	0.0;	
25	16.86	0.074	0.403	0.61	1.64	-0.23	0.0543;	
50	16.68	0.074	0.651	0.372	2.69	-0.536	0.16;	
75	16.46	0.074	1.029	0.226	4.413	-0.91	0.356;	
100	16.22	0.074	1.569	0.138	7.239	-1.306	0.677;	
113	16.09	0.074	1.915	0.107	9.364	-1.505	0.905;	merging;
125	15.82	0.074	2.476	0.085	11.76	-1.917	1.5;	
150	15.14	0.074	5.429	0.0518	19.29	-2.867	3.454;	
166	14.63	0.074	9.162	0.0377	26.48	-3.487	5.338;	bottom hit;
175	14.3	0.074	12.2	0.0316	31.64	-3.844	6.713;	
200	13.15	0.074	25.51	0.0192	51.91	-4.879	12.35;	
202	13.0	0.074	26.61	0.0185	54.01	-4.991	13.13;	surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 10.46 m

conc	dilutn	width	distnce	time				
(kg/kg)		(m)	(m)	(hrs)	(kg/kg)	(s-1)	(m/s)	(m0.67/s2)
1.27E-2	78.52	20.75	66.14	0.232	0.0	0.0	0.074	7.00E-4

count: 1

/ UM3.
Case 7; ambient file C:\Plumes\Ridge Columbia.001.db; Diffuser table record 7: ----------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
1.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
2.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
3.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
4.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
5.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
6.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(ft)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
0.25	2.0	30.0	169.0	10.0	21.7	217.0	17.0	1.7	0.05	24.0	1.0

Simulation:
Froude number: 64.01; effleunt density (sigma-T) -2.603; effleunt velocity 1.633(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	x-posn	y-posn
	(ft)	(m/s)	(ft)	(kg/kg)	()	(ft)	(ft)
0	17.0	0.074	0.25	1.0	1.0	0.0	0.0;
25	16.83	0.074	0.405	0.61	1.64	-0.283	0.06;
50	16.59	0.074	0.661	0.372	2.69	-0.701	0.167;
75	16.24	0.074	1.073	0.226	4.413	-1.288	0.362;
100	15.78	0.074	1.721	0.138	7.239	-2.058	0.709;
117	15.4	0.074	2.342	0.0989	10.11	-2.692	1.095; merging;
125	14.94	0.074	2.823	0.0844	11.84	-3.441	1.644;
150	13.0	0.074	6.396	0.0514	19.43	-6.459	4.58;
175	10.83	0.074	15.73	0.0313	31.87	-9.477	9.067;
179	10.49	0.074	18.14	0.029	34.5	-9.906	9.894; bottom hit;
184	10.08	0.074	21.65	0.0262	38.09	-10.42	10.96; surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 8.94 m

conc	dilutn	width	distnce	time				
(kg/kg)		(m)	(m)	(hrs)	(kg/kg)	(s-1)	(m/s)	(m0.67/s2)
1.74E-2	57.38	18.42	66.14	0.231	0.0	0.0	0.074	7.00E-4

count: 1

/ UM3.

Case 8; ambient file C:\Plumes\Ridge Columbia.001.db; Diffuser table record 8: -----------------------------------

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
1.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
2.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
3.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
4.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
5.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734
6.0	0.074	90.0	0.08	20.3	0.0	0.0	0.074	90.0	0.0007	-1.734

Diffuser table:

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(ft)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
0.25	2.0	30.0	169.0	10.0	21.7	217.0	17.0	2.7	0.05	24.0	1.0

Simulation:

Froude number: 101.7; effleunt density (sigma-T) -2.603; effleunt velocity 2.594(m/s);

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	x-posn	y-posn	
	(ft)	(m/s)	(ft)	(kg/kg)	()	(ft)	(ft)	
0	17.0	0.074	0.25	1.0	1.0	0.0	0.0;	
25	16.82	0.074	0.405	0.61	1.64	-0.301	0.0618;	
50	16.55	0.074	0.663	0.372	2.69	-0.761	0.169;	
75	16.15	0.074	1.082	0.226	4.413	-1.439	0.36;	
100	15.59	0.074	1.754	0.138	7.239	-2.386	0.698;	
117	15.11	0.074	2.421	0.0986	10.14	-3.196	1.066;	merging;
125	14.56	0.074	2.924	0.0841	11.88	-4.111	1.556;	
150	11.64	0.074	6.683	0.0513	19.48	-8.83	4.821;	
175	7.884	0.074	16.82	0.0313	31.96	-14.42	10.49;	
176	7.736	0.074	17.46	0.0306	32.6	-14.63	10.75;	surface;

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 7.67 m

conc	dilutn	width	distnce	time				
(kg/kg)		(m)	(m)	(hrs)	(kg/kg)	(s-1)	(m/s)	(m0.67/s2)
1.97E-2	50.73	16.33	66.14	0.228	0.0	0.0	0.074	7.00E-4

count: 1

;

4:54:27 PM. amb fills: 2

COSMOPOLITAN ENGINEERING GROUP

Appendix F

Water Quality Spreadsheets

Civil, Environmental, and Recreational Consulting

Printed on Recycled Paper

COSMOPOLITAN
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Appendix F-1

2004 Ambient Data

Civil, Environmental,
and Recreational
Consulting

Printed on Recycled Paper

Total

Sample Location	Method	units	Date Collected	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Nickel	Selenium	Silver	Thallium	Zinc	Method	units	Mercury
Ambient	200.8	ug/L	8/10/2004	0.46	7.2	0.121	0.11	1.54	2.32	0.491	2.16	[illegible]	0.103	0.108	3.4	245.1	ug/L	0.05
Ambient	200.8	ug/L	8/31/2004	0.14	1.2	[illegible]	0.02	0.53	1.36	0.269	1.6	[illegible]	0.0045	[illegible]	2.5	245.1	ug/L	0.02
Ambient - dup	200.8	ug/L	8/31/2004	0.15	1.3	[illegible]	0.02	0.47	1.28	0.263	1.5	[illegible]	0.0045	[illegible]	3.2	245.1	ug/L	0.02
Ambient	200.8	ug/L	10/27/2004	0.16	1	[illegible]	0.01	0.48	1.26	0.25	1.51	[illegible]	0.005	[illegible]	4	245.1	ug/L	0.05
Ambient	200.8	ug/L	12/27/2004	0.12	0.5	[illegible]	0.023	0.39	1.39	0.23	1.55	0.05	0.005	[illegible]	20.7	1631	ug/l	0.018
Geometric Mean				0.20	1.83	0.03	0.03	0.66	1.50	0.31	1.67	0.36	0.01	0.03	3.23			0.03
Estimated 90th %ile				0.35	3.19	0.04	0.04	1.14	2.61	0.53	2.91	0.62	0.02	0.04	5.62			0.05
Acute Water Quality Standard												20.00						
Chronic Water Quality Standard												5.00						0.012
Sludge	200.8	ug/L	8/31/2004	16.60	97.2	4.17	78.3	602	19300	802	377	179	33.6	1.03	20800	245.1	ug/L	12.5
Influent	200.8	ug/L	8/31/2004	0.19	2.2	0.024	0.3	4.92	102	3.39	6	1.7	0.065	[illegible]	137	245.1	ug/L	0.02
Effluent	200.8	ug/L	9/2/2004	0.419	2.12	0.0035	0.085	0.47	10.5	0.219	1.49	0.1	0.001	0.0015	39	245.1	ug/L	0.05
Sludge	200.8/200.9	ug/L	12/27/2004	10.700	[illegible]	2.85	42.6	321	14900	524	276	[illegible]	12.7	0.689	14800	245.1	ug/L	6.36
Influent	200.8/200.9	ug/L	12/27/2004	0.330	1	[illegible]	0.462	2.95	107	2.47	4.54	1	0.21	0.004	157	1631	ug/l	1.05
Effluent	200.8	ug/L	12/30/2004	0.161	0.94	0.0035	0.097	0.49	11.1	0.532	1	[illegible]	[illegible]	[illegible]	109		ug/l	0.011

Dissolved

Sample Location	Method	units	Date Collected	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Nickel	Selenium	Silver	Thallium	Zinc	Method	units	Mercury
Ambient	200.8	ug/L	8/10/2004	0.42	6.8	[illegible]	0.01	0.64	1.6	0.022	1.46	[illegible]	[illegible]	0.04	0.8	245.1	ug/L	0.05
Ambient	200.8	ug/L	8/31/2004	0.17	1.1	[illegible]	0.01	0.23	0.84	[illegible]	1.3	[illegible]	[illegible]	[illegible]	0.5	245.1	ug/L	0.02
Ambient - dup	200.8	ug/L	8/31/2004	0.18	1.1	0.003	0.01	0.25	0.81	0.0045	1.3	[illegible]	0.0045	[illegible]	4.2	245.1	ug/L	0.02
Ambient	200.8	ug/L	10/27/2004	0.18	0.9	0.005	0.01	0.28	0.84	[illegible]	1.22	[illegible]	[illegible]	[illegible]	0.8	245.1	ug/L	0.05
Ambient	200.8/200.9	ug/L	12/27/2004	0.12	0.5	0.005	0.027	[illegible]	1.03	0.03	1.19	0.5	0.005	[illegible]	6.69		ug/l	0
Geometric Mean				0.22	1.65	0.01	0.01	0.32	0.98	0.01	1.32	0.32	0.01	0.02	1.08			#NUM!
Estimated 90th %ile				0.38	2.87	0.01	0.02	0.55	1.70	0.02	2.29	0.56	0.02	0.03	1.87			#NUM!
Acute Water Quality Standard				9000.00	360.00	130.00	1.83	15.00	9.22	31.61	816.64		1.13	1400.00	65.98			2.10
Chronic Water Quality Standard				1600.00	190.00	5.30	0.64	10.00	6.51	1.23	90.69		---	40.00	60.25			
Effluent	200.8	ug/L	9/2/2004	0.398	1.94	0.0035	0.077	0.33	9.62	0.319	1.26	[illegible]	0.001	0.0015	30.9	245.1	ug/L	0.05
Effluent	200.8	ug/L	12/29/2004	0.156	0.92	0.0035	0.093	0.63	9.82	0.489	0.87	0.1	0.001	0.0015	94.4	245.1	ug/l	0.02

Transfer Blanks

Sample Location	Method	units	Date Collected	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Nickel	Selenium	Silver	Thallium	Zinc	Method	units	Mercury
Ambient	200.8	ug/L	8/10/2004	0.01	0.1	[illegible]	0.02	0.22	0.63	0.063	[illegible]	0.1	0.0045	[illegible]	1.6	245.1	ug/l	0.05
Ambient	200.8/200.9	ug/L	12/27/2004	0.01	0.5	0.005	[illegible]	[illegible]	0.33	0.04	0.03	0.5	0.005	0.002	0.86	245.1	ug/L	0.02
Effluent	200.8	ug/l	12/29/2004	[illegible]	0.045	0.0035	0.0035	0.03	0.76	0.088	0.03	0.1	0.001	0.0015	2.2	245.1	ug/L	0.02

Note: Yellow highlighted cells indicate the compound was analyzed for, but not detected at or above the MRL/MDL. (Data qualifier U)
And value recorded in the spreadsheet is 1/2 of the reported result.
Green highlighted cells indicate the result is an estimated concentration. (Data qualifier B)

Translator Calculation

				Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Nickel	Selenium	Silver	Thallium	Zinc			Mercury
Dissolved	Mean			0.2375	2.4750	0.0070	0.0100	0.3500	1.0225	0.0141	1.3200	0.3250	0.0114	0.0215	1.5750			0.0350
Total	Mean			0.2275	2.6750	0.0420	0.0400	0.7550	1.5550	0.3183	1.6925	0.3750	0.0293	0.0393	3.2750			0.0350
Translator				1.0440	0.9252	0.1667	0.2500	0.4636	0.6576	0.0444	0.7799	0.8667	0.3889	0.5478	0.4809			1.0000

Cyanide							
Sample Location	Date Collected	Method	units	Cyanide	Comments	MRL	Value for Calculation
Ambient	8/10/2004	335.2	mg/L	ND		0.01	0
Ambient	8/31/2004	335.2	mg/L	ND		0.01	0
Ambient - dup	8/31/2004	335.2	mg/L	ND		0.01	0
Ambient	10/27/2004	335.2	mg/L	ND		0.01	0
Geometric Mean							#NUM!
Estimated 90th %ile							0
Acute Water Quality Standard							0.022
Chronic Water Quality Standard							0.0052
Effluent	9/2/2004	335.2	mg/L	ND		0.01	0

Phenolics, Total							
Sample Location	Date Collected	Method	units	Phenolics, Total	Comments	MRL	Value for Calculation
Ambient	8/10/2004	420.1	mg/L	0.003	J	0.01	0.003
Ambient	8/31/2004	335.2	mg/L	ND		0.01	0.000001
Ambient - dup	8/31/2004	335.2	mg/L	ND		0.01	0.000001
Ambient	10/27/2004	420.1	mg/L	ND		0.01	0.000001
Geometric Mean							7.40083E-06
Estimated 90th %ile							1.28774E-05
Acute Water Quality Standard							10.2
Chronic Water Quality Standard							2.56
Effluent	9/2/2004	335.2	mg/L	0.008	J	0.01	0.008

Total Ammonia Nitrogen				
Sample Location				
Ambient	90th %ile		mg/L	0.1
Effluent	95th %ile		mg/L	0.48
Acute Water Quality Standard				1.1
Chronic Water Quality Standard				0.18

Appendix F-2

Metals and Ammonia Criteria Worksheets

COSMOPOLITAN ENGINEERING GROUP

Civil, Environmental, and Recreational Consulting

Printed on Recycled Paper

SPREADSHEET CREATED BY D. NUNNALLEE, REV. 1-92 BY G. SHERVEY
Last revision date 9/03

FACILITY:

FILENAME:
RUN DATE 12/14/2005
PREPARED BY:

WATER QUALITY CRITERIA (in ug/L unless otherwise noted)

Pollutant, CAS No. & Application Ref. No.	PRIORITY PLTNT	CARCINGEN	Water Quality Criteria: Fresh acute	Fresh chronic	Marine acute	Marine chronic	Human Health Criteria: Fresh	Marine	Organoleptic Effects	Metals Translators: Freshwater Acute	Freshwater Chronic	Marine Acute	Marine Chronic
ESS VALUE USED FOR HARDNESS DEPENDENT LIMITS>>>>				60.00	mg/L								
* = INSUFFIFIENT DATA TO DEVELOP CRITERIA													
ALUE PRESENTED IS TH L.O.E.L- LOWEST OBSERVED													

d font = National Toxics Rule (FR 64, Nov. 9, 199 | Blue font = EPA National Recommended Water Quality Criteria:2002 (EPA 822-R-02-47)
Black font = WAC 173-201A (Nov. 1997) | Green font = Other source - see comment

WATER QUALITY CRITERIA (in ug/L unless otherwise noted)

Pollutant, CAS No. & NPDES Application Ref. No.	PRIORITY PLTNT	CARCINGEN	Water Quality Criteria: Fresh acute	Fresh chronic	Marine acute	Marine chronic	Human Health Criteria: Fresh	Marine	Organoleptic Effects	Metals Translators: Freshwater Acute	Freshwater Chronic	Marine Acute	Marine Chronic
EIVING WATER TSS (IF UNKNOWN LEAVE BLANK) >	0												
INSERT A, OR IF FROM CRITICAL PERIOD INSERT S>	S												
ENTER HARDNESS>>>>>>>>>	60												
ARSENIC (dissolved) 7440382 2M	Y	Y	360	190	69	36				1.00	1.00	1.00	
ARSENIC (inorganic)	Y	Y					0.018	0.14					
CADMIUM - 7440439 4M Hardness dependent	Y	N	2.13	0.71	42.00	9.3				0.943	0.943	0.994	0.994
Based on hardness in next column	60												
CHROMIUM(TRI) -16065831 5M Hardness dependent	N	N	361.14	117.15									
Based on hardness in next column	60.0									0.316	0.86		
COPPER - 744058 6M Hardness dependent	Y	N	10.52	7.34	4.80	3.10			1000.00	0.996	0.996	0.83	0.83
Based on hardness in next column	60.0												
CYANIDE 57125 14M	Y	N	22	5.20	1.00	1.00	700	220000					
LEAD - 7439921 7M Dependent on hardness	Y	N	36.88	1.44	210.00	8.10				0.466	0.466	0.951	0.95
Based on hardness in next column	60.0												
MERCURY 7439976 8M	Y	N	2.10	0.012	1.80	0.0250	0.14	0.15		0.85		0.85	
NICKEL - 7440020 9M - Dependent on hardness	Y	N	918.75	102.03	74.00	8.20	610	4600		0.998	0.997	0.99	0.99
Based on hardness in next column	60.0												
SELENIUM 7782492 10M	Y	N	20	5	290	71	170.00	4200.00					
SILVER - 7740224 11M dependent on hardness.	Y	N	1.43	NA	1.90	NA				0.85		0.85	
Based on hardness in next column	60.0												
SULFIDE, HYDROGEN SULFIDE 7783064	N	N		2.0		2.0							
ZINC- 7440666 13M hardness dependent	Y	N	74.24	67.79	90.00	81.00			5000.00	0.996	0.996	0.946	0.946
Based on hardness in next column	60.0												
* = INSUFFICIENT DATA TO DEVELOP CRITERIA VALUE PRESENTED IS THE L.O.E.L- LOWEST OBSERVED													
CADMIUM ACUTE CONVERSION FACTOR			0.97										
CADMIUM CHRONIC CONVERSION FACTOR			0.93										
LEAD CONVERSION FACTOR			0.87										

12/14/2005 2:54 PM
tsdcalc11.xls
AMMONIAfw.XLS

AMMONIA WATER QUALITY CRITERIA CALCULATION

NPDES Permit #

Calculation Of Ammonia Concentration and Criteria for fresh water. Based on EPA Quality Criteria for Water (EPA 400/5-86-001) and WAC 173-201A. Revised 1-5-94 (corrected total ammonia criterion). Revised 3/10/95 to calculate chronic criteria in accordance with EPA Memorandum from Heber to WQ Stds Coordinators dated July 30, 1992.

INPUT	
1. Ambient Temperature (deg C; 0<T<30)	24.5
2. Ambient pH (6.5<pH<9.0)	8.60
3. Acute TCAP (Salmonids present- 20; absent- 25)	20
4. Chronic TCAP (Salmonids present- 15; absent- 20)	15

OUTPUT	
1. Intermediate Calculations:	
Acute FT	1.00
Chronic FT	1.41
FPH	1.00
RATIO	14
pKa	9.26
Fraction Of Total Ammonia Present As Un-ionized	17.9431%
2. Un-ionized Ammonia Criteria	
Acute (1-hour) Un-ionized Ammonia Criterion (ug NH3/L)	260.0
Chronic (4-day) Un-ionized Ammonia Criterion (ug NH3/L)	42.0
3. Total Ammonia Criteria:	
Acute Total Ammonia Criterion (mg NH3+ NH4/L)	1.4
Chronic Total Ammonia Criterion (mg NH3+ NH4/L)	0.2
4. Total Ammonia Criteria expressed as Nitrogen:	
Acute Ammonia Criterion as mg N	1.19
Chronic Ammonia Criterion as N	0.192

Appendix F-3

Projected Effluent Limits

WATER QUALITY BASED
PERMIT LIMIT CALCULATIONS

Dilution (Dil'n) factor is the inverse of the percent effluent concentration at the edge of the acute or chronic mixing zone.

Permit Limit Calculation Summary

PARAMETER	Acute Dil'n Factor	Chronic Dil'n Factor	Metal Criteria Translator (Acute)	Metal Criteria Translator (Chronic)	Ambient Concentration ug/L	Water Quality Standard Acute ug/L	Water Quality Standard Chronic ug/L	Average Monthly Limit (AML) ug/L	Maximum Daily Limit (MDL) ug/L	Comments
Columbia River Single Port Alternative										
2019										
Ammonia-N	14.8	39			0.02	4.60	0.660	18.2	41.0	Units are mg/L
Cadmium	14.8	39	0.943	0.943	0.06	1.80	0.60	18.7	27.3	
Copper	14.8	39	0.996	0.996	2.82	8.90	6.30	63.9	93.2	
Lead	14.8	39	0.466	0.466	0.56	30.1	1.2	64.2	93.6	
Mercury	14.8	39			0.0012	2.100	0.012	0.48	0.69	
Nickel	14.8	39	0.998	0.997	20.00	787.0	87.5	2996	4370	
Silver	14.8	39	0.850		0.10	1.05	1000.00	11.4	16.7	
Zinc	14.8	39	0.996	0.996	1.26	63.6	58.0	636	928	
2024										
Ammonia-N	13.4	31			0.02	4.60	0.660	14.5	32.6	Units are mg/L
Cadmium	13.4	31	0.943	0.943	0.06	1.80	0.60	17.0	24.7	
Copper	13.4	31	0.996	0.996	2.82	8.90	6.30	56.0	84.6	
Lead	13.4	31	0.466	0.466	0.56	30.1	1.2	51.3	74.8	
Mercury	13.4	31			0.0012	2.100	0.012	0.38	0.55	
Nickel	13.4	31	0.998	0.997	20.00	787.0	87.5	2386	3481	
Silver	13.4	31	0.850		0.10	1.05	1000.00	10.3	15.1	
Zinc	13.4	31	0.996	0.996	1.26	63.6	58.0	576	840	

Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations / **Statistical variables for permit limit calculation**

PARAMETER	WLA Acute ug/L	WLA Chronic ug/L	LTA Acute ug/L	LTA Chronic ug/L	LTA Coeff. Var. (CV) decimal	LTA Prob'y Basis decimal	Limiting LTA ug/L	Coeff. Var. (CV) decimal	AML Prob'y Basis decimal	MDL Prob'y Basis decimal	# of Samples per Month n	
2019												
Ammonia-N	68	24.98	21.8	13.2	0.60	0.99	13.2	0.60	0.95	0.99	8.00	1.00
Cadmium	26	20.97	8.3	11.1	0.60	0.99	8.3	0.60	0.95	0.99	1.00	0.94
Copper	93	138.54	29.8	73.1	0.60	0.99	29.8	0.60	0.95	0.99	1.00	1.00
Lead	438	26.56	140.6	14.0	0.60	0.99	14.0	0.60	0.95	0.99	1.00	0.47
Mercury	31	0.42	10.0	0.2	0.60	0.99	0.2	0.60	0.95	0.99	1.00	1.00
Nickel	11372	2652.60	3651.2	1399.0	0.60	0.99	1399.0	0.60	0.95	0.99	1.00	1.00
Silver	14	38996.20	4.5	20567.9	0.60	0.99	4.5	0.60	0.95	0.99	1.00	0.85
Zinc	924	2214.12	296.6	1167.8	0.60	0.99	296.6	0.60	0.95	0.99	1.00	1.00
2024												
Ammonia-N	61	19.86	19.7	10.5	0.60	0.99	10.5	0.60	0.95	0.99	8.00	1.00
Cadmium	23	16.68	7.5	8.8	0.60	0.99	7.5	0.60	0.95	0.99	1.00	0.94
Copper	84	110.70	27.1	58.4	0.60	0.99	27.1	0.60	0.95	0.99	1.00	1.00
Lead	396	21.22	127.3	11.2	0.60	0.99	11.2	0.60	0.95	0.99	1.00	0.47
Mercury	28	0.34	9.0	0.2	0.60	0.99	0.2	0.60	0.95	0.99	1.00	1.00
Nickel	10298	2112.50	3306.5	1114.2	0.60	0.99	1114.2	0.60	0.95	0.99	1.00	1.00
Silver	13	30997.00	4.1	16348.9	0.60	0.99	4.1	0.60	0.95	0.99	1.00	0.85
Zinc	837	1760.20	268.6	928.4	0.60	0.99	268.6	0.60	0.95	0.99	1.00	1.00

WATER QUALITY BASED
PERMIT LIMIT CALCULATIONS

Dilution (Dil'n) factor is the inverse of the percent effluent concentration at the edge of the acute or chronic mixing zone.

	Permit Limit Calculation Summary										Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations							Statistical variables for permit limit calculation				
PARAMETER	Acute Dil'n Factor	Chronic Dil'n Factor	Metal Criteria Translator Acute	Metal Criteria Translator Chronic	Ambient Concentration ug/L	Water Quality Standard Acute ug/L	Water Quality Standard Chronic ug/L	Average Monthly Limit (AML) ug/L	Maximum Daily Limit (MDL) ug/L	Comments	WLA Acute ug/L	WLA Chronic ug/L	LTA Acute ug/L	LTA Chronic ug/L	LTA Coeff. Var. (CV) decimal	LTA Prob'y Basis decimal	Limiting LTA ug/L	Coeff. Var. (CV) decimal	AML Prob'y Basis decimal	MDL Prob'y Basis decimal	# of Samples per Month n	
Columbia River 10-Port Diffuser Alternative																						
2019																						
Ammonia-N	29.5	57			0.02	4.60	0.660	26.6	60.0	Units are mg/L	135	36.50	43.4	19.3	0.60	0.99	19.3	0.60	0.95	0.99	8.00	1.00
Cadmium	29.5	57	0.943	0.943	0.06	1.80	0.60	36.6	53.3		51	30.62	16.5	16.1	0.60	0.99	16.1	0.60	0.95	0.99	1.00	0.94
Copper	29.5	57	0.996	0.996	2.82	8.90	6.30	125.4	182.9		182	201.18	58.5	106.1	0.60	0.99	58.5	0.60	0.95	0.99	1.00	1.00
Lead	29.5	57	0.466	0.466	0.56	30.1	1.2	93.2	135.9		872	38.56	280.0	20.3	0.60	0.99	20.3	0.60	0.95	0.99	1.00	0.47
Mercury	29.5	57			0.0012	2.100	0.012	0.69	1.01		62	0.62	19.9	0.3	0.60	0.99	0.3	0.60	0.95	0.99	1.00	1.00
Nickel	29.5	57	0.998	0.997	20.00	787.0	87.5	4368	6372		22647	3867.50	7271.4	2039.8	0.60	0.99	2039.8	0.60	0.95	0.99	1.00	1.00
Silver	29.5	57	0.850		0.10	1.05	1000.00	22.7	33.1		28	56994.40	9.0	30060.8	0.60	0.99	9.0	0.60	0.95	0.99	1.00	0.85
Zinc	29.5	57	0.996	0.996	1.26	63.6	58.0	1267	1848		1840	3235.44	590.9	1706.5	0.60	0.99	590.9	0.60	0.95	0.99	1.00	1.00
2024																						
Ammonia-N	27.3	51			0.02	4.60	0.660	23.8	53.6	Units are mg/L	125	32.66	40.2	17.2	0.60	0.99	17.2	0.60	0.95	0.99	8.00	1.00
Cadmium	27.3	51	0.943	0.943	0.06	1.80	0.60	32.7	47.7		47	27.40	15.2	14.5	0.60	0.99	14.5	0.60	0.95	0.99	1.00	0.94
Copper	27.3	51	0.996	0.996	2.82	8.90	6.30	116.2	169.5		169	180.30	54.2	95.1	0.60	0.99	54.2	0.60	0.95	0.99	1.00	1.00
Lead	27.3	51	0.466	0.466	0.56	30.1	1.2	83.5	121.8		807	34.55	259.1	18.2	0.60	0.99	18.2	0.60	0.95	0.99	1.00	0.47
Mercury	27.3	51			0.0012	2.100	0.012	0.62	0.91		57	0.55	18.4	0.3	0.60	0.99	0.3	0.60	0.95	0.99	1.00	1.00
Nickel	27.3	51	0.998	0.997	20.00	787.0	87.5	3911	5705		20959	3462.50	6729.6	1826.2	0.60	0.99	1826.2	0.60	0.95	0.99	1.00	1.00
Silver	27.3	51	0.850		0.10	1.05	1000.00	21.0	30.8		26	50995.00	8.4	26896.5	0.60	0.99	8.4	0.60	0.95	0.99	1.00	0.85
Zinc	27.3	51	0.996	0.996	1.26	63.6	58.0	1172	1710		1703	2895.00	546.9	1526.9	0.60	0.99	546.9	0.60	0.95	0.99	1.00	1.00

WATER QUALITY BASED
PERMIT LIMIT CALCULATIONS

	[illegible]		Permit Limit Calculation Summary								Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations							Statistical variables for permit limit calculation															
PARAMETER	Acute Dil'n Factor	Chronic Dil'n Factor	Metal Criteria Translator Acute	Metal Criteria Translator Chronic	Ambient Concentration ug/L	Water Quality Standard Acute ug/L	Water Quality Standard Chronic ug/L	Average Monthly Limit (AML) ug/L	Maximum Daily Limit (MDL) ug/L	Comments	WLA Acute ug/L	WLA Chronic ug/L	LTA Acute ug/L	LTA Chronic ug/L	LTA Coeff. Var. (CV) decimal	LTA Prob'y Basis decimal	Limiting LTA ug/L	Coeff. Var. (CV) decimal	AML Prob'y Basis decimal	MDL Prob'y Basis decimal	# of Samples per Month n												
Lake River Single Port Alternative																																
2010 Flows																																
Ammonia-N	4.3	29.0			0.10	1.19	0.192	2.8	4.8	Units are mg/L	5	2.77	1.5	1.5	0.60	0.99	1.5	0.60	0.95	0.99	8.00	1.00							400.00				400.00
Cadmium	4.3	29.0	0.943	0.943	0.04	2.13	0.71	6.6	9.6		9	19.37	2.9	10.2	0.60	0.99	2.9	0.60	0.95	0.99	1.00	0.94											
Copper	4.3	29.0	0.996	0.996	2.61	10.62	7.34	25.2	36.8		37	139.66	11.8	73.7	0.60	0.99	11.8	0.60	0.95	0.99	1.00	1.00					0.50	0.77	130.87		0.90	1.39	8.22
Lead	4.3	29.0	0.466	0.466	0.53	36.9	1.4	64.8	94.6		157	26.83	50.4	14.2	0.60	0.99	14.2	0.60	0.95	0.99	1.00	0.47					0.70	1.08	93.78		1.10	1.69	6.90
Mercury	4.3	29.0				2.100	0.012	0.39	0.57		9	0.35	2.9	0.2	0.60	0.99	0.2	0.60	0.95	0.99	1.00	1.00					1.70	2.62	39.20		2.50	3.85	3.60
Nickel	4.3	29.0	0.998	0.997	2.91	918.7	102.0	2707	3949		3941	2877.62	1265.4	1517.7	0.60	0.99	1265.4	0.60	0.95	0.99	1.00	1.00					2.70	4.16	25.05		3.70	5.70	2.76
Silver	4.3	29.0	0.850		0.02	1.43	1000.00	4.9	7.2		6	25999.44	2.0	15295.3	0.60	0.99	2.0	0.60	0.95	0.99	1.00	0.85											
Zinc	4.3	29.0	0.996	0.996	5.62	74.2	67.8	207	302		301	1808.60	96.5	853.9	0.60	0.99	96.5	0.60	0.95	0.99	1.00	1.00											

REASONABLE POTENTIAL CALCULATION

NPDES Permit No.

This spreadsheet calculates the reasonable potential to exceed state water quality standards for a small number of samples. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-based Toxics Control, U.S. EPA, March, 1991 (EPA/505/2-90-001) on page 56.

				State Water Quality Standard		Max concentration at edge of...			CALCULATIONS									
	Metal Criteria Translator as decimal	Metal Criteria Translator as decimal	Ambient Concentration (metals as dissolved)	Acute	Chronic	Acute Mixing Zone	Chronic Mixing Zone	LIMIT REQ'D?	Effluent percentile value		Max effluent conc. measured (metals as total recoverable)	Coeff Variation		# of samples	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor	
Parameter	Acute	Chronic	ug/L	ug/L	ug/L	ug/L	ug/L			Pn	ug/L	CV	s	n				COMMENTS
Lake River Single Port Alternative																		
Ammonia-N			0.10	1.19	0.192	0.36	0.14	NO	0.95	0.972	1.41	0.60	0.55	104	0.87	4.3	29.0	
Cadmium	0.943	0.943	0.04	2.13	0.71	0.11	0.05	NO	0.95	0.224	0.10	0.60	0.55	2	3.79	4.3	29.0	
Copper	0.996	0.996	2.61	10.52	7.34	11.76	3.97	YES	0.95	0.224	11.1	0.60	0.55	2	3.79	4.3	29.0	
Lead	0.466	0.466	0.53	38.9	1.4	0.63	0.54	NO	0.95	0.224	0.53	0.60	0.55	2	3.79	4.3	29.0	
Mercury				2.100	0.012	0.01	0.00	NO	0.95	0.224	0.011	0.60	0.55	2	3.79	4.3	29.0	
Nickel	0.998	0.997	2.91	918.7	102.0	3.55	3.00	NO	0.95	0.224	1.49	0.60	0.55	2	3.79	4.3	29.0	
Silver	0.850		0.02	1.43	1000.00	0.02	0.02	NO	0.95	0.224	0.003	0.60	0.55	2	3.79	4.3	29.0	
Zinc	0.996	0.996	5.62	74.2	67.8	100.12	19.63	YES	0.95	0.224	109	0.60	0.55	2	3.79	4.3	29.0	

John Wilson

From: Bill Fox [BFox@cosmopolitaneng.com]
Sent: Thursday, February 15, 2007 11:42 AM
To: jwilson@g-o.com
Subject: RE: Ridgefield outfall

I don't think that case was ever presented. Here are the results for all metals for that case.

Dilution (Dil'n) factor is the inverse of the percent effluent concentration at the edge of the acute or chronic mixing zone.

			Permit Limit Calculation Summary							
	Acute Dil'n Factor	Chronic Dil'n Factor	Metal Criteria Translator	Metal Criteria Translator	Ambient Concentration	Water Quality Standard Acute	Water Quality Standard Chronic	Average Monthly Limit (AML)	Maximum Daily Limit (MDL)	Comments
PARAMETER			Acute	Chronic	ug/L	ug/L	ug/L	ug/L	ug/L	
Lake River Single Port Alternative										
2010 Flows										
Ammonia-N	4.6	42.0			0.10	1.19	0.192	2.3.	5.1	Units are mg/L
Cadmium	4.6	42.0	0.943	0.943	0.04	2.13	0.71	7.0	10.2	
Copper	4.6	42.0	0.996	0.996	2.61	10.52	7.34	26.8	39.1	
Lead	4.6	42.0	0.466	0.466	0.53	36.9	1.4	93.3	136.2	
Mercury	4.6	42.0				2.100	0.012	0.57	0.83	
Nickel	4.6	42.0	0.998	0.997	2.91	918.7	102.0	2896	4224	
Silver	4.6	42.0	0.850		0.02	1.43	1000.00	5.3	7.7	
Zinc	4.6	42.0	0.996	0.996	5.62	74.2	67.8	221	323	

-----Original Message-----
From: John Wilson [mailto:jwilson@g-o.com]
Sent: Thursday, February 15, 2007 11:15 AM
To: Bill Fox
Subject: FW: Ridgefield outfall

Bill:

Any chance I could get some help from you this morning on the copper limit described below?

Thanks,
John

John P. Wilson, P.E.
Gray & Osborne, Inc.
701 Dexter Ave N. Suite 200
Seattle WA, 98109

Ph(206)284-0860
Fx(206)283-3206

Memorandum

COSMOPOLITAN ENGINEERING GROUP

117 South 8th Street Phone (253) 265-2958
Tacoma, WA 98402 Fax (253) 265-6041
BFox@cosmopolitaneng.com

DATE: November 21, 2006

TO: David Knight, Ecology SWRO

FROM: Bill Fox, Cosmopolitan Engineering Group

RE: **FINAL ADDENDUM TO THE CITY OF RIDGEFIELD MIXING ZONE STUDY**

FILE: G/O014

cc: Mike Johnson, Gray & Osborne

WILLIAM P. FOX
STATE OF WASHINGTON
23463
REGISTERED PROFESSIONAL ENGINEER
11/22/06
EXPIRES: 10/29/07

PURPOSE AND SCOPE

This memorandum constitutes the FINAL ADDENDUM to the City of Ridgefield Mixing Zone Study, Part II – Future Discharge Alternatives, which was dated December 2005. This addendum includes the following additional data and analyses pursuant to comments received by Ecology on the Part II report:

- Final effluent design flows provided by Gray & Osborne from the Facility Planning documents
- Wastewater treatment plant and outfall improvements linked to the final effluent flow criteria
- Descriptions of Lake River and Columbia River outfall alternatives
- Documentation of critical ambient discharge for Lake River during the late summer low flow season
- Results of supplemental field studies in winter/spring 2006 to assess seasonal variability of ambient discharge in Lake River
- Final dilution model runs for each phased discharge alternative
- Calculation of ammonia limits for the Lake River discharge alternatives

PHASED WWTP DESIGN FLOWS

Per the City *of Ridgefield General Sewer and Wastewater Facility Plan* (Gray & Osborne, August 2006), the City intends to construct improvements to its Wastewater Treatment Plant (WWTP) to provide the following Design Flows.

Maximum Month Design Flow	Peak Day Design Flow	WWTP Improvements	Effluent Discharge Location
0.5 MGD	0.9 MGD	None	Lake River
0.7 MGD	1.14 MGD	Phase 1	Lake River
1.0 MGD	1.54 MGD	Phase 2A	Lake River
1.83 MGD	2.60 MGD	Phase 2A + Columbia River Outfall	Columbia River
2.68 MGD	3.71 MGD	Phase 2B + Columbia River Outfall	Columbia River

A summary of the WWTP improvements to be completed at each phase are provide below:

Phase 1

1. Convert existing circular aerobic digester to a secondary clarifier.
2. Convert existing rectangular back-up secondary clarifier to an aerobic digester.
3. Construct a new waste sludge thickening facility.
4. Construct a new secondary clarifier splitter box.
5. Extend the existing outfall 100 feet into Lake River.

Phase 2A

1. Construct headworks improvements.
2. Construct new Aerations Basins No. 1 and No. 2.
3. Install new aeration basin blowers.
4. Convert existing aeration basins to aerobic digesters.
5. Construct modifications to the UV disinfection system.
6. Construct a new effluent pump station.
7. Construct a sludge dewatering and drying system along with a solids handling building.

Phase 2B

1. Construct a third aeration basin.
2. Construct a third secondary clarifier.
3. Construct UV disinfection system modifications.
4. Construct a laboratory and office building.

OUTFALL ALTERNATIVES

The City of Ridgefield has committed to extending the outfall to the Columbia River mainstem, and have initiated engineering and environmental studies to obtain the necessary permits. However, the schedule for completing the Columbia River outfall is uncertain due to federal permit and easement requirements. Therefore, the following two outfall alternatives are established for this mixing zone study:

Lake River

The existing outfall will be extended into Lake River on an interim basis until the Columbia River outfall is completed. Plans and specifications for the outfall extension have been completed. The outfall will be extended to a depth of –7 feet mean lower low water (MLLW) datum. The terminus of the outfall would consist of a single 8-inch diameter nozzle discharging at a vertical angle of 30 degrees.

Columbia River

No outfall siting or diffuser design studies have been completed for the Columbia River alternative. For this mixing zone study we have assumed the new outfall would extend to a depth of –17 feet MLLW datum, with a 22.5 foot diffuser consisting of ten 4-inch diameter ports spaced at 2.5 foot intervals.

DRY SEASON CRITICAL AMBIENT CONDITIONS

Section 2.2 of the December 2005 Mixing Zone Study presented the limited data on Lake River tributary flows during critical dry season conditions. Subsequent dye tracer studies during August and September 2004 demonstrated that residual circulation produced by tidal flux from the Columbia River mainstem was the dominant source of ambient discharge during this period. The following calculation of the critical ambient discharge rate from the dye study was also presented in the December 2005 report.

Fischer's *Mixing in Inland and Coastal Waters* in Chapter 7 introduces the concepts of flushing time and residual circulation, also known as "tidal pumping." Flushing time is the time it takes to replace the volume of water. Residual circulation is the net flow produced by the tides in an estuary that may be superimposed on the background freshwater runoff. The equations for flushing time and residual circulation are defined below:

$$dM/dt + M(Q/V_o) = 0$$

Where:

- Vo = mean volume of the estuary downstream of a tracer source
- M = mass of a conservative tracer in an estuary
- Q = the residual circulation
- t = time

The solution of this differential equation demonstrates that the mass of tracer in an estuary (or concentration) would be inversely proportional to the residual circulation:

$$M(t) = M_o\, e^{-t/\tau}$$

Where:

- τ = flushing time of the estuary = Vo/Q
- t = time
- M0 = initial mass of tracer discharged
- M(t) = tracer mass in estuary as a function of time

<u>Flushing Time (τ):</u>

44% of the tracer remained in Lake River after one tidal cycle (12.4 hours). Using a conservative estimate of approximately 50% mass remaining after one tide cycle:

$$\frac{dM}{dt} + M\frac{Q}{V_O} = 0$$
$$M = M_O e^{-t/\tau}$$

for

$$t = 12.4\ hrs;$$
$$M/M_o = 0.5 = e\text{-}12.4/\tau$$
$$\ell n(0.5) = -12.4/\tau$$
$$\tau = 18\ hrs \pm$$

<u>Residual Circulation (Q):</u>

$$V_o = (10{,}000\ lf)(2600\ sf) = 26(10)^6\ cf$$
$$\tau = 18\ hrs = 64{,}800\ sec$$
$$Q = V_o/\tau = 26(10)^6/64{,}800 = 401\ cfs$$

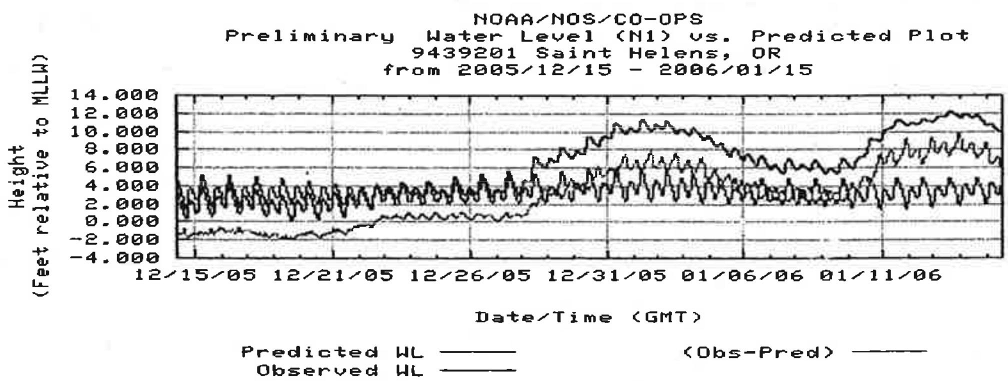
The residual circulation is by definition a consistent net flow of fresh ambient water past the outfall, which overshadows the 7Q10 total of the upstream creeks. Therefore, 400 cfs is the critical ambient discharge rate stipulated in the mixing zone criteria [WAC 173-201A-100(7)(a) and -(8)(a)].

WET SEASON CRITICAL AMBIENT CONDITIONS

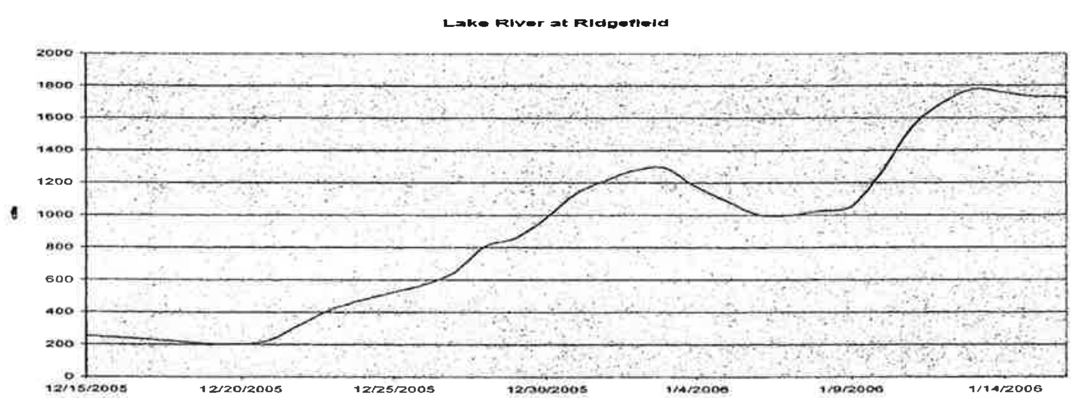
In a meeting on February 15, 2006, Ecology raised concerns regarding the ambient conditions that exist during the wet season, since the dye tracer study was conducted during dry, low flow conditions. Cosmopolitan Engineering concurred that ambient discharge during the wet season had not been documented, and supplemental field studies were collaboratively planned to obtain relevant data.

Peak Wet Weather Conditions

NOAA tide gauge records from St. Helens, OR demonstrate that tidal influences persist in Lake River during all but peak wet weather conditions. The graph below shows water surface elevation measured at St. Helens, approximately 2 miles downstream of Ridgefield, in December 2005 and January 2006. This was a period of very wet weather beginning in late December through early January, and again in late January. There was a strong tidal influence during early December when the river discharge was down around normal levels. As the river rose with the high flows, the tidal influence was dampened significantly. Tidal influence is very likely insignificant during these high flow events.



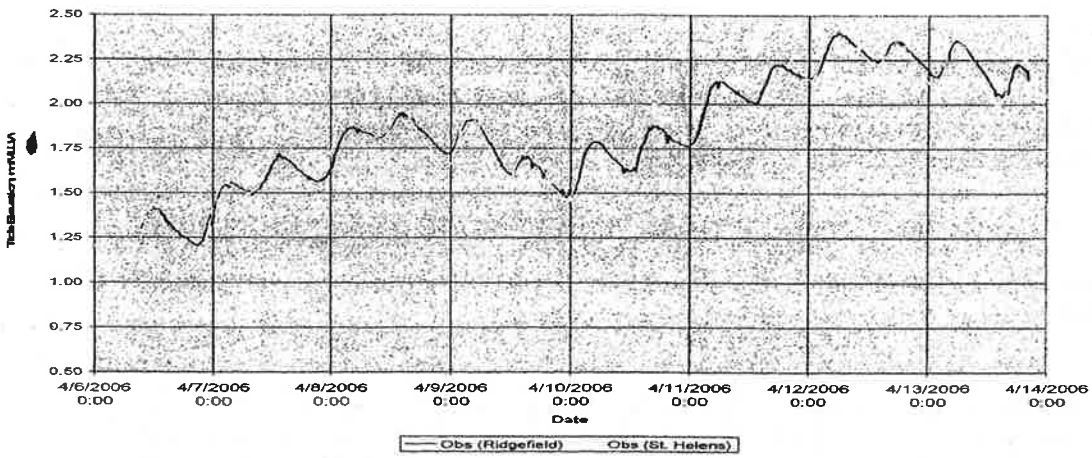
Upstream discharge in Lake River, shown in the graph below, followed a similar pattern associated with the very wet weather of this period. During the late December and early January periods of high flow and water level, it is clear that Lake River upstream discharge was well in excess of the critical 400 cfs residual circulation discharge observed during the dry season.



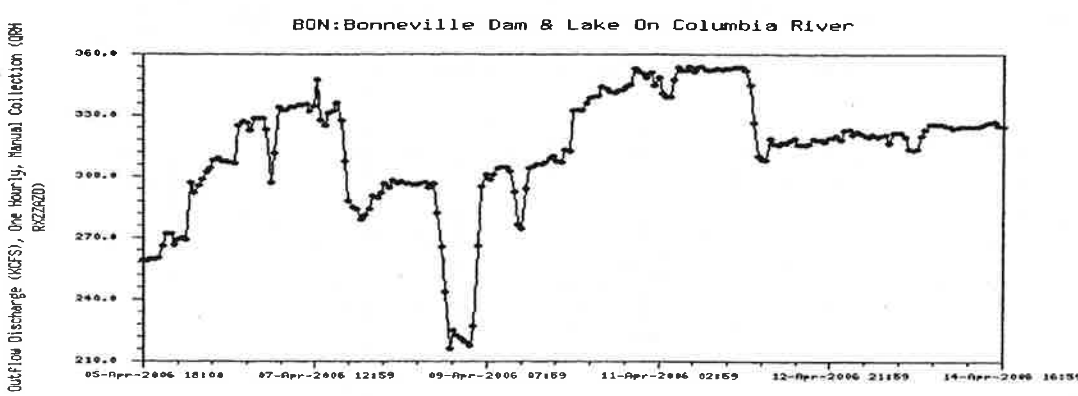
Moderate Wet Season Conditions

Water surface elevation was measured in Lake River near the Port of Ridgefield kayak dock from April 6 through April 13, 2006, using a SeaBird SBE16 Datalogger CTD. This period was selected to capture both neap and spring tide conditions, which are separated by approximately 7 days. The dates were selected based on projected upstream discharge in Lake River approaching 400 cfs.

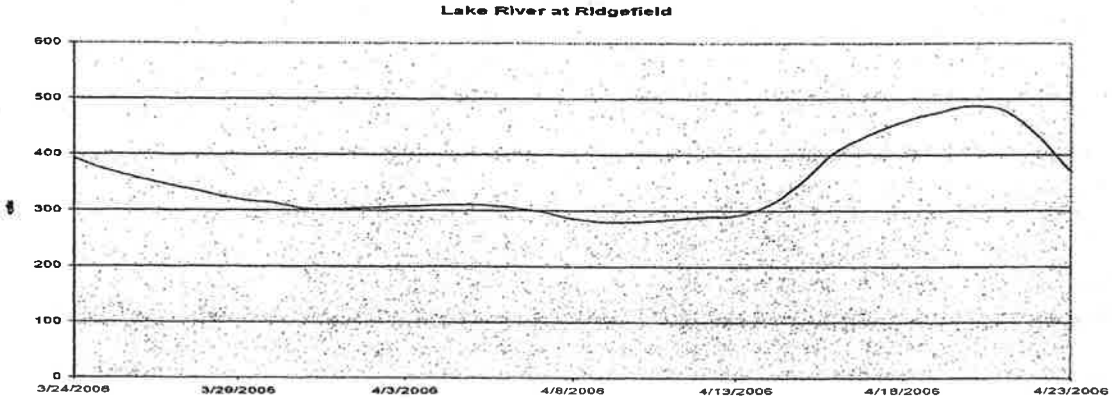
The water surface elevation measured at Ridgefield is plotted below, together with water surface elevation from St. Helens collected by NOAA. The tide data at Ridgefield slightly lag St. Helens, and amplitudes are similar, as they must be given the proximity of the two stations. The mean tidal amplitude was approximately 1 foot (0.3 m), or about half the tide amplitude during the September 2004 dry weather study.



Mean water surface elevation was also higher in April 2006 than in September 2004. This is due to the higher flow in the Columbia River during this period. Bonneville Dam release data are shown below. Mean discharge during this period was approximately 300,000 cfs, contrasted to the approximately 100,000 cfs discharge in September 2004. Note that the reduced discharge April 8 – 10 was reflected in a corresponding dip in tide elevations.

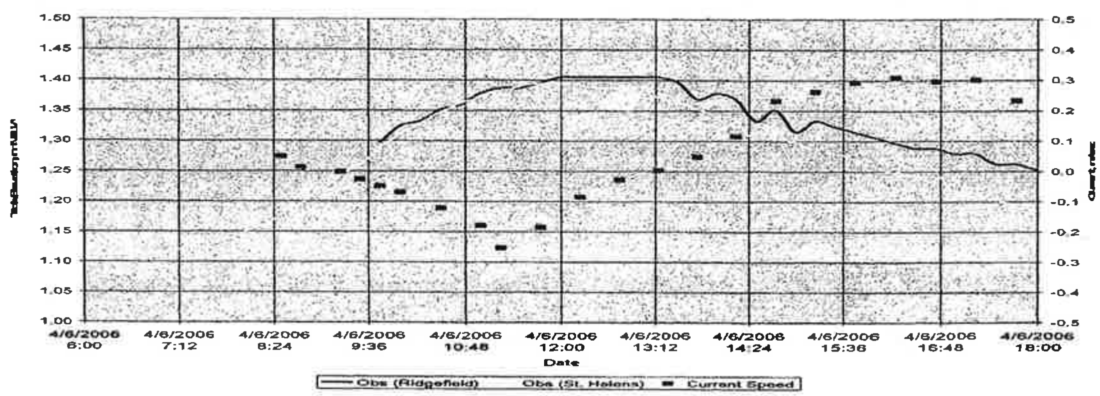


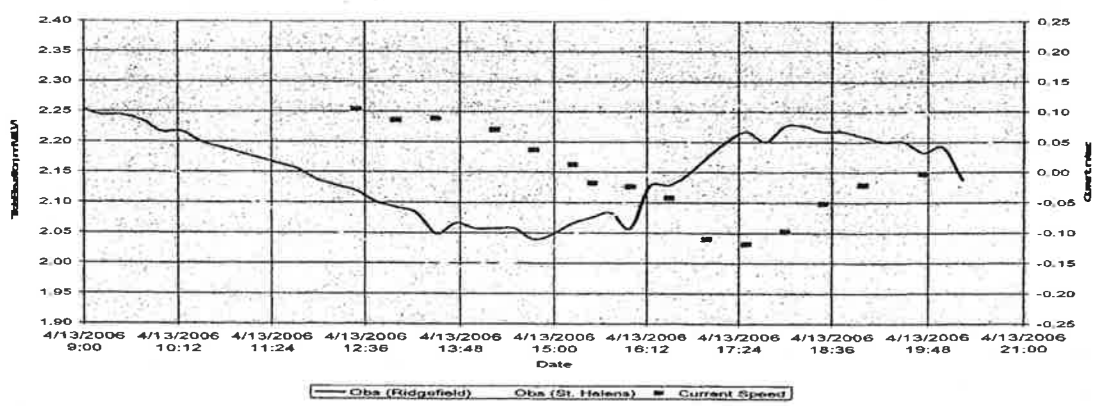
Using the regression equation for Lake River discharge, the target discharge rate was met in this period, ranging from 280 to 310 cfs. The upstream hydrograph for this period is shown below.



Currents were measured in Lake River on April 6 and 13, 2006. Currents were measured with a windowshade drogue consisting of a 1 m^2 vane suspended from a surface float at a depth of approximately 2 m. The drogue was deployed from mid-channel near the kayak dock approximately every half-hour through the entire flood tide. Drogue position was recorded using GPS, and the data and velocity calculations are provided in Attachment A.

The drogue velocity data are plotted together with water surface elevation data in the figures below. Negative current speed is upstream, positive is downstream. These data clearly demonstrate that currents moved upstream during the last half of the flood tides through slightly after high slack tide. The April 6 tides had both higher amplitude and higher velocities than April 13.





We may confidently conclude that during the April 2006 conditions, in which upstream flow approached 400 cfs, that there continued to be significant tidal influence in Lake River near Ridgefield. Residual circulation was not quantified. However, it follows that the combination of upstream flow and tidal influence produced net discharge exceeding that observed in September 2004 dry weather conditions, when net circulation was produced almost solely be downstream tidal influence.

These studies confirm the validity of the dry season ambient flow of 400 cfs is the appropriate critical condition. In addition, since the tidal influence persists during all but peak wet weather, this critical ambient flow may apply during all seasons, not just dry weather.

DILUTION MODELING

Model Selection and Calibration

The EPA model UM3 was selected for all dilution modeling in Lake River and the Columbia River. Reflux calculations. UM3 model calibration was presented in Chapter 5 of the December 2005 Mixing Zone Study. A dispersion value of 0.003 $cm^{2/3}$/sec was selected for the Brooks farfield model based on the model calibration.

Reflux

Reflux for the Lake River discharge was also presented in Chapter 5 of the December 2005 Mixing Zone Study. Reflux is proportional to effluent flow, and only applies to the Lake River discharge alternatives. Thus, reflux calculations from Table 9 of the 2005 report are amended as follows:

	Effluent Flow Rate (mgd)		Reflux Concentration (%)	
Phase	**Max Month**	**Max Day**	**Chronic**	**Acute**
Existing	0.5	0.9	0.33	0.59
1	0.7	1.14	0.46	0.75
2A	1.0	1.54	0.66	1.01

Reflux must also be determined for the Columbia River outfall alternatives. However, no site specific outfall studies have been conducted yet for that alternative, so there is no data to calculate reflux. However, based on the experience with the Salmon Creek dye tracer studies, reflux is anticipated to be negligible, and so will be ignored for this phase of analysis. Reflux should be determined when the Columbia River outfall studies commence.

Lake River Results

The dilution model UM3 was run for the existing, Phase 1 and Phase 2A flows. Critical ambient conditions included 10^{th} and 90^{th} percentile current speeds for acute, and median for chronic. Two of the measured ambient density profiles representing the range of conditions were run in the model. The buoyancy differences and density stratification were insignificant and did not affect the model predictions. The only differences between these model runs and those presented in the December 2005 Mixing Zone Study are the effluent flow rates. Model output files are provided in Attachment B.

Acute and chronic dilution factors are summarized below. The table includes the dilution model results, effective dilution adjusted for reflux, and the maximum allowable dilution based on the 7Q10. The critical dilution factors that shall be used for water quality and permit limit calculations are highlighted.

Lake River Dilution Summary

Case	Phase	Current Speed	DF Dilution	V Reflux	DF Eff Dil	Effluent Q (mgd)	Effluent Q (cfs)	Ambient Q (cfs)	Max Dilution
Acute	Exist	10%	4.8	0.0059	4.7	0.90	1.386	10	8.2
Acute	1	10%	4.7	0.0075	4.6	1.14	1.7556	10	6.7
Acute	2A	10%	4.4	0.0101	4.3	1.54	2.3716	10	5.2
Acute	Exist	90%	15.8	0.0059	14.5	0.90	1.386	10	8.2
Acute	1	90%	12.3	0.0075	11.3	1.14	1.7556	10	6.7
Acute	2A	90%	8.9	0.0101	8.2	1.54	2.3716	10	5.2
Chronic	Exist	Median	75	0.0033	60.3	0.50	0.77	100	131
Chronic	1	Median	52	0.0046	42.1	0.70	1.078	100	94
Chronic	2A	Median	36	0.0066	29.2	1.00	1.54	100	66

DF determined from UM3 model

Effective Dilution:
DF = DF/(1+V*(DF-1))

Allowable Ambient Discharge = 0.025 * 7Q10 for acute, = 0.25 * 7Q10 for chronic
Max Dilution Allowed under WAC 173-201A-100 = (Eff Q + Amb Q) / Eff Q

Shading denotes critical values used in water quality and permit limit calculations

Columbia River Results

The dilution model parameters for the Columbia River discharge alternative are the same as presented in Chapter 6 of the December 2005 Mixing Zone Study for the 10-port alternative, except for the revised effluent flow rates. Model output files are provided in Attachment B. Results are summarized below

Phase	Effluent Flow Rate (mgd)		Dilution Factor	
	Max Month	**Max Day**	**Chronic**	**Acute**
2A	1.83	2.60	56.3	29.5
2B	2.68	3.71	50.7	27.3

AMMONIA LIMITS FOR LAKE RIVER DISCHARGE ALTERNATIVES

Ammonia Criteria

Dry season is clearly the critical season for ammonia because of high pH in Lake River. The ambient monitoring program the City of Ridgefield conducted in 2004 and 2005 included twice-weekly sampling for pH and peak daily temperature. The data were presented in the *Effluent and Receiving Water Sampling Data Report* dated May 2006. The 90th percentile values were 8.84 for pH and 24.1 C for temperature. The sample sizes were 104 pH measurements and 337 daily maximum temperature measurements. The resulting water quality criteria for these values are 0.79 mg/L (as N) for acute and 0.13 mg/L (as N) for chronic, as shown in the following criteria spreadsheet.

INPUT	
1. Ambient Temperature (deg C; 0<T<30)	**24.1**
2. Ambient pH (6.5<pH<9.0)	**8.84**
3. Acute TCAP (Salmonids present- 20; absent- 25)	**20**
4. Chronic TCAP (Salmonids present- 15; absent- 20)	**15**

OUTPUT	
1. Intermediate Calculations:	
Acute FT	1.00
Chronic FT	1.41
FPH	1.00
RATIO	14
pKa	9.27
Fraction Of Total Ammonia Present As Un-ionized	26.9730%
2. Un-ionized Ammonia Criteria	
Acute (1-hour) Un-ionized Ammonia Criterion (ug NH3/L)	260.0
Chronic (4-day) Un-ionized Ammonia Criterion (ug NH3/L)	42.0
3. Total Ammonia Criteria:	
Acute Total Ammonia Criterion (mg NH3+ NH4/L)	0.96
Chronic Total Ammonia Criterion (mg NH3+ NH4/L)	0.16
4. Total Ammonia Criteria expressed as Nitrogen:	
Acute Ammonia Criterion as mg N	0.792
Chronic Ammonia Criterion as N	0.128

Ambient Ammonia Concentration

The City of Ridgefield also measured 104 ambient ammonia concentrations in the 2004/05 study. These are reported in the May 2006 *Effluent and Receiving Water Sampling Data Report.* The 90th percentile ambient ammonia measured in 2004/05 was 0.09 mg/L (as total ammonia). The equivalent critical ambient concentration expressed as N is 0.07 mg/L, which shall be used in the effluent limit calculations.

Effluent Ammonia Limits

Effluent ammonia limits for the Lake River discharge alternatives are calculated below based on the final values for dilution, ammonia criteria and ambient concentrations presented in this memorandum. Since the tidal influence exists year-round, we have assessed the limits on an annual basis rather than seasonal. While there may be some relaxing of the ammonia limits possible during the wet season, we do not have year-round ambient data to determine where the cutoff between seasons may be. Therefore, to be conservative we have assumed that the ammonia limits would apply year-round.

I have recalculated the ammonia limit for the proposed interim WWTP capacity of 1.0 mgd maximum month in the following table.

Lake River Ammonia Limit Calculation (mg/L as N)									
	Month Average Flow (mgd)	Peak Day Flow (mgd)	Acute Dil'n Factor	Chronic Dil'n Factor	Ambient Concentr ation	Water Quality Standard Acute	Water Quality Standard Chronic	Average Monthly Limit (AML)	Maximum Daily Limit (MDL)
					ug/L	ug/L	ug/L	ug/L	ug/L
Existing	0.50	0.90	4.7	60.3	0.07	0.79	0.130	**1.53**	**3.45**
Phase 1	0.70	1.14	4.6	42.1	0.07	0.79	0.130	**1.50**	**3.38**
Phase 2A	1.00	1.54	4.3	29.2	0.07	0.79	0.130	**1.33**	**2.99**

Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations							Statistical variables for permit calculation			
WLA Acute	WLA Chronic	LTA Acute	LTA Chronic	LTA Coeff. Var. (CV)	LTA Prob'y Basis	Limiting LTA	Coeff. Var. (CV)	AML Prob'y Basis	MDL Prob'y Basis	# of Samples per Month
ug/L	ug/L	ug/L	ug/L	decimal	decimal	ug/L	decimal	decimal	decimal	n
3.5	3.69	1.11	1.95	0.60	0.99	1.11	0.60	0.95	0.99	8.00
3.4	2.60	1.09	1.37	0.60	0.99	1.09	0.60	0.95	0.99	8.00
3.2	1.82	1.02	0.96	0.60	0.99	0.96	0.60	0.95	0.99	8.00

ATTACHMENT A. LAKE RIVER DROGUE DATA

DATE: 6-Apr-06

DROGUE	TIME minutes	LAT 45 min	LONG 122 min	dT minutes	dY ft	dX ft	tot. dist. ft	speed ft/sec	speed m/sec	bearing degrees
A	8:22:00	49.294	45.265							
				0:13:00	115	-54	127	0.16	0.050	335
A	8:35:00	49.313	45.278							
				0:18:00	36	-12	38	0.04	0.011	341
A	8:53:00	49.319	45.281							
B	9:14:00	49.295	45.263							
				0:26:00	-12	8	15	0.01	0.003	146
B	9:40:00	49.293	45.261							
				0:10:00	-49	25	55	0.09	0.028	153
B	9:50:00	49.285	45.255							
				0:14:20	-128	45	135	0.16	0.048	160
B	10:04:20	49.264	45.244							
C	9:59:10	49.294	45.265							
				0:14:10	-176	78	193	0.23	0.069	156
C	10:13:20	49.265	45.246							
D	10:28:00	49.295	45.263							
				0:08:50	-194	82	211	0.40	0.121	157
D	10:36:50	49.263	45.243							
E	11:01:40	49.295	45.263							
				0:06:20	-207	86	224	0.59	0.180	157
E	11:08:00	49.261	45.242							
				0:09:20	-425	193	467	0.83	0.254	156
E	11:17:20	49.191	45.195							
F	11:31:30	49.297	45.267							
				0:24:50	-820	379	903	0.61	0.185	155
F	11:56:20	49.162	45.175							
G	12:01:00	49.295	45.264							
				0:19:50	-304	140	334	0.28	0.086	155
G	12:20:50	49.245	45.230							
H	12:33:00	49.295	45.263							
				0:11:00	-55	25	60	0.09	0.028	156
H	12:44:00	49.286	45.257							
I	12:58:40	49.297	45.265							
				0:23:20	-6	-8	10	0.01	0.002	234
I	13:22:00	49.296	45.267							
J	13:29:30	49.295	45.264							
				0:09:10	79	-41	89	0.16	0.049	332
J	13:38:40	49.308	45.274							
K	14:00:00	49.295	45.263							
				0:20:00	419	-189	460	0.38	0.117	336
K	14:20:00	49.364	45.309							
L	14:30:00	49.296	45.266							
				0:12:10	510	-222	557	0.76	0.232	336
L	14:42:10	49.38	45.32							
M	15:00:20	49.295	45.263							
				0:11:30	541	-239	591	0.86	0.261	336
M	15:11:50	49.384	45.321							
N	15:30:30	49.293	45.26							
				0:10:20	547	-231	593	0.96	0.292	337
N	15:40:50	49.383	45.316							
O	16:00:10	49.295	45.263							
				0:10:10	565	-239	613	1.01	0.307	337
O	16:10:20	49.388	45.321							
P	16:30:00	49.296	45.264							
				0:10:10	553	-218	594	0.97	0.297	338
P	16:40:10	49.387	45.317							
Q	17:00:00	49.295	45.264							
				0:10:00	547	-226	592	0.99	0.301	337
Q	17:10:00	49.385	45.319							
R	17:30:50	49.295	45.265							
				0:12:40	528	-231	577	0.76	0.231	336
R	17:43:30	49.382	45.321							

ATTACHMENT A. LAKE RIVER DROGUE DATA

DATE: 13-Apr-06

DROGUE	TIME minutes	LAT 45 min	LONG 122 min	dT minutes	dY ft	dX ft	tot. dist. ft	speed ft/sec	speed m/sec	bearing degrees
A	12:31:00	49.297	45.267							
				0:12:00	219	-103	242	0.34	0.102	335
A	12:43:00	49.333	45.292							
B	13:00:30	49.295	45.263							
				0:16:40	255	-124	283	0.28	0.086	334
B	13:17:10	49.337	45.293							
C	13:34:00	49.295	45.266							
				0:13:40	213	-99	234	0.29	0.087	335
C	13:47:40	49.33	45.29							
D	14:00:20	49.295	45.263							
				0:19:30	237	-119	265	0.23	0.069	333
D	14:19:50	49.334	45.292							
E	14:45:20	49.293	45.262							
				0:13:40	85	-41	94	0.12	0.035	334
E	14:59:00	49.307	45.272							
				0:20:00	49	-16	51	0.04	0.013	341
E	15:19:00	49.315	45.276							
F	15:30:20	49.297	45.267							
				0:14:00	-36	29	46	0.06	0.017	142
F	15:44:20	49.291	45.26							
G	16:00:00	49.294	45.264							
				0:10:10	-43	29	51	0.08	0.026	146
G	16:10:10	49.287	45.257							
H	16:31:00	49.295	45.263							
				0:07:10	-55	25	60	0.14	0.043	156
H	16:38:10	49.286	45.257							
I	17:00:00	49.297	45.267							
				0:09:40	-188	91	209	0.36	0.110	154
I	17:09:40	49.266	45.245							
J	17:30:30	49.296	45.265							
				0:07:10	-152	74	169	0.39	0.120	154
J	17:37:40	49.271	45.247							
K	18:00:00	49.295	45.263							
				0:08:30	-146	70	162	0.32	0.097	154
K	18:08:30	49.271	45.246							
L	18:30:00	49.297	45.266							
				0:14:50	-140	62	153	0.17	0.052	156
L	18:44:50	49.274	45.251							
M	19:00:10	49.295	45.264							
				0:26:50	-109	37	115	0.07	0.022	161
M	19:27:00	49.277	45.255							
N	19:33:20	49.293	45.262							
				0:18:00	-12	-4	13	0.01	0.004	199
N	19:51:20	49.291	45.263							

ATTACHMENT B. DILUTION MODEL OUTPUT

LAKE RIVER ACUTE
10TH PERCENTILE CURRENT
EXISTING EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:26:35 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: ------------------------------------
      Depth    Amb-cur   Amb-dir   Amb-sal   Amb-tem   Amb-pol     Decay  Far-spd   Far-dir   Disprsn
          m        m/s       deg       psu         C     kg/kg       s-1      m/s       deg  m0.67/s2
        0.0     0.0427       0.0     0.066     21.43       0.0       0.0    0.427       0.0     0.003
       0.61     0.0427       0.0     0.066     21.35       0.0       0.0    0.427       0.0     0.003
      1.219     0.0427       0.0     0.066     21.29       0.0       0.0    0.427       0.0     0.003
      1.829     0.0427       0.0     0.066     21.28       0.0       0.0    0.427       0.0     0.003
      2.438     0.0427       0.0     0.066     21.28       0.0       0.0    0.427       0.0     0.003
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     8.0     6.0    30.0    90.0     1.0    20.7   207.0     7.0     0.9    0.05    24.0     1.0
Froude number:     38.56
        Depth  Amb-cur    P-dia  Polutnt   Dilutn  CL-diln   x-posn   y-posn
Step     (ft)    (m/s)     (in)  (kg/kg)       ()       ()     (ft)     (ft)
   0      7.0   0.0427    7.589      1.0      1.0      1.0      0.0      0.0;
  25    6.557   0.0427    12.32     0.61     1.64      1.0  0.00924    0.767;
  50    5.878   0.0427    20.19    0.372     2.69    1.394   0.0596    1.935;
  75    4.875   0.0427    32.99    0.226    4.414    2.275     0.22    3.647;
 100    3.456   0.0427    53.58    0.138    7.241    3.679    0.638    6.014;
 114    2.455   0.0427    69.93    0.105    9.554    4.777    1.079    7.636; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of        1.78 m
    conc   dilutn    width distnce     time
 (kg/kg)              (m)     (m)     (hrs)  (kg/kg)    (s-1)    (m/s)(m0.67/s2)
5.11E-2    19.57    5.015    63.0   0.0395      0.0      0.0    0.427    0.003
```

ATTACHMENT B. DILUTION MODEL OUTPUT

LAKE RIVER ACUTE
10^{TH} PERCENTILE CURRENT
PHASE 1 EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:26:44 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: ---------------------------------
      Depth    Amb-cur   Amb-dir   Amb-sal   Amb-tem   Amb-pol      Decay   Far-spd   Far-dir   Disprsn
          m        m/s       deg       psu         C     kg/kg        s-1       m/s       deg  m0.67/s2
        0.0     0.0427       0.0     0.066     21.43       0.0        0.0     0.427       0.0     0.003
       0.61     0.0427       0.0     0.066     21.35       0.0        0.0     0.427       0.0     0.003
      1.219     0.0427       0.0     0.066     21.29       0.0        0.0     0.427       0.0     0.003
      1.829     0.0427       0.0     0.066     21.28       0.0        0.0     0.427       0.0     0.003
      2.438     0.0427       0.0     0.066     21.28       0.0        0.0     0.427       0.0     0.003
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     8.0     6.0    30.0    90.0     1.0    20.7   207.0     7.0    1.14    0.05    24.0     1.0
Froude number:     48.85
        Depth  Amb-cur    P-dia  Polutnt   Dilutn  CL-diln   x-posn    y-posn
Step     (ft)    (m/s)     (in)  (kg/kg)       ()       ()     (ft)      (ft)
   0      7.0   0.0427    7.589      1.0      1.0      1.0      0.0      0.0;
  25    6.546   0.0427    12.32     0.61     1.64      1.0   0.0075    0.786;
  50    5.842   0.0427     20.2    0.372     2.69    1.395   0.0488    2.001;
  75    4.783   0.0427    33.06    0.226    4.414    2.281    0.183    3.818;
 100    3.251   0.0427    53.88    0.138    7.241    3.708    0.545    6.405;
 112    2.317   0.0427    67.92    0.109    9.183    4.662    0.869    7.952; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of       1.73 m
    conc  dilutn    width distnce     time
 (kg/kg)              (m)     (m)    (hrs) (kg/kg)    (s-1)    (m/s)(m0.67/s2)
 5.27E-2   18.96     4.91    63.0   0.0394     0.0      0.0    0.427    0.003
 3.82E-2   26.17    6.789   126.0   0.0804     0.0      0.0    0.427    0.003
count: 2
 ;
2:26:45 PM. amb fills: 2
```

ATTACHMENT B. DILUTION MODEL OUTPUT

LAKE RIVER ACUTE
10^{TH} PERCENTILE CURRENT
PHASE 2A EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:26:52 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: --------------------------------
      Depth    Amb-cur    Amb-dir    Amb-sal    Amb-tem    Amb-pol      Decay    Far-spd    Far-dir     Disprsn
          m        m/s        deg        psu          C      kg/kg        s-1        m/s        deg   m0.67/s2
        0.0     0.0427        0.0      0.066      21.43        0.0        0.0      0.427        0.0       0.003
       0.61     0.0427        0.0      0.066      21.35        0.0        0.0      0.427        0.0       0.003
      1.219     0.0427        0.0      0.066      21.29        0.0        0.0      0.427        0.0       0.003
      1.829     0.0427        0.0      0.066      21.28        0.0        0.0      0.427        0.0       0.003
      2.438     0.0427        0.0      0.066      21.28        0.0        0.0      0.427        0.0       0.003
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     8.0     6.0    30.0    90.0     1.0    20.7   207.0     7.0    1.54    0.05    24.0     1.0
Froude number:       65.98
        Depth  Amb-cur     P-dia  Polutnt   Dilutn  CL-diln    x-posn     y-posn
Step     (ft)    (m/s)      (in)  (kg/kg)       ()       ()      (ft)       (ft)
   0      7.0   0.0427     7.589      1.0      1.0      1.0       0.0       0.0;
  25    6.535   0.0427     12.33     0.61     1.64      1.0    0.0057     0.806;
  50    5.804   0.0427     20.21    0.372     2.69    1.396    0.0376      2.07;
  75    4.683   0.0427     33.11    0.226    4.414    2.286     0.144       4.0;
 100    3.021   0.0427     54.11    0.138    7.241    3.731     0.437     6.836;
 109     2.26   0.0427     64.51    0.115    8.653    4.443      0.63     8.121; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of        1.64 m
    conc  dilutn    width distnce     time
 (kg/kg)              (m)     (m)    (hrs)  (kg/kg)    (s-1)   (m/s)(m0.67/s2)
 5.51E-2   18.13    4.733    63.0   0.0394      0.0      0.0   0.427   0.003
 3.99E-2   25.05    6.551   126.0   0.0804      0.0      0.0   0.427   0.003
count: 2
 ;
2:26:52 PM. amb fills: 2
```

ATTACHMENT B. DILUTION MODEL OUTPUT

LAKE RIVER ACUTE
90TH PERCENTILE CURRENT
EXISTING EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:27:09 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: ----------------------------------
      Depth    Amb-cur    Amb-dir    Amb-sal    Amb-tem    Amb-pol      Decay    Far-spd    Far-dir    Disprsn
          m        m/s        deg        psu          C      kg/kg        s-1        m/s        deg   m0.67/s2
        0.0      0.427        0.0      0.066      21.43        0.0        0.0      0.427        0.0      0.003
       0.61      0.427        0.0      0.066      21.35        0.0        0.0      0.427        0.0      0.003
      1.219      0.427        0.0      0.066      21.29        0.0        0.0      0.427        0.0      0.003
      1.829      0.427        0.0      0.066      21.28        0.0        0.0      0.427        0.0      0.003
      2.438      0.427        0.0      0.066      21.28        0.0        0.0      0.427        0.0      0.003
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     8.0     6.0    30.0    90.0     1.0    20.7   207.0     7.0     0.9    0.05    24.0     1.0
Froude number:       38.56
         Depth   Amb-cur     P-dia  Polutnt    Dilutn  CL-diln   x-posn    y-posn
Step      (ft)     (m/s)      (in)  (kg/kg)        ()       ()     (ft)      (ft)
   0       7.0     0.427     7.589      1.0       1.0      1.0      0.0       0.0;
  25     6.787     0.427     12.21     0.61      1.64      1.0   0.0424     0.368;
  50     6.589     0.427     18.07    0.396     2.523    1.104    0.175      0.71;
  52     6.576     0.427     18.55    0.384       2.6    1.125    0.189     0.733; begin overlap,
  75     6.422     0.427     24.12    0.275     3.641    1.351    0.394       1.0;
 100     6.248     0.427     31.08    0.187     5.349    1.651    0.772     1.298;
 103     6.227     0.427     32.05    0.177     5.635    1.702    0.834     1.335; bottom hit,
 110     6.175     0.427     34.46    0.156     6.391    1.843    0.996     1.423; end overlap,
 125      6.05     0.427     40.39    0.116     8.579    2.289    1.506     1.637;
 150     5.795     0.427      51.8    0.071     14.08    3.559    3.143     2.072;
 175     5.466     0.427     65.99   0.0433     23.09    5.794    6.672     2.622;
 200     5.036     0.427     84.06   0.0264     37.88    9.551    14.15     3.316;
 213      4.76     0.427     95.39   0.0204     49.01    12.39    20.83     3.745; acute zone,
 225     4.463     0.427     107.2   0.0161     62.15    15.76    29.69     4.186; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of      2.72 m
    conc   dilutn     width distnce     time
 (kg/kg)               (m)     (m)     (hrs)  (kg/kg)    (s-1)    (m/s)(m0.67/s2)
 9.29E-3    107.6    6.478    63.0     0.035      0.0      0.0    0.427    0.003
 6.66E-3    150.1    9.076   126.0     0.076      0.0      0.0    0.427    0.003
count: 2
 ;
2:27:10 PM. amb fills: 2
```

ATTACHMENT B. DILUTION MODEL OUTPUT

LAKE RIVER ACUTE
90TH PERCENTILE CURRENT
PHASE 1 EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:27:14 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: ---------------------------------
      Depth    Amb-cur    Amb-dir    Amb-sal    Amb-tem    Amb-pol      Decay   Far-spd    Far-dir    Disprsn
          m        m/s        deg        psu          C      kg/kg        s-1       m/s        deg   m0.67/s2
        0.0      0.427        0.0      0.066      21.43        0.0        0.0     0.427        0.0      0.003
       0.61      0.427        0.0      0.066      21.35        0.0        0.0     0.427        0.0      0.003
      1.219      0.427        0.0      0.066      21.29        0.0        0.0     0.427        0.0      0.003
      1.829      0.427        0.0      0.066      21.28        0.0        0.0     0.427        0.0      0.003
      2.438      0.427        0.0      0.066      21.28        0.0        0.0     0.427        0.0      0.003
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     8.0     6.0    30.0    90.0     1.0    20.7   207.0     7.0    1.14    0.05    24.0     1.0
Froude number:      48.85
        Depth  Amb-cur     P-dia  Polutnt   Dilutn  CL-diln   x-posn   y-posn
Step     (ft)    (m/s)      (in)  (kg/kg)       ()       ()     (ft)     (ft)
   0      7.0    0.427     7.589      1.0      1.0      1.0      0.0     0.0;
  25    6.756    0.427     12.26     0.61     1.64      1.0   0.0387   0.422;
  50    6.483    0.427     19.25    0.376    2.657    1.217    0.193   0.895;
  67    6.328    0.427     24.45    0.284    3.519    1.462    0.354   1.162; begin overlap,
  75    6.261    0.427     26.96    0.251    3.983    1.572    0.447   1.278;
 100    6.046    0.427     35.57    0.169    5.909    1.951    0.865   1.649;
 106    5.992    0.427     37.93    0.153    6.546     2.07    1.005    1.74; bottom hit,
 111    5.947    0.427     40.04     0.14    7.158    2.186    1.137   1.818; end overlap,
 125    5.807    0.427     46.74    0.106    9.392    2.635    1.645   2.059;
 150    5.504    0.427     60.52   0.0649    15.41    3.995    3.342   2.576;
 175    5.113    0.427     77.43   0.0395    25.28    6.414    7.005   3.233;
 200    4.606    0.427     98.81   0.0241    41.47    10.51    14.74   4.063;
 208    4.412    0.427     106.8   0.0206    48.59    12.32     18.7   4.371; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of     2.71 m
   conc   dilutn    width distnce     time
 (kg/kg)              (m)     (m)    (hrs) (kg/kg)    (s-1)    (m/s) (m0.67/s2)
 1.15E-2   86.24    6.621    63.0   0.0372     0.0      0.0    0.427    0.003
 8.41E-3   118.9    9.167   126.0   0.0782     0.0      0.0    0.427    0.003
count: 2
 ;
2:27:15 PM. amb fills: 2
```

LAKE RIVER ACUTE
90^{TH} PERCENTILE CURRENT
PHASE 2A EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:27:19 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: ------------------------------------
      Depth    Amb-cur    Amb-dir    Amb-sal    Amb-tem    Amb-pol      Decay    Far-spd    Far-dir    Disprsn
          m        m/s        deg        psu          C      kg/kg        s-1        m/s        deg   m0.67/s2
        0.0      0.427        0.0      0.066      21.43        0.0        0.0      0.427        0.0      0.003
       0.61      0.427        0.0      0.066      21.35        0.0        0.0      0.427        0.0      0.003
      1.219      0.427        0.0      0.066      21.29        0.0        0.0      0.427        0.0      0.003
      1.829      0.427        0.0      0.066      21.28        0.0        0.0      0.427        0.0      0.003
      2.438      0.427        0.0      0.066      21.28        0.0        0.0      0.427        0.0      0.003
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     8.0     6.0    30.0    90.0     1.0    20.7   207.0     7.0    1.54    0.05    24.0     1.0
Froude number:      65.98
        Depth  Amb-cur    P-dia  Polutnt    Dilutn  CL-diln   x-posn   y-posn
Step     (ft)    (m/s)     (in)  (kg/kg)        ()       ()     (ft)     (ft)
   0      7.0    0.427    7.589      1.0       1.0      1.0      0.0     0.0;
  25    6.718    0.427    12.29     0.61      1.64      1.0   0.0335   0.489;
  50    6.368    0.427    19.78    0.372      2.69    1.297    0.183   1.093;
  75    6.015    0.427    29.98    0.232       4.3    1.835    0.502   1.703;
  88    5.863    0.427    35.66    0.187     5.344      2.1    0.718   1.967; begin overlap,
 100    5.726    0.427    41.22    0.154      6.51    2.355    0.968   2.203;
 116    5.537    0.427    49.55    0.116      8.59    2.773    1.422   2.527; bottom hit, end overlap,
 125    5.422    0.427    54.99   0.0981     10.19    3.094    1.779   2.725;
 150    5.049    0.427    72.35   0.0598     16.72    4.517    3.475   3.364;
 175    4.575    0.427    93.23   0.0364     27.43    7.085    7.081   4.166;
 187      4.3    0.427    105.0   0.0287     34.78    8.914    10.06   4.627; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of      2.67 m
    conc   dilutn    width distnce    time
 (kg/kg)              (m)     (m)     (hrs)  (kg/kg)    (s-1)    (m/s)(m0.67/s2)
 1.58E-2     63.1    6.656    63.0  0.0388      0.0      0.0    0.427    0.003
 1.15E-2    86.38    9.142   126.0  0.0798      0.0      0.0    0.427    0.003
count: 2
 ;
2:27:19 PM. amb fills: 2
```

ATTACHMENT B. DILUTION MODEL OUTPUT

LAKE RIVER CHRONIC
MEDIAN CURRENT
EXISTING EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:27:55 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: --------------------------------
      Depth   Amb-cur   Amb-dir   Amb-sal   Amb-tem   Amb-pol     Decay   Far-spd   Far-dir   Disprsn
          m       m/s       deg       psu         C     kg/kg       s-1       m/s       deg  m0.67/s2
        0.0     0.168       0.0     0.066     21.43       0.0       0.0     0.427       0.0     0.003
       0.61     0.168       0.0     0.066     21.35       0.0       0.0     0.427       0.0     0.003
      1.219     0.168       0.0     0.066     21.29       0.0       0.0     0.427       0.0     0.003
      1.829     0.168       0.0     0.066     21.28       0.0       0.0     0.427       0.0     0.003
      2.438     0.168       0.0     0.066     21.28       0.0       0.0     0.427       0.0     0.003
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     8.0     6.0    30.0    90.0     1.0    20.7   207.0     7.0     0.5    0.05    24.0     1.0
Froude number:      21.42
         Depth  Amb-cur    P-dia  Polutnt   Dilutn  CL-diln   x-posn   y-posn
Step      (ft)    (m/s)     (in)  (kg/kg)       ()       ()     (ft)     (ft)
   0       7.0    0.168    7.589      1.0      1.0      1.0      0.0      0.0;
  25     6.742    0.168    12.26     0.61     1.64      1.0   0.0368    0.446;
  50     6.435    0.168    19.55    0.372    2.687    1.256    0.194    0.973;
  75     6.169    0.168    28.18    0.242    4.129    1.678    0.471    1.426; begin overlap,
 100     5.925    0.168    37.71    0.162    6.178     2.11    0.907    1.834;
 111     5.813    0.168    42.61    0.134    7.483    2.363    1.189     2.02; bottom hit,
 113     5.792    0.168    43.57    0.129    7.764    2.418    1.249    2.055; end overlap,
 125     5.654    0.168    49.91    0.102    9.805    2.831    1.706     2.28;
 150     5.308    0.168    64.96   0.0621    16.09     4.24    3.394    2.828;
 175     4.848    0.168     83.3   0.0379    26.39    6.756     6.95    3.508;
 198     4.273    0.168    104.4    0.024    41.61     10.6     13.4    4.264; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of       2.65 m
   conc  dilutn   width distnce    time
 (kg/kg)            (m)     (m)   (hrs)  (kg/kg)    (s-1)    (m/s) (m0.67/s2)
 1.33E-2   75.14  6.584    63.0  0.0382      0.0      0.0    0.427    0.003
 9.69E-3   103.2  9.073   126.0  0.0792      0.0      0.0    0.427    0.003
count: 2
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2:27:55 PM. amb fills: 2
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ATTACHMENT B. DILUTION MODEL OUTPUT

LAKE RIVER CHRONIC
MEDIAN CURRENT
PHASE 1 EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:28:02 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: ----------------------------------
      Depth    Amb-cur    Amb-dir    Amb-sal    Amb-tem    Amb-pol      Decay    Far-spd    Far-dir    Disprsn
          m        m/s        deg        psu          C      kg/kg        s-1        m/s        deg   m0.67/s2
        0.0      0.168        0.0      0.066      21.43        0.0        0.0      0.427        0.0      0.003
       0.61      0.168        0.0      0.066      21.35        0.0        0.0      0.427        0.0      0.003
      1.219      0.168        0.0      0.066      21.29        0.0        0.0      0.427        0.0      0.003
      1.829      0.168        0.0      0.066      21.28        0.0        0.0      0.427        0.0      0.003
      2.438      0.168        0.0      0.066      21.28        0.0        0.0      0.427        0.0      0.003
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     8.0     6.0    30.0    90.0     1.0    20.7   207.0     7.0     0.7    0.05    24.0     1.0
Froude number:      29.99
        Depth   Amb-cur     P-dia   Polutnt    Dilutn   CL-diln    x-posn    y-posn
Step     (ft)     (m/s)      (in)   (kg/kg)        ()        ()      (ft)      (ft)
   0      7.0     0.168     7.589       1.0       1.0       1.0       0.0       0.0;
  25    6.699     0.168     12.29      0.61      1.64       1.0    0.0309      0.52;
  50    6.316     0.168     19.87     0.372      2.69     1.321     0.172      1.18;
  75    5.889     0.168     30.98     0.228     4.389     1,943     0.511     1.911;
 100    5.529     0.168     43.83     0.147     6.778     2.568     1.019     2.519; begin overlap,
 115    5.323     0.168     52.52     0.114     8.787     2.995     1.451     2.863; end overlap,
 123    5.207     0.168     57.72    0.0982     10.18      3.28     1.755     3.055; bottom hit,
 125    5.176     0.168      59.1    0.0945     10.57     3.361     1.843     3.106;
 150    4.744     0.168      78.5    0.0577     17.33      4.82     3.515     3.807;
 175    4.191     0.168     101.6    0.0351     28.44     7.454     6.958      4.66; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of       2.58 m
    conc   dilutn     width  distnce      time
 (kg/kg)                (m)      (m)     (hrs)   (kg/kg)     (s-1)     (m/s)(m0.67/s2)
 1.91E-2    52.35     6.539     63.0    0.0393       0.0       0.0     0.427     0.003
 1.39E-2    71.55     8.965    126.0    0.0803       0.0       0.0     0.427     0.003
count: 2
 ;
2:28:02 PM. amb fills: 2
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ATTACHMENT B. DILUTION MODEL OUTPUT

LAKE RIVER CHRONIC
MEDIAN CURRENT
PHASE 2A EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:28:07 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: ---------------------------------
      Depth    Amb-cur    Amb-dir    Amb-sal    Amb-tem    Amb-pol      Decay    Far-spd    Far-dir    Disprsn
          m        m/s        deg        psu          C      kg/kg        s-1        m/s        deg   m0.67/s2
        0.0      0.168        0.0      0.066      21.43        0.0        0.0      0.427        0.0      0.003
       0.61      0.168        0.0      0.066      21.35        0.0        0.0      0.427        0.0      0.003
      1.219      0.168        0.0      0.066      21.29        0.0        0.0      0.427        0.0      0.003
      1.829      0.168        0.0      0.066      21.28        0.0        0.0      0.427        0.0      0.003
      2.438      0.168        0.0      0.066      21.28        0.0        0.0      0.427        0.0      0.003
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     8.0     6.0    30.0    90.0     1.0    20.7   207.0     7.0     1.0    0.05    24.0     1.0
Froude number:      42.85
         Depth   Amb-cur     P-dia  Polutnt    Dilutn   CL-diln    x-posn    y-posn
Step      (ft)     (m/s)      (in)  (kg/kg)        ()        ()      (ft)      (ft)
   0       7.0     0.168     7.589      1.0       1.0       1.0       0.0       0.0;
  25     6.658     0.168     12.31     0.61      1.64       1.0    0.0248     0.592;
  50     6.197     0.168     20.04    0.372      2.69     1.358     0.145     1.388;
  75     5.627     0.168     32.08    0.226     4.414     2.102     0.466     2.367;
 100     5.029     0.168     49.03    0.139     7.177     3.025     1.089     3.386;
 125     4.513     0.168     68.78   0.0889     11.24     4.013       2.0     4.254;
 140     4.191     0.168     82.88    0.067     14.92       4.8     2.838     4.789; bottom hit,
 150     3.955     0.168     93.44   0.0549     18.19     5.499     3.619     5.175;
 153     3.882     0.168     96.73   0.0518      19.3     5.741     3.896     5.294; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of       2.46 m
    conc   dilutn    width distnce      time
 (kg/kg)              (m)     (m)      (hrs)  (kg/kg)    (s-1)    (m/s)(m0.67/s2)
 2.76E-2    36.16    6.335    63.0   0.0397      0.0      0.0    0.427    0.003
 2.02E-2     49.4    8.681   126.0   0.0807      0.0      0.0    0.427    0.003
count: 2
 ;
2:28:08 PM. amb fills: 2
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COLUMBIA RIVER ACUTE
10^{TH} PERCENTILE CURRENT
PHASE 2A EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:40:34 PM
Case 1; ambient file c:\plumes\VP plume 14.001.db; Diffuser table record 1: ---------------------------------
      Depth     Amb-cur    Amb-dir    Amb-sal    Amb-tem    Amb-pol      Decay    Far-spd    Far-dir    Disprsn
          m         m/s        deg        psu          C      kg/kg        s-1        m/s        deg   m0.67/s2
        0.0       0.051       90.0       0.08       20.3        0.0        0.0      0.051       90.0     0.0007
        1.0       0.051       90.0       0.08       20.3        0.0        0.0      0.051       90.0     0.0007
        2.0       0.051       90.0       0.08       20.3        0.0        0.0      0.051       90.0     0.0007
        3.0       0.051       90.0       0.08       20.3        0.0        0.0      0.051       90.0     0.0007
        4.0       0.051       90.0       0.08       20.3        0.0        0.0      0.051       90.0     0.0007
        5.0       0.051       90.0       0.08       20.3        0.0        0.0      0.051       90.0     0.0007
        6.0       0.051       90.0       0.08       20.3        0.0        0.0      0.051       90.0     0.0007
   P-dia  P-elev V-angle H-angle   Ports Spacing AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal     Temp Polutnt
    (in)    (ft)   (deg)   (deg)      ()    (ft)    (ft)    (ft)    (ft)   (MGD)   (psu)      (C) (kg/kg)
     3.0     2.0    30.0   169.0    10.0     2.5    21.7   217.0    17.0     2.6    0.05     24.0     1.0
Froude number:       97.9
        Depth  Amb-cur     P-dia  Polutnt    Dilutn    x-posn    y-posn
Step     (ft)    (m/s)      (in)  (kg/kg)        ()      (ft)      (ft)
   0     17.0    0.051       3.0      1.0       1.0       0.0       0.0;
  25    16.82    0.051     4.867     0.61      1.64     -0.31    0.0628;
  50    16.53    0.051     7.967    0.372      2.69    -0.793      0.17;
  75     16.1    0.051     13.02    0.226     4.413    -1.524     0.358;
 100    15.48    0.051     21.19    0.138     7.239    -2.583     0.687;
 118    14.88    0.051     29.97   0.0966     10.34    -3.586     1.071; merging,
 125    14.34    0.051     35.51   0.0841     11.88    -4.474     1.462;
 150    10.79    0.051     80.99   0.0513     19.48    -10.14       4.6;
 171    6.126    0.051     174.9   0.0338     29.53    -16.85     9.688; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of       6.79 m
    conc   dilutn    width distnce     time
 (kg/kg)              (m)      (m)    (hrs)  (kg/kg)    (s-1)    (m/s)(m0.67/s2)
 1.82E-2    54.79    17.33     66.0   0.327      0.0      0.0    0.051 7.00E-4
 1.31E-2    75.88    24.08    132.0   0.687      0.0      0.0    0.051 7.00E-4
count: 2
 ;
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ATTACHMENT B. DILUTION MODEL OUTPUT

COLUMBIA RIVER CHRONIC
MEDIAN CURRENT
PHASE 2A EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:42:55 PM
Case 1; ambient file c:\plumes\VP plume 14.001.db; Diffuser table record 1: ----------------------------------
      Depth    Amb-cur    Amb-dir    Amb-sal    Amb-tem    Amb-pol      Decay    Far-spd    Far-dir    Disprsn
          m        m/s        deg        psu          C      kg/kg        s-1        m/s        deg   m0.67/s2
        0.0      0.074       90.0       0.08       20.3        0.0        0.0      0.074       90.0     0.0007
        1.0      0.074       90.0       0.08       20.3        0.0        0.0      0.074       90.0     0.0007
        2.0      0.074       90.0       0.08       20.3        0.0        0.0      0.074       90.0     0.0007
        3.0      0.074       90.0       0.08       20.3        0.0        0.0      0.074       90.0     0.0007
        4.0      0.074       90.0       0.08       20.3        0.0        0.0      0.074       90.0     0.0007
        5.0      0.074       90.0       0.08       20.3        0.0        0.0      0.074       90.0     0.0007
        6.0      0.074       90.0       0.08       20.3        0.0        0.0      0.074       90.0     0.0007
   P-dia  P-elev V-angle H-angle   Ports Spacing AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (ft)   (deg)   (deg)      ()    (ft)    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     3.0     2.0    30.0   169.0    10.0     2.5    21.7   217.0    17.0    1.83    0.05    24.0     1.0
Froude number:     68.91
        Depth  Amb-cur     P-dia  Polutnt    Dilutn   x-posn   y-posn
Step     (ft)    (m/s)      (in)  (kg/kg)        ()     (ft)     (ft)
   0     17.0    0.074       3.0      1.0       1.0      0.0      0.0;
  25    16.83    0.074     4.861     0.61      1.64   -0.286   0.0603;
  50    16.58    0.074     7.937    0.372      2.69   -0.712    0.168;
  75    16.22    0.074      12.9    0.226     4.413   -1.315    0.361;
 100    15.75    0.074     20.74    0.138     7.239   -2.114    0.708;
 117    15.36    0.074     28.33   0.0986     10.14   -2.761    1.082; merging,
 125     14.9    0.074     34.05   0.0844     11.83   -3.524    1.612;
 150     12.8    0.074     77.22   0.0515     19.41   -6.802    4.622;
 175    10.43    0.074     190.8   0.0314     31.85   -10.15    9.284;
 181    9.881    0.074     236.6   0.0279     35.87   -10.85    10.58; bottom hit,
 183    9.703    0.074     254.1   0.0268     37.32   -11.08    11.02; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of      8.80 m
   conc  dilutn    width distnce    time
 (kg/kg)            (m)     (m)    (hrs) (kg/kg)    (s-1)    (m/s)(m0.67/s2)
 1.77E-2   56.33   18.17    66.0    0.23     0.0      0.0    0.074 7.00E-4
 1.32E-2   75.52   24.54   132.0   0.478     0.0      0.0    0.074 7.00E-4
count: 2
;
```

Memorandum

ENGINEERING GROUP

117 South 8th Street
Tacoma, WA 98402
Phone (253) 265-2958
Fax (253) 265-6041
BFox@cosmopolitaneng.com

DATE: May 22, 2006

TO: John Wilson and Mike Johnson, Gray & Osborne

FROM: Bill Fox, Cosmopolitan Engineering Group

RE: Additional Information for Lake River Mixing Zone Study

FILE: G/O019

cc: David Knight and Anise Ahmed, Ecology

BACKGROUND

As you recall, we had met with David Knight and Anise Ahmed of Ecology on February 15, 2006. The subject of the meeting was their concerns about the results of the mixing zone study in support of the proposed interim Lake River improvements. Their concern pertained to the ambient conditions that exist during the wet season, since our dye study was conducted during dry, low flow conditions. A summary of that meeting follows:

1. The tracer study was conducted during late summer, dry weather, low river flow conditions in September 2004. The results revealed that the tidal influence at the outfall was very significant to ambient mixing, with a critical ambient residual circulation of 400 cfs, which was used in the mixing zone modeling for critical ambient flow.

2. Ecology needs documentation of the tidal influence during wet season conditions. I acknowledged that we performed no ambient studies of tidal influence outside of the late summer, low flow condition to determine if the tidal reversal persists throughout the year, and acknowledged that this would be important information.

3. The water surface elevation data from St Helens shows that there is a persistent tidal influence at this location all year, and is suspended only during very high river flows. The need, then, is to assess whether tide reversal occurs under elevated ambient flows that occur during the wet season.

4. We discussed two ambient conditions that should be investigated: (1) high ambient flow conditions such as observed in December 2005 and January 2006. We would assess this condition assuming there is no tidal influence, using ambient velocity based on upstream discharge only; and (2) moderate wet season ambient conditions, when the upstream flows total 300 to 400 cfs (*i.e.* when ambient flow approaches the 400 cfs critical dry weather residual circulation). My proposal was to document the currents using windowshade drogues during two tidal conditions (neap and spring) in Spring 2006.

5. Ecology shared some concerns about documentation of dye loss. I explained the work that was performed and relevant literature of the properties of Rhodamine WT decay (I use "decay" broadly to include all categories of dye loss). The time scales were so short that dye loss was insignificant to the reflux and residual circulation calculations.

6. Ecology requested a figure showing the proposed Lake River outfall extension plan and profile.

PURPOSE

The field studies agreed to in this meeting were completed in April 2006. The purpose of this memorandum is to assess the wet season critical conditions as described in item 4 above. We will present ambient data and dilution modeling for the December 2005 through January 2006 very wet weather conditions. We also present the results of the field studies conducted in April 2006, and update the Lake River mixing zone modeling for the more moderate wet season conditions that were observed at that time. To put the January and April 2006 measurements in context, I will first reiterate the critical dry weather conditions that were observed in September 2004.

SEPTEMBER 2004 CRITICAL CONDITIONS

The dye studies were conducted in September 2004. Using a regression equation to estimate total upstream discharge in Lake River from Clark County gauge data on Salmon Creek, the total upstream discharge was estimated to be approximately 60 cfs during the dye studies. Release from the Bonneville Dam on the Columbia River was approximately 100,000 cfs during this period.

A strong tidal influence exists in Lake River near Ridgefield. The mean daily tidal range observed during the dye study was approximately 2 feet (see graph below). The dye studies demonstrated that tidal flux of Columbia River water from the downstream boundary of Lake River was the dominant source of kinetic energy (*i.e.* current speed) and net supply of dilution water. Median current speed was 0.42 ft/sec (0.13 m/sec), and 10th percentile was 0.13 ft/sec (0.04 m/sec). The net circulation of water from the Columbia River produced by the tides, termed the "residual circulation," was determined to be 400 cfs.

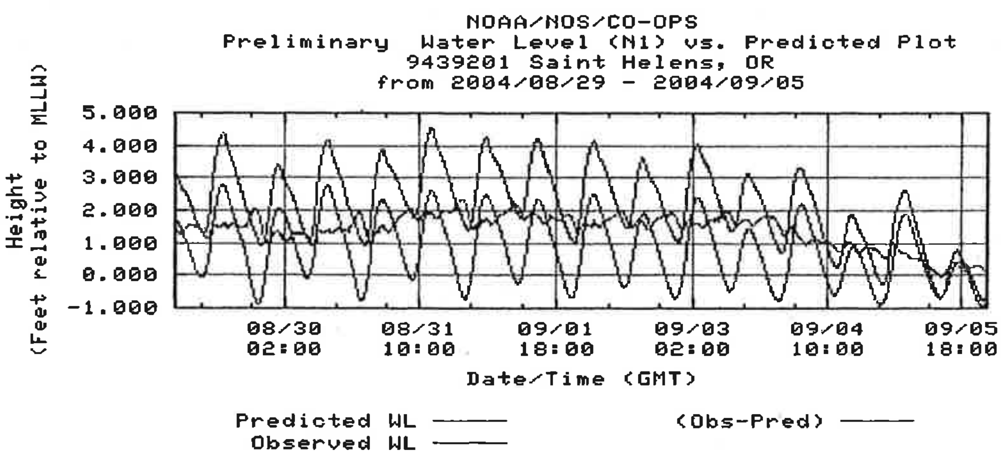


Figure 1. Tides Observed During the 2004 Dye Study

DECEMBER 2005 – JANUARY 2006 PEAK WET WEATHER CONDITIONS

It has been shown that tidal conditions exist in Lake River during all but peak discharge conditions. The graph below shows water surface elevation measured by NOAA at St. Helens, OR, approximately 2 miles downstream of Ridgefield, in December 2005 and January 2006. This was a period of very wet weather in late December through January. There is a strong tidal influence during the preceding days when the river was down around normal levels. As the river rose with the high flows, the tidal influence was dampened significantly. Tidal influence is very likely insignificant during these events.

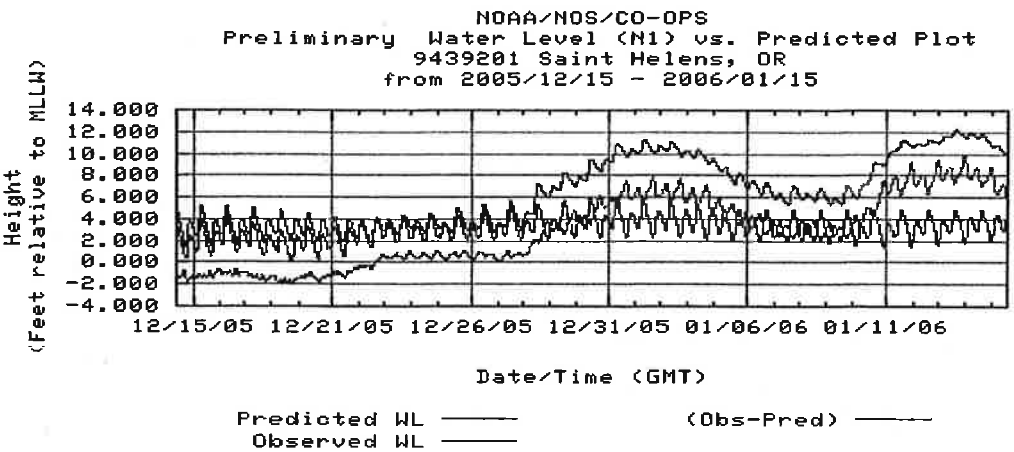


Figure 2. Tides Observed During December 2005 – January 2006 Peak Flows

Upstream discharge in Lake River followed a similar pattern associated with the very wet weather of this period. The graph of Lake River discharge is shown below in Figure 3. During the late December and early January periods of high flow and water level (from Figure 2), it is clear that Lake River upstream discharge was well in excess of the 400 cfs residual circulation discharge observed during the dry season.

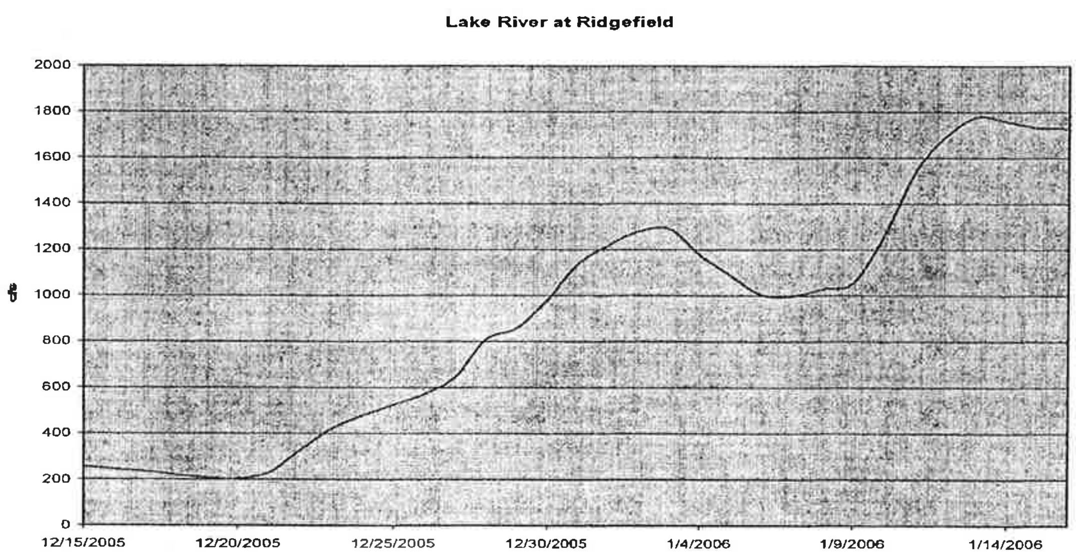


Figure 3. Lake River Upstream Discharge During December 2005 – January 2006 Peak Flows

APRIL 2006 MODERATE WET SEASON CONDITIONS

Water surface elevation was measured in Lake River near the Port of Ridgefield kayak dock from April 6 through April 13, 2006, using a SeaBird SBE16 Datalogger CTD. This period was selected to capture both neap and spring tide conditions, which are separated by approximately 7 days. The dates were selected based on projected upstream discharge in Lake River approaching 400 cfs.

The water surface elevation measured at Ridgefield is plotted in Figure 4, together with water surface elevation from St. Helens collected by NOAA. The tide data at Ridgefield slightly lag St. Helens, and amplitudes are similar, as they must be given the proximity of the two stations. The mean tidal amplitude was approximately 1 foot (0.3 m), or about half the tide amplitude during the September 2004 dry weather study.

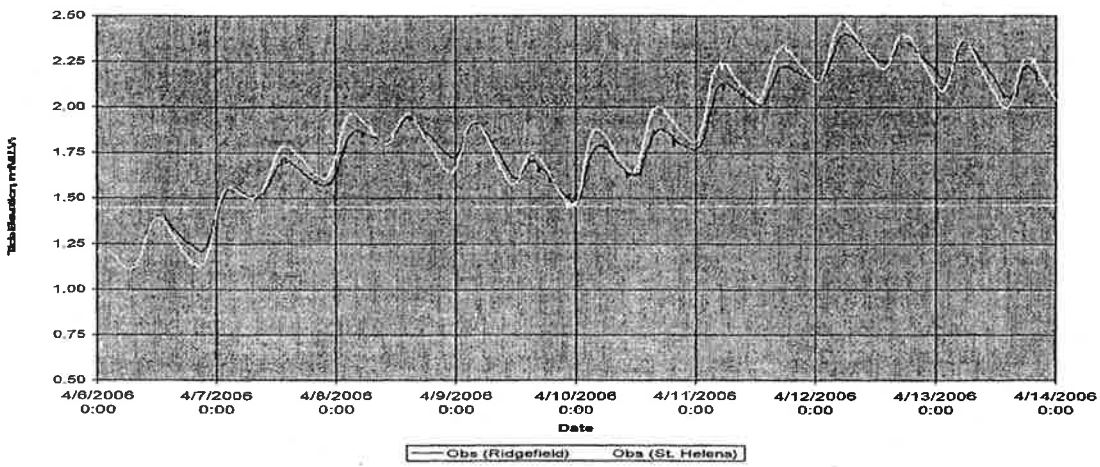


Figure 4. Water Surface Elevation at Ridgefield and St. Helens, April 6 – 13, 2006

Mean water surface elevation was also higher in April 2006 than in September 2004. This is due to the higher flow in the Columbia River during this period. Bonneville Dam release data are shown in Figure 5. Mean discharge during this period was approximately 300,000 cfs, contrasted to the 100,000 cfs discharge in September 2004. Note that the reduced discharge April 8 – 10 was reflected in a corresponding dip in tide elevations.

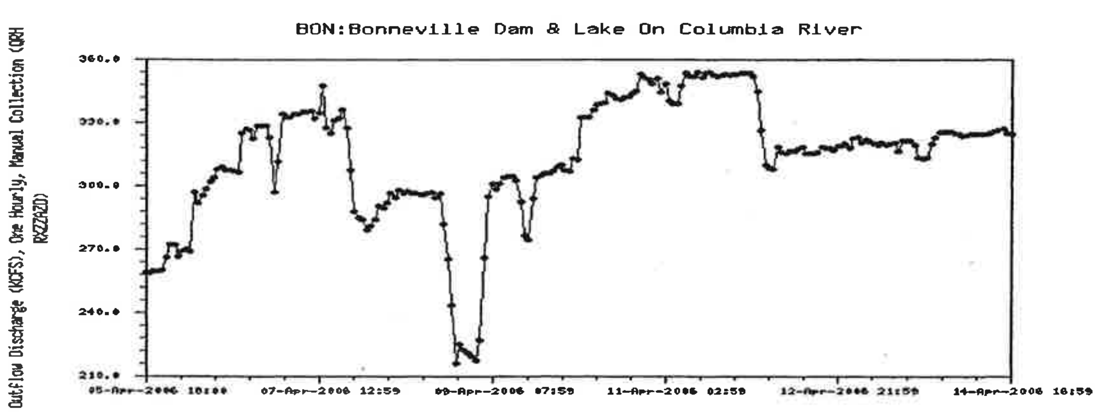


Figure 5. Bonneville Dam Release Data April 5 – 14, 2006.

Using the regression equation for Lake River discharge, the target discharge rate was met in this period, ranging from 280 to 310 cfs. The upstream hydrograph is shown in Figure 6 for this period.

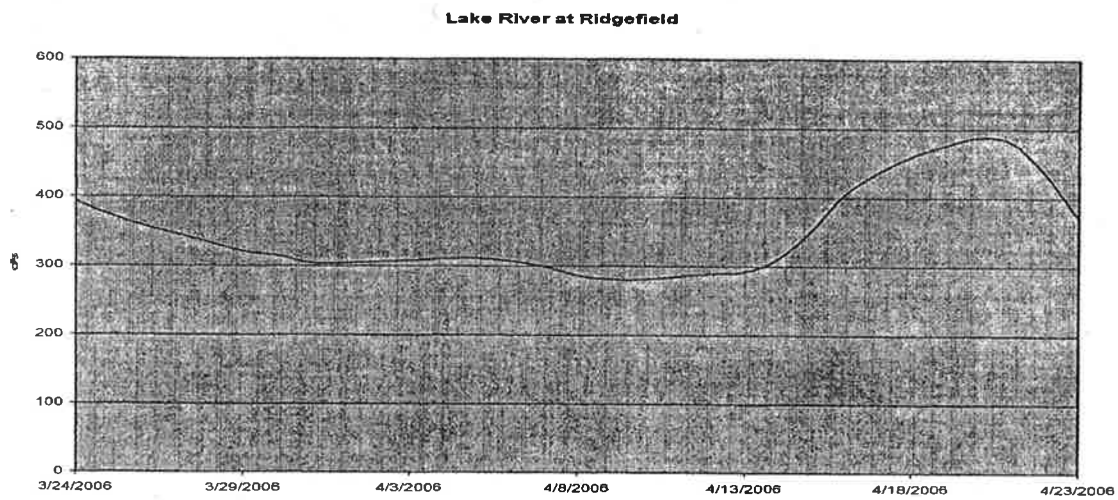


Figure 6. Lake River Upstream Discharge April 2006

Currents were measured in Lake River on April 6 and 13, 2006. Currents were measured with a windowshade drogue consisting of a 1 m^2 vane suspended from a surface float at a depth of approximately 2 m. The drogue was deployed from mid-channel near the kayak dock approximately every half-hour through the entire flood tides. Drogue position was recorded using GPS, and the data and velocity calculations are provided in Attachment A.

The drogue velocity data are plotted together with water surface elevation data in Figure 7 for April 6, and Figure 8 for April 13. Negative current speed is upstream, positive is downstream. These data clearly demonstrate that currents moved upstream during the last half of the flood tides through slightly after high slack tide. The April 6 tides had both higher amplitude and higher velocities than April 13.

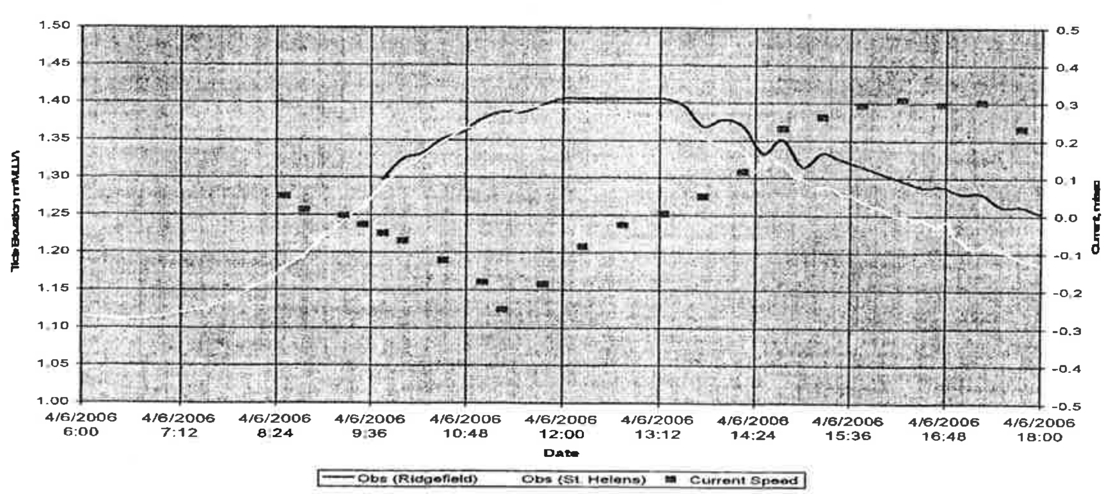


Figure 7. Water Surface Elevation and Current Velocity April 6, 2006

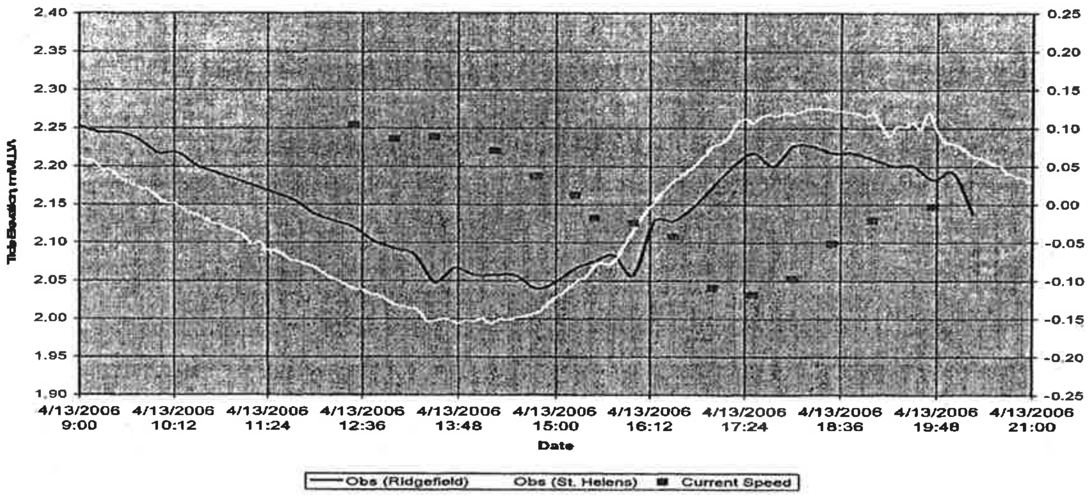


Figure 8. Water Surface Elevation and Current Velocity April 13, 2006

We may confidently conclude that during the April 2006 conditions, in which upstream flow approached 400 cfs, that there continued to be significant tidal influence in Lake River near Ridgefield. Residual circulation was not quantified. However, it follows that the combination of upstream flow and tidal influence produced net discharge exceeding that observed in September 2004 dry weather conditions, when net circulation was produced almost solely be downstream tidal influence.

DILUTION MODELING

The EPA model UM3, which was used in the dilution modeling for the Mixing Zone Study (Cosmopolitan Engineering, December 2005), was run for the conditions observed in January 2006 and April 2006. For the January 2006 model runs, (1) water surface elevation was increased 2.5 meters, (2) ambient and effluent temperatures were adjusted to seasonal averages, and (3) tidal current speeds were based on upstream flow only (1,800 cfs divided by 5,000 ft^2 cross-sectional area = 0.36 fps) assuming no tidal component. For the April 2006 runs, (1) water surface elevation was increased one meter, (2) ambient and effluent temperatures were adjusted to seasonal averages, and (3) current speed was set to the 10^{th} and 50^{th} percentiles measured in the drogue studies.

All model runs were based on the proposed outfall extension into Lake River. Plan and profile drawings of the proposed extension are provided in Attachment B.

The model results are provided in Attachment C for year 2010 effluent flow projections furnished by Gray & Osborne (1.0 mgd max month, 1.6 mgd max day). The results are summarized in Table 1, including the September 2004 critical conditions and the limitations based on 2.5% and 25% of critical ambient discharge (400 cfs). The results substantiate the dry weather critical dilutions of 29 (chronic) and 4.3 (acute) that were established in the December 2005 Mixing Zone Study.

Table 1. Summary of Mixing Zone Modeling (2010 Flows)

Ambient Condition	Acute Dilution	Chronic Dilution
Arithmetic (based on 400 cfs 7Q10)	5.0	66
September 2004 (dry weather)	4.3	29
January 2006 (peak wet weather)	11.2	147
April 2006 (moderate wet weather)	5.6	69

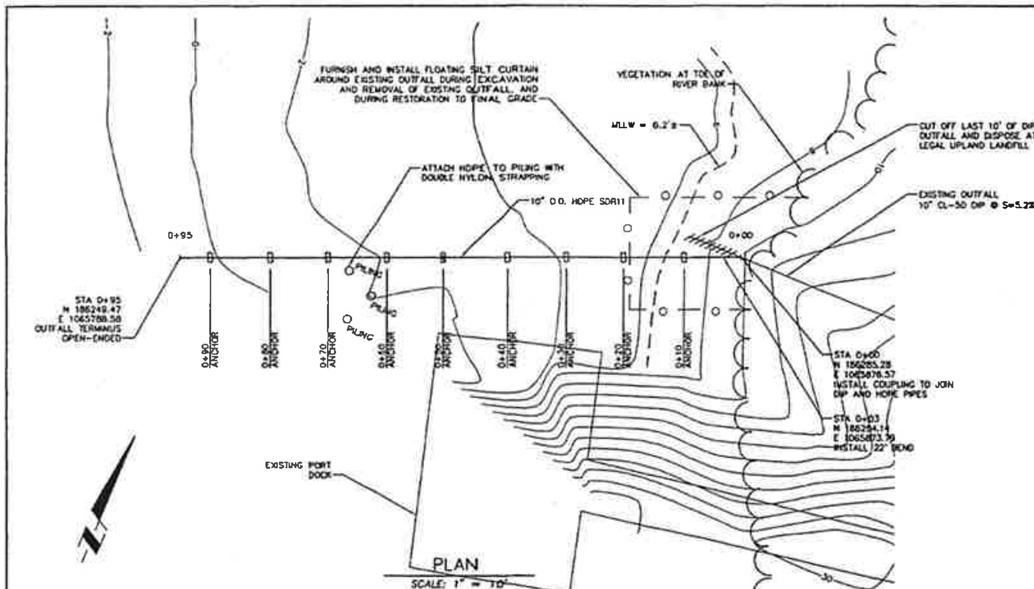
ATTACHMENT A. DROGUE DATA

DATE: 6-Apr-06

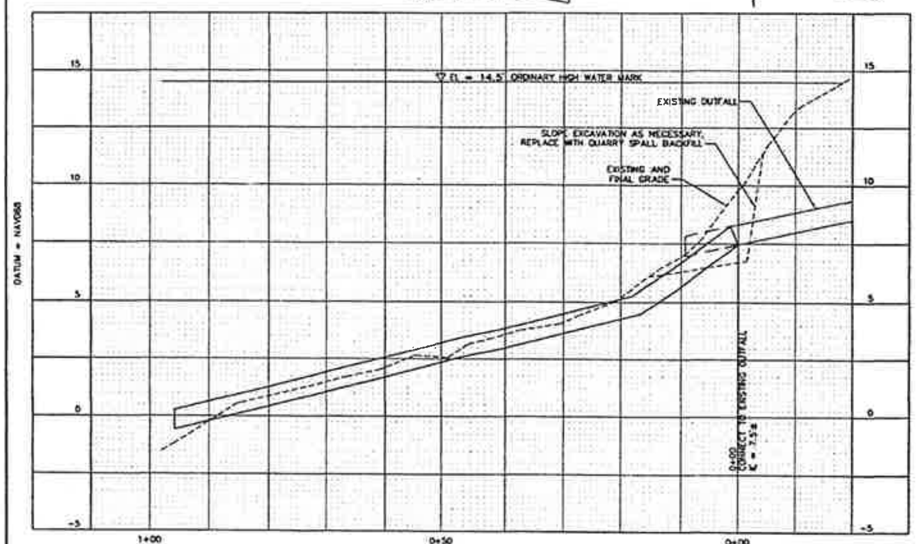
DROGUE	TIME minutes	LAT 45 min	LONG 122 min	dT minutes	dY ft	dX ft	tot. dist. ft	speed ft/sec	speed m/sec	bearing degrees
A	8:22:00	49.294	45.265							
				0:13:00	115	-54	127	0.16	0.050	335
A	8:35:00	49.313	45.278							
				0:18:00	36	-12	38	0.04	0.011	341
A	8:53:00	49.319	45.281							
B	9:14:00	49.295	45.263							
				0:26:00	-12	8	15	0.01	0.003	146
B	9:40:00	49.293	45.261							
				0:10:00	-49	25	55	0.09	0.028	153
B	9:50:00	49.285	45.255							
				0:14:20	-128	45	135	0.16	0.048	160
B	10:04:20	49.264	45.244							
C	9:59:10	49.294	45.265							
				0:14:10	-176	78	193	0.23	0.069	156
C	10:13:20	49.265	45.246							
D	10:28:00	49.295	45.263							
				0:08:50	-194	82	211	0.40	0.121	157
D	10:36:50	49.263	45.243							
E	11:01:40	49.295	45.263							
				0:06:20	-207	86	224	0.59	0.180	157
E	11:08:00	49.261	45.242							
				0:09:20	-425	193	467	0.83	0.254	156
E	11:17:20	49.191	45.195							
F	11:31:30	49.297	45.267							
				0:24:50	-820	379	903	0.61	0.185	155
F	11:56:20	49.162	45.175							
G	12:01:00	49.295	45.264							
				0:19:50	-304	140	334	0.28	0.086	155
G	12:20:50	49.245	45.230							
H	12:33:00	49.295	45.263							
				0:11:00	-55	25	60	0.09	0.028	156
H	12:44:00	49.286	45.257							
I	12:58:40	49.297	45.265							
				0:23:20	-6	-8	10	0.01	0.002	234
I	13:22:00	49.296	45.267							
J	13:29:30	49.295	45.264							
				0:09:10	79	-41	89	0.16	0.049	332
J	13:38:40	49.308	45.274							
K	14:00:00	49.295	45.263							
				0:20:00	419	-189	460	0.38	0.117	336
K	14:20:00	49.364	45.309							
L	14:30:00	49.296	45.266							
				0:12:10	510	-222	557	0.76	0.232	336
L	14:42:10	49.38	45.32							
M	15:00:20	49.295	45.263							
				0:11:30	541	-239	591	0.86	0.261	336
M	15:11:50	49.384	45.321							
N	15:30:30	49.293	45.26							
				0:10:20	547	-231	593	0.96	0.292	337
N	15:40:50	49.383	45.316							
O	16:00:10	49.295	45.263							
				0:10:10	565	-239	613	1.01	0.307	337
O	16:10:20	49.388	45.321							
P	16:30:00	49.296	45.264							
				0:10:10	553	-218	594	0.97	0.297	338
P	16:40:10	49.387	45.317							
Q	17:00:00	49.295	45.264							
				0:10:00	547	-226	592	0.99	0.301	337
Q	17:10:00	49.385	45.319							
R	17:30:50	49.295	45.265							
				0:12:40	528	-231	577	0.76	0.231	336
R	17:43:30	49.382	45.321							

DATE: 13-Apr-06

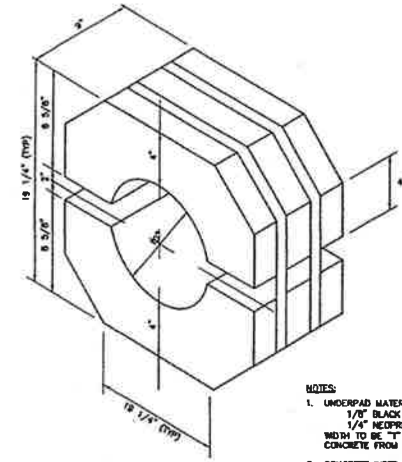
DROGUE	TIME	LAT 45	LONG 122	dT	dY	dX	tot. dist.	speed	speed	bearing
	minutes	min	min	minutes	ft	ft	ft	ft/sec	m/sec	degrees
A	12:31:00	49.297	45.267							
				0:12:00	219	-103	242	0.34	0.102	335
A	12:43:00	49.333	45.292							
B	13:00:30	49.295	45.263							
				0:16:40	255	-124	283	0.28	0.086	334
B	13:17:10	49.337	45.293							
C	13:34:00	49.295	45.266							
				0:13:40	213	-99	234	0.29	0.087	335
C	13:47:40	49.33	45.29							
D	14:00:20	49.295	45.263							
				0:19:30	237	-119	265	0.23	0.069	333
D	14:19:50	49.334	45.292							
E	14:45:20	49.293	45.262							
				0:13:40	85	-41	94	0.12	0.035	334
E	14:59:00	49.307	45.272							
				0:20:00	49	-16	51	0.04	0.013	341
E	15:19:00	49.315	45.276							
F	15:30:20	49.297	45.267							
				0:14:00	-36	29	46	0.06	0.017	142
F	15:44:20	49.291	45.26							
G	16:00:00	49.294	45.264							
				0:10:10	-43	29	51	0.08	0.026	146
G	16:10:10	49.287	45.257							
H	16:31:00	49.295	45.263							
				0:07:10	-55	25	60	0.14	0.043	156
H	16:38:10	49.286	45.257							
I	17:00:00	49.297	45.267							
				0:09:40	-188	91	209	0.36	0.110	154
I	17:09:40	49.266	45.245							
J	17:30:30	49.296	45.265							
				0:07:10	-152	74	169	0.39	0.120	154
J	17:37:40	49.271	45.247							
K	18:00:00	49.295	45.263							
				0:08:30	-146	70	162	0.32	0.097	154
K	18:08:30	49.271	45.246							
L	18:30:00	49.297	45.266							
				0:14:50	-140	62	153	0.17	0.052	156
L	18:44:50	49.274	45.251							
M	19:00:10	49.295	45.264							
				0:26:50	-109	37	115	0.07	0.022	161
M	19:27:00	49.277	45.255							
N	19:33:20	49.293	45.262							
				0:18:00	-12	-4	13	0.01	0.004	199
N	19:51:20	49.291	45.263							



PLAN
SCALE: 1" = 10'

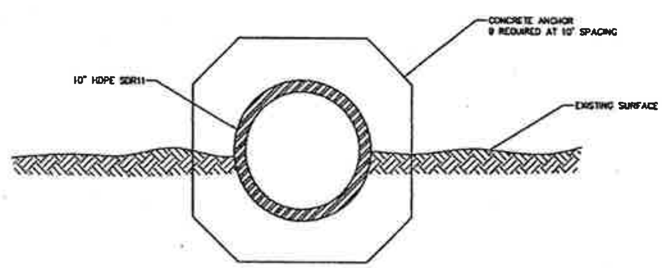


PROFILE
SCALE: H: 1" = 10' V: 1" = 2.5'



TYPICAL OFFSHORE ANCHOR
DETAIL (A)
NO SCALE

NOTES:
1. UNDERPAD MATERIAL:
   1/8" BLACK OR RED RUBBER SHEET
   1/4" NEOPRENE SPONGE PADDING
   WIDTH TO BE "T" + 2" MINIMUM TO PREVENT CONCRETE FROM CONTACTING PIPE SURFACE
2. CONCRETE INTERIOR SURFACE SHOULD BE SMOOTH (3000 psi – 28 DAYS)
3. ALL CONCRETE BLOCKS SHALL BE SUITABLY REINFORCED WITH REINFORCING ROD TO PREVENT CRACKING DURING HANDLING, TIGHTENING, AND MOVEMENT OF WEIGHTED PIPE.
4. PROVIDE SUITABLE LIFTING LUGS
5. TYPICAL BLOCK FASTENED WITH STAINLESS-STEEL STRAPPING. ALL SHARP CORNERS MUST BE SUITABLY CHAMFERED, WITH GROOVES TO HOLD STRAPPING IN PLACE.



NOTES:
1. NO EXCAVATION OF BOTTOM SEDIMENTS
2. EMBED PIPE TO SPRINGLINE BY VIBRATION METHODS

TYPICAL OFFSHORE ANCHOR
SECTION (B)
NO SCALE

0 1" 2"
TWO INCHES AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

WILLIAM P. FOX
EXPIRES 10-29-07

Gray & Osborne, Inc.
CONSULTING ENGINEERS
701 DEXTER AVENUE NORTH SUITE 200
SEATTLE, WASHINGTON 98109 • (206) 284-0860

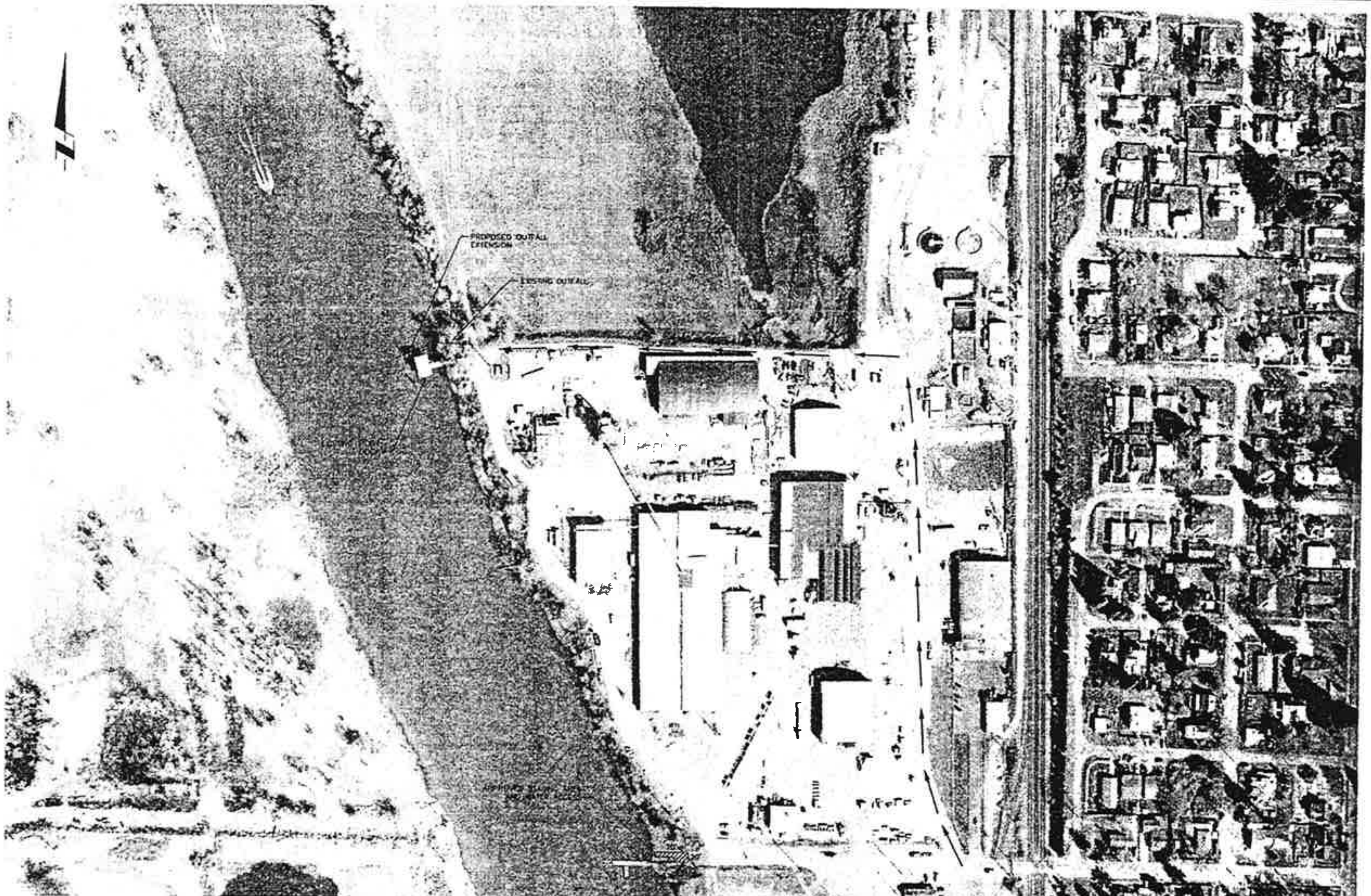
DATE: MAR. 2006
SCALE: NOTED
DRAWN:
CHECKED: xxx
APPROVED: xxx

No.	REVISION	DATE	APPD

CITY OF RIDGEFIELD
CLARK COUNTY WASHINGTON

WASTEWATER TREATMENT PLANT
0.7 MGD UPGRADE
EFFLUENT OUTFALL MODIFICATIONS, PLAN SECTION AND DETAILS

SHEET: G-11
OF: 12
JOB NO.: 05018
DWG: 0-001501



PLAN

SCALE: 1" = 100' (APPROX.)

APPROVED TRAFFIC ACCESS ROUTE. SITE ACCESS MUST BE COORDINATED WITH THE PORT OF RIDGEFIELD

0 1" 2"

TWO INCHES AT FULL SCALE. IF NOT, SCALE ACCORDINGLY

WILLIAM P. FOX

EXPIRES 10-29-07

Gray & Osborne, Inc.

CONSULTING ENGINEERS

701 DEXTER AVENUE NORTH SUITE 200
SEATTLE, WASHINGTON 98109 • (206) 284-0860

117 E. 6th Street
Tacoma, WA 98402

DATE: MAR. 2006
SCALE: NOTED
DRAWN:
CHECKED:
APPROVED:

No.	REVISION	DATE	APPD

CITY OF RIDGEFIELD
CLARK COUNTY WASHINGTON

WASTEWATER TREATMENT PLANT
0.7 MGD UPGRADE

OUTFALL IMPROVEMENTS
VICINITY MAP

SHEET: G-12
OF: 12

JOB NO.: 05618
DWG: G-001901

ATTACHMENT C. UM3 DILUTION MODEL RESULTS

LAKE RIVER JANUARY 2006 HIGH FLOW DILUTION MODEL - ACUTE

/ Windows UM3. 5/22/2006 7:11:54 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: -----------------------------------

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2
0.0	0.11	0.0	0.05	7.0	0.0	0.0	0.11	0.0	0.003
2.0	0.11	0.0	0.05	7.0	0.0	0.0	0.11	0.0	0.003
4.0	0.11	0.0	0.05	7.0	0.0	0.0	0.11	0.0	0.003
6.0	0.11	0.0	0.05	7.0	0.0	0.0	0.11	0.0	0.003
8.0	0.11	0.0	0.05	7.0	0.0	0.0	0.11	0.0	0.003

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(in)	(in)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
8.0	6.0	30.0	90.0	1.0	20.7	207.0	15.0	1.6	0.05	16.0	1.0

Froude number: 56.3

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	CL-diln	x-posn	y-posn	
	(ft)	(m/s)	(in)	(kg/kg)	()	()	(ft)	(ft)	
0	15.0	0.11	7.589	1.0	1.0	1.0	0.0	0.0;	
25	14.58	0.11	12.32	0.61	1.64	1.0	0.0127	0.729;	
50	13.95	0.11	20.18	0.372	2.69	1.39	0.0801	1.811;	
75	13.07	0.11	32.95	0.226	4.412	2.255	0.287	3.34;	
100	11.89	0.11	53.32	0.138	7.238	3.593	0.802	5.355;	
125	10.47	0.11	84.41	0.0841	11.87	5.497	1.89	7.773;	
150	8.998	0.11	127.8	0.0514	19.44	7.887	3.768	10.23;	
175	7.618	0.11	181.2	0.0317	31.5	10.79	6.648	12.48;	
178	7.447	0.11	188.4	0.0299	33.42	$\boxed{11.22}$	7.109	12.75;	surface,

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 4.79 m

conc	dilutn	width	distnce	time				
(kg/kg)		(m)	(m)	(hrs)	(kg/kg)	(s-1)	(m/s)	(m0.67/s2)
1.08E-2	92.23	18.24	63.09	0.148	0.0	0.0	0.11	0.003

count: 1
;
7:11:54 PM. amb fills: 2

LAKE RIVER JANUARY 2006 HIGH FLOW DILUTION MODEL - CHRONIC

/ Windows UM3. 5/22/2006 7:12:01 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1:

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2
0.0	0.11	0.0	0.05	7.0	0.0	0.0	0.11	0.0	0.003
2.0	0.11	0.0	0.05	7.0	0.0	0.0	0.11	0.0	0.003
4.0	0.11	0.0	0.05	7.0	0.0	0.0	0.11	0.0	0.003
6.0	0.11	0.0	0.05	7.0	0.0	0.0	0.11	0.0	0.003
8.0	0.11	0.0	0.05	7.0	0.0	0.0	0.11	0.0	0.003

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(in)	(in)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
8.0	6.0	30.0	90.0	1.0	20.7	207.0	15.0	1.0	0.05	16.0	1.0

Froude number: 35.19

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	CL-diln	x-posn	y-posn	
	(ft)	(m/s)	(in)	(kg/kg)	()	()	(ft)	(ft)	
0	15.0	0.11	7.589	1.0	1.0	1.0	0.0	0.0;	
25	14.62	0.11	12.32	0.61	1.64	1.0	0.0184	0.665;	
50	14.07	0.11	20.13	0.372	2.69	1.38	0.112	1.608;	
75	13.34	0.11	32.64	0.226	4.412	2.203	0.382	2.858;	
100	12.45	0.11	51.84	0.138	7.238	3.382	0.996	4.369;	
125	11.53	0.11	78.65	0.0846	11.81	4.848	2.09	5.906;	
150	10.69	0.11	110.9	0.0529	18.88	6.549	3.732	7.272;	
165	10.15	0.11	134.0	0.0393	25.4	7.975	5.276	8.132;	bottom hit,
175	9.758	0.11	150.6	0.0323	30.96	9.209	6.671	8.733;	
200	8.616	0.11	197.7	0.0197	50.79	13.85	12.36	10.42;	
204	8.402	0.11	206.1	0.0182	54.98	14.86	13.7	10.72;	surface,

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 5.23 m

conc	dilutn	width	distnce	time				
(kg/kg)		(m)	(m)	(hrs)	(kg/kg)	(s-1)	(m/s)	(m0.67/s2)
6.82E-3	$\boxed{146.6}$	19.27	63.					

LAKE RIVER APRIL 2006 WET SEASON DILUTION MODEL - ACUTE

/ Windows OM3. 5/22/2006 7:18:41 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: ------------------------------------

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2
0.0	0.01	0.0	0.05	13.0	0.0	0.0	0.01	0.0	0.003
2.0	0.01	0.0	0.05	13.0	0.0	0.0	0.01	0.0	0.003
4.0	0.01	0.0	0.05	13.0	0.0	0.0	0.01	0.0	0.003
6.0	0.01	0.0	0.05	13.0	0.0	0.0	0.01	0.0	0.003
8.0	0.01	0.0	0.05	13.0	0.0	0.0	0.01	0.0	0.003

P-dia	P-elev	V-angle	H-angle	Ports	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(in)	(in)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
8.0	6.0	30.0	90.0	1.0	20.7	207.0	10.0	1.6	0.05	17.0	1.0

Froude number: 71.06

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	CL-diln	x-posn	y-posn
	(ft)	(m/s)	(in)	(kg/kg)	()	()	(ft)	(ft)
0	10.0	0.01	7.589	1.0	1.0	1.0	0.0	0.0;
25	9.507	0.01	12.33	0.61	1.64	1.0	0.00137	0.853;
50	8.707	0.01	20.22	0.372	2.691	1.397	0.00926	2.237;
75	7.414	0.01	33.14	0.226	4.414	2.291	0.037	4.465;
100	5.339	0.01	54.28	0.138	7.241	3.758	0.12	8.009;
120	2.824	0.01	80.4	0.0929	10.76	$\boxed{5.581}$	0.284	12.23; surface,

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 2.04 m

conc	dilutn	width	distnce	time				
(kg/kg)		(m)	(m)	(hrs)	(kg/kg)	(s-1)	(m/s)	(m0.67/s2)
3.84E-2	26.05	6.824	6.0	0.0631	0.0	0.0	0.01	0.003
2.08E-2	48.0	12.59	12.0	0.23	0.0	0.0	0.01	0.003
1.59E-2	62.7	16.45	18.0	0.396	0.0	0.0	0.01	0.003
1.34E-2	74.53	19.55	24.0	0.563	0.0	0.0	0.01	0.003
1.18E-2	84.73	22.23	30.0	0.73	0.0	0.0	0.01	0.003
1.06E-2	93.83	24.62	36.0	0.896	0.0	0.0	0.01	0.003
9.79E-3	102.1	26.8	42.0	1.063	0.0	0.0	0.01	0.003
9.11E-3	109.8	28.81	48.0	1.23	0.0	0.0	0.01	0.003
8.55E-3	117.0	30.69	54.0	1.396	0.0	0.0	0.01	0.003
8.08E-3	123.7	32.47	60.0	1.563	0.0	0.0	0.01	0.003
7.69E-3	130.1	34.15	66.0	1.73	0.0	0.0	0.01	0.003

count: 11
;
7:18:41 PM. amb fills: 2

LAKE RIVER APRIL 2006 WET SEASON DILUTION MODEL - CHRONIC

```
/ Windows UM3. 5/22/2006 7:22:07 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: -----------------------------------
     Depth    Amb-cur    Amb-dir    Amb-sal    Amb-tem    Amb-pol      Decay    Far-spd    Far-dir    Disprsn
         m        m/s        deg        psu          C      kg/kg        s-1        m/s        deg   m0.67/s2
       0.0       0.08        0.0       0.05       13.0        0.0        0.0       0.08        0.0      0.003
       2.0       0.08        0.0       0.05       13.0        0.0        0.0       0.08        0.0      0.003
       4.0       0.08        0.0       0.05       13.0        0.0        0.0       0.08        0.0      0.003
       6.0       0.08        0.0       0.05       13.0        0.0        0.0       0.08        0.0      0.003
       8.0       0.08        0.0       0.05       13.0        0.0        0.0       0.08        0.0      0.003
  P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
   (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
    8.0     6.0    30.0    90.0     1.0    20.7   207.0    10.0     1.0    0.05    17.0     1.0
Froude number:      44.42
       Depth  Amb-cur    P-dia  Polutnt   Dilutn  CL-diln   x-posn    y-posn
Step    (ft)    (m/s)     (in)  (kg/kg)       ()       ()     (ft)      (ft)
   0    10.0     0.08    7.589      1.0      1.0      1.0      0.0      0.0;
  25    9.59     0.08    12.32     0.61     1.64      1.0   0.0144     0.71;
  50   8.986     0.08    20.17    0.372    2.691    1.388   0.0897    1.751;
  75   8.146     0.08    32.87    0.226    4.414    2.244    0.317    3.193;
 100   7.053     0.08    52.89    0.138    7.241    3.543    0.866    5.045;
 125   5.766     0.08    82.77   0.0841    11.88    5.332    1.979    7.175;
 149   4.534     0.08    121.1   0.0526    19.02    7.424    3.705    9.139; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of       3.08 m
    conc  dilutn   width distnce     time
 (kg/kg)             (m)     (m)    (hrs) (kg/kg)   (s-1)    (m/s)(m0.67/s2)
 2.05E-2   48.68   10.87    30.0   0.0937     0.0     0.0     0.08    0.003
 1.44E-2  [69.18]  15.46    60.0    0.198     0.0     0.0     0.08    0.003
 1.17E-2   84.86   18.97    90.0    0.302     0.0     0.0     0.08    0.003
count: 3
 ;
7:22:07 PM. amb fills: 2
```

APPENDIX E

DAILY MONITORING REPORTS, JANUARY 2008 THROUGH DECEMBER 2012

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: **Month:** January **Year: 2008**

Facility Name: City of Ridgefield **County:** Clark

Receiving Water: **Plant operators:** John Duback 3/7102 Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection **Population:** 4053 Schools & Industries

	INFLUENT					EFFLUENT									
Frequency	2/week		CONT	CONT	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	1/WK	DAILY	1/WK	1/MO	Daily
Date	BOD 5-DAY MG/L		TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/ 100 ML	TOTAL AMMONIA NITR MG/L	RAIN FALL INCHES
1	227	780	189	649	0.412	3.8	98.3%	13.1	4.3	97.7%	14.8	7.1			0.19
2					0.474							7.0	1	4.50	0.50
3	194	862	166	738	0.533	3.7	98.1%	16.4	4.2	97.5%	18.7	7.1			0.44
4					0.510							7.0	3	6.30	0.25
5					0.517							7.1			0.27
6					0.505							7.0			0.31
7					0.479							7.0			0.55
8	181	892	128	631	0.591	4.7	97.4%	23.2	5.8	95.5%	28.6	7.0			0.25
9					0.512							6.9	1	4.20	0.41
10	173	791	145	663	0.548	4.1	97.6%	18.7	4.4	97.0%	20.1	6.9			0.30
11					0.514							6.9	7	4.10	0.30
12					0.531							7.0			0.20
13					0.470							7.0			0.02
14					0.440							7.0			0.23
15	178	598	207	696	0.403	3.0	98.3%	10.1	3.3	98.4%	11.1	7.0			0.00
16					0.377							7.0	2	6.30	0.01
17	273	815	213	636	0.358	3.1	98.9%	9.3	3.3	98.5%	9.9	7.0			0.02
18					0.343							7.0	1	8.20	0.00
19					0.346							7.1			0.02
20					0.344							7.1			0.00
21					0.345							7.0			0.00
22	330	908	270	743	0.330	5.4	98.4%	14.9	5.5	98.0%	15.1	7.0			0.00
23					0.326							6.9	3	3.40	0.00
24	272	730	253	679	0.322	4.7	98.3%	12.6	5.7	97.7%	15.3	6.9			0.00
25					0.306							7.0	1	3.60	0.00
26					0.341							7.1			0.42
27					0.360							7.1			0.04
28					0.338							7.1			0.23
29	242	823	219	745	0.408	5.6	97.7%	19.1	7.1	96.8%	24.2	7.0			0.53
30					0.412							6.9	1	5.40	0.24
31	184	666	184	666	0.434	5.3	97.1%	19.2	7.8	95.8%	28.2	7.0			0.22
Total	2254	7867	1974	6846	13.129	43.4		156.5	51.4		185.9			46.00	5.95
	AVG 225	787	AVG 197	AVG 685	AVG 0.424	AVG 4.34	AVG 98.0	AVG 15.65	AVG 5.14	AVG 97.3	AVG 18.59	MIN 6.9	GEM 2	AVG 5.11	
Permit		0		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 330	908	MAX 270	MAX 745	AVW 0.526	AVW 5.45		AVW 20.90	AVW 7.45		AVW 26.20	MAX 7.1	GM7 3	AVW 7.25	
Limits		0				45		188	45		188	9	200		

PAGE 1 0F 1

AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
GM7=highest 7-day Geometric Mean

I certify under penalty of law that I have personally examined the information submitted herein; and based on my inquiry of those individuals immediately responsible, I believe the information to be accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and/or imprisonment. (Penalties under statutes 18 & 33 U.S.C. may include fines up to $10,000 and/or maximum imprisonment of five years.)

Please Circle ALL Permit Violations Mail to P.O. Box 47775, Olympia WA 98504-7775

ohn Duback WWTP Operator

Name and Title Signature Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 **Month:** February **Year:** 2008

Facility Name: City of Ridgefield **County:** Clark

Receiving Water: LAKE RIVER **Plant operators:** John Duback 3/7102 Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection **Population:** 4053 **Schools &** **Industries**

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	CONT	CONT	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	1/WK	DAILY	1/WK	1/MO	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/ 100 ML	TOTAL AMMONIA MG/L NITR	RAIN FALL INCHES
1					0.410							7.0	3	4.80	0.25
2					0.559							7.0			0.70
3					0.521							7.0			0.03
4					0.422							6.9			0.18
5	201	731	179	651	0.436	5.7	97.2%	20.7	4.8	97.3%	17.5	6.9			0.09
6					0.445							6.9	10	3.20	0.76
7	126	596	156	738	0.567	5.3	95.8%	25.1	6.8	95.6%	32.2	6.9			0.07
8					0.520							6.9	2	2.80	0.37
9					0.477							7.0			0.00
10					0.419							6.9			0.00
11					0.382							6.9			0.00
12	264	826	230	719	0.375	7.8	97.0%	24.4	5.3	97.7%	16.6	7.0			0.03
13					0.354							7.0		2.70	0.00
14	288	814	237	670	0.339	5.5	98.1%	15.5	4.8	98.0%	13.6	6.9			0.00
15					0.325							7.0		2.20	0.00
16					0.316							7.1			0.00
17					0.313							7.0			0.00
18					0.314							7.0			0.00
19			282	717	0.305				4.3	98.5%	10.9	6.9			0.0(
20					0.296							6.9			0.00
21					0.304										0.00
22															
23															
24															
25															
26															
27															
28															
Total	879	2967	1084	3495	8.399	24.3		85.7	26.0		90.7	139.1	15	15.70	2.48
	AVG 220	AVG 371	AVG 217	AVG 437	AVG 0.400	AVG 6.08	AVG 97.8	AVG 10.72	AVG 5.20	AVG 98.1	AVG 11.34	MIN 6.9	GEM 6	AVG 3.14	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 288	MAX 826	MAX 282	MAX 738	AVW 0.369	AVW 7.35		AVW 22.65	AVW 6.95		AVW 21.80	MAX 7.1	GM7 32	AVW 1.35	
Limits						45		188	45		188	9	200		

PAGE 1 0F 1

AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
GM7=highest 7-day Geometric Mean

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John Duback WWTP Operator

Name and Title Signature Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 **Month:** March **Year:** 2008

Facility Name: City of Ridgefield **County:** Clark

Receiving Water: LAKE RIVER **Plant operators:** John Duback 3/7102 Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection **Population:** 4053 **Schools &** **Industries**

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	CONT	CONT	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	1/WK	DAILY	1/WK	1/MO	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/ 100 ML	TOTAL AMMONIA NITR MG/L	RAIN FALL INCHES
1					0.295							6.9			0.02
2					0.304							6.9			0.00
3					0.310							7.0			0.08
4	290	711	247	606	0.294	11.0	96.2%	27.0	7.4	97.0%	18.1	6.9			0.01
5					0.293							6.9	19	0.80	0.00
6	289	694	364	874	0.288	8.8	97.0%	21.1	5.5	98.5%	13.2	7.0			0.00
7					0.283							6.9	3	1.10	0.05
8					0.291							6.9			0.00
9					0.302							7.0			0.00
10					0.285							7.0			0.00
11	332	806	277	672	0.291	10.5	96.8%	25.5	6.4	97.7%	15.5	7.1			0.01
12					0.279							7.0	3	0.80	0.27
13	270	766	329	933	0.340	6.8	97.5%	19.3	6.1	98.1%	17.3	7.0			0.37
14					0.363							6.9	1	0.40	0.40
15					0.392							7.0			0.25
16					0.357							7.0			0.11
17					0.358							6.9			0.31
18	205	663	213	689	0.388	5.4	97.4%	17.5	4.9	97.7%	15.9	6.9			0.11
19					0.356							6.9	3	0.00	0.00
20	291	937	293	943	0.386	4.3	98.5%	13.8	3.9	98.7%	12.6	7.0			0.11
21					0.332							6.9	1	0.00	0.00
22					0.336							6.9			0.07
23					0.359							7.1			0.16
24					0.333							7.0			0.00
25	279	738	326	862	0.317	5.8	97.9%	15.3	5.5	98.3%	14.5	7.0			0.27
26					0.402							7.0	6	0.20	0.15
27	233	707	310	941	0.364	4.9	97.9%	14.9	5.4	98.3%	16.4	7.0			0.21
28					0.395							6.8	1	0.50	0.10
29					0.377							7.0			0.20
30					0.367							7.0			0.04
31					0.338							6.9			0.02
Total	2189	6022	2359	6521	10.375	57.5		154.4	45.1		123.5	215.7	37	3.80	3.32
	AVG 274	AVG 753	AVG 295	AVG 815	AVG 0.335	AVG 7.19	AVG 97.4	AVG 19.30	AVG 5.64	AVG 98.0	AVG 15.44	MIN 6.8	GEM 3	AVG 0.48	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 332	MAX 937	MAX 364	MAX 943	AVW 0.364	AVW 9.90		AVW 24.05	AVW 6.45		AVW 16.40	MAX 7.1	GM7 8	AVW 0.95	
Limits						45		188	45		188	9	200		

PAGE 1 0F 1

AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
GM7=highest 7-day Geometric Mean

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ohn Duback WWTP Operator

Name and Title Signature Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 | **Month:** April | **Year:** 2008

Facility Name: City of Ridgefield | **County:** Clark

Receiving Water: LAKE RIVER | **Plant operators:** John Duback 3/7102 | Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection | **Population:** 4053 | **Schools &** | **Industries**

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	CONT	CONT	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	1/WK	DAILY	1/WK	1/MO	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/ 100 ML	TOTAL AMMONIA NITR MG/L	RAIN FALL INCHES
1	223	599	222	596	0.322	4.0	98.2%	10.7	5.6	97.5%	15.0	6.9			0.00
2					0.318							6.9	2	0.03	0.00
3	205	509	211	524	0.298	2.8	98.6%	7.0	4.9	97.7%	12.2	6.9			0.00
4					0.310							6.9	1	0.03	0.15
5					0.320							7.0			0.05
6					0.333							7.0			0.01
7					0.313							6.9			0.14
8	188	492	234	613	0.314	4.4	97.7%	11.5	5.0	97.9%	13.1	6.9			0.04
9					0.321							7.0	1	0.03	0.09
10	241	647	221	593	0.322	4.7	98.0%	12.6	4.4	98.0%	11.8	6.9			0.00
11					0.293							7.0	1	0.03	0.00
12					0.278							7.0			0.00
13					0.314							7.0			0.06
14					0.316							7.0			0.07
15	211	544	338	871	0.309	4.9	97.7%	12.6	6.8	98.0%	17.5	7.0			0.01
16					0.306							7.0	1	0.03	0.01
17	188	486	284	734	0.310	4.1	97.8%	10.6	5.7	98.0%	14.7	7.0			0.00
18					0.305							6.9	1	0.03	0.00
19					0.320							7.1			0.10
20					0.330							7.2			0.02
21					0.331							7.0			0.29
22	220	670	227	691	0.365	4.2	98.1%	12.8	5.6	97.5%	17.0	7.0			0.38
23					0.393							7.0	5	0.07	0.02
24	162	466	216	621	0.345	2.6	98.4%	7.5	4.3	98.0%	12.4	6.9			0.01
25					0.319							7.0	1	0.06	0.00
26					0.300							6.9			0.00
27					0.315							7.0			0.00
28					0.307							7.0			0.01
29	215	563	263	689	0.314	4.3	98.0%	11.3	4.9	98.1%	12.8	7.0			0.18
30					0.327							7.0	8	0.14	0.13
Total	1853	4977	2216	5933	9.568	36.0		96.6	47.2		126.6	209.3	21	0.45	1.77
	AVG 206	AVG 553	AVG 246	AVG 659	AVG 0.319	AVG 4.00	AVG 98.1	AVG 10.73	AVG 5.24	AVG 98.9	AVG 14.07	MIN 6.9	GEM 2	AVG 0.05	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 241	MAX 670	MAX 338	MAX 871	AVW 0.340	AVW 4.55		AVW 12.05	AVW 6.25		AVW 16.10	MAX 7.2	GM7 2	AVW 0.07	
Limits						45		188	45		188	9	200		

AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
GM7=highest 7-day Geometric Mean

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John Duback WWTP Operator

Name and Title

Signature

Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 **Month:** May **Year:** 2008

Facility Name: City of Ridgefield **County:** Clark

Receiving Water: LAKE RIVER **Plant operators:** John Duback 3/7102 Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection **Population:** 4099 **Schools & Industries**

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	CONT	CONT	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	1/WK	DAILY	1/WK	1/MO	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/ 100 ML	TOTAL AMMONIA MG/L NITR	RAIN FALL INCHES
1	217	561	233	602	0.310	5.4	97.5%	14.0	6.1	97.4%	15.8	7.0			0.00
2					0.294							7.0	2	0.12	0.00
3					0.294							7.0			0.00
4					0.298							7.0			0.00
5					0.289							7.1			0.00
6	194	466	260	624	0.288	4.0	97.9%	9.6	5.3	98.0%	12.7	7.1			0.00
7					0.311							7.0	2	0.03	0.00
8	257	705	336	922	0.329	3.6	98.6%	9.9	4.2	98.8%	11.5	7.0			0.00
9					0.308							7.0	34	0.03	0.00
10					0.307							7.0			0.05
11					0.324							7.0			0.02
12					0.296							7.0			0.00
13	206	488	283	670	0.284	5.6	97.3%	13.3	6.6	97.7%	15.6	7.0			0.10
14					0.288							7.0	1	0.11	0.02
15	264	586	284	630	0.266	6.1	97.7%	13.5	6.6	97.7%	14.6	7.0			0.00
16					0.240							7.1	1	0.12	0.00
17					0.246							7.0			0.00
18					0.272							7.0			0.00
19					0.263							7.1			0.21
20	241	589	277	677	0.293	10.8	95.5%	26.4	13.1	95.3%	32.0	7.1			0.06
21					0.293							6.9	112	0.28	0.01
22	251	607	275	665	0.290	12.3	95.1%	29.7	16.4	94.0%	39.7	7.1			0.02
23					0.288							7.1	157	0.20	0.06
24					0.248							7.0			0.00
25					0.254							7.0	50		0.10
26					0.276							7.0	9		0.06
27	275	615	316	706	0.268	14.1	94.9%	31.5	17.6	94.4%	39.3	7.1			0.00
28					0.282							7.1	10	0.54	0.00
29	257	622	301	728	0.290	9.1	96.5%	22.0	13.6	95.5%	32.9	7.0			0.00
30					0.258							7.0	123	0.27	0.00
31					0.265							7.0			0.00
Total	2162	5238	2565	6225	8.812	71.0		169.9	89.5		214.2		501	1.70	0.71
	AVG 240	AVG 582	AVG 285	AVG 692	AVG 0.284	AVG 7.89	AVG 96.8	AVG 18.88	AVG 9.94	AVG 96.5	AVG 23.80	MIN 6.9	GEM 13	AVG 0.19	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 275	MAX 705	MAX 336	MAX 922	AVW 0.309	AVW 11.60		AVW 28.05	AVW 15.60		AVW 36.10	MAX 7.1	GM7 133	AVW 0.41	
Limits						45		188	45		.	9	200		

AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
GM7=highest 7-day Geometric Mean

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ohn Duback WWTP Operator

Name and Title

Signature Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 **Month:** June **Year:** 2008
Facility Name: City of Ridgefield **County:** Clark
Receiving Water: LAKE RIVER **Plant operators:** John Duback 3/7102 Frederick Crippen 3/6838
Plant Type: Activated Sludge W/UV Disinfection **Population:** 4099 **Schools &** **Industries**

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	CONT	CONT	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	1/WK	DAILY	1/WK	1/MO	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/ 100 ML	TOTAL AMMONIA NITR MG/L	RAIN FALL INCHES
1					0.294							7.0			0.00
2					0.289							7.0			0.94
3	237	716	281	848	0.362	8.2	96.5%	24.8	10.7	96.2%	32.3	7.0			0.10
4					0.311							7.0	7	0.30	0.00
5	221	566	275	704	0.307	6.2	97.2%	15.9	10.4	96.2%	26.6	7.0			0.07
6					0.307							7.0	21	0.20	0.03
7					0.297							7.0			0.00
8					0.302							7.0			0.01
9					0.300							7.0			0.04
10	282	710	348	877	0.302	4.0	98.6%	10.1	10.3	97.0%	25.9	6.9			0.03
11					0.282							7.0	14	0.30	0.00
12	369	874	434	1028	0.284	4.6	98.8%	10.9	7.2	98.3%	17.1	7.0			0.00
13					0.268							7.0	22	0.20	0.00
14					0.267							7.1			0.00
15					0.282							7.1			0.00
16					0.283							7.1			0.00
17	281	663	318	751	0.283	5.6	98.0%	13.2	6.8	97.9%	16.0	7.0			0.00
18					0.257							7.0	23	0.30	0.00
19	347	732	367	774	0.253	4.0	98.8%	8.4	4.4	98.8%	9.3	7.1			0.00
20					0.242							7.1	4	0.20	0.00
21					0.242							7.2			0.00
22					0.264							7.1			0.00
23					0.274							7.1			0.00
24	297	642	343	741	0.259	3.5	98.8%	7.6	4.8	98.6%	10.4	7.1			0.00
25					0.263							7.0	2	0.24	0.00
26	261	579	379	841	0.266	2.8	98.9%	6.2	3.4	99.1%	7.5	7.1			0.00
27					0.229							7.1	1	0.20	0.00
28					0.253							7.1			0.00
29					0.252							7.1			0.00
30					0.256							7.1			0.00
Total	2295	5482	2745	6564	8.330	38.9		97.0	58.0		145.2	211.4	94	1.94	1.22
	AVG 287	AVG 685	AVG 343	AVG 820	AVG 0.278	AVG 4.86	AVG 98.2	AVG 12.13	AVG 7.25	AVG 97.8	AVG 18.15	MIN 6.9	GEM 7	AVG 0.24	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 369	MAX 874	MAX 434	MAX 1028	AVW 0.310	AVW 7.20		AVW 20.35	AVW 10.55		AVW 29.45	MAX 7.2	GM7 18	AVW 0.25	
Limits						45		188	45		188	9	200		

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AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
GM7=highest 7-day Geometric Mean

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John Duback WWTP Operator
Name and Title

Signature Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 **Month:** July **Year:** 2008

Facility Name: City of Ridgefield **County:** Clark

Receiving Water: LAKE RIVER **Plant operators:** John Duback 3/7102 Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection **Population:** 4099 **Schools &** **Industries**

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	CONT	CONT	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	1/WK	DAILY	1/WK	1/MO	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/ 100 ML	TOTAL AMMONIA NITR MG/L	RAIN FALL INCHES
1	404	852	338	713	0.253	4.4	98.9%	9.3	3.7	98.9%	7.8	7.2			0.00
2					0.261							7.2	2	0.10	0.04
3	303	657	362	785	0.260	4.2	98.6%	9.1	3.6	99.0%	7.8	7.1			0.00
4					0.260							7.1	24	0.40	0.04
5					0.273							7.1			0.05
6					0.269							7.1			0.00
7					0.269							7.1			0.00
8	354	765	382	825	0.259	3.6	99.0%	7.8	3.6	99.1%	7.8	7.1			0.00
9					0.237							7.1	1	0.40	0.00
10	309	642	392	814	0.249	1.8	99.4%	3.7	1.6	99.6%	3.3	7.1			0.00
11					0.241							7.2	1	0.22	0.00
12					0.221							7.0			0.00
13					0.234							7.1			0.00
14					0.242							7.1			0.00
15	301	590	362	709	0.235	4.0	98.7%	7.8	7.4	98.0%	14.5	7.0			0.00
16					0.256							7.0	22	0.20	0.00
17	351	770	339	744	0.263	4.3	98.8%	9.4	4.0	98.8%	8.8	7.3			0.00
18					0.245							7.2	2	0.50	0.00
19					0.241							7.2			0.00
20					0.255							7.1			0.00
21					0.248							7.1			0.00
22	362	740	466	952	0.245	7.1	98.0%	14.5	12.3	97.4%	25.1	7.0			0.00
23					0.255							7.1	4	0.40	0.00
24	375	760	330	669	0.243	4.2	98.9%	8.5	4.7	98.6%	9.5	7.0			0.00
25					0.240							7.1	1	0.30	0.00
26					0.222							6.9			0.00
27					0.257							6.9			0.00
28					0.234							7.0			0.00
29	315	673	342	730	0.256	2.5	99.2%	5.3	2.8	99.2%	6.0	7.0			0.01
30					0.256							7.0	1	0.30	0.00
31	321	640	353	704	0.239	2.5	99.2%	5.0	1.4	99.6%	2.8	7.0			0.00
Total	3395	7088	3666	7645	7.718	38.6		80.5	45.1		93.4	219.5	58	2.82	0.14
	AVG 340	AVG 709	AVG 367	AVG 765	AVG 0.249	AVG 3.86	AVG 98.9	AVG 8.05	AVG 4.51	AVG 98.8	AVG 9.34	MIN 6.9	GEM 3	AVG 0.31	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 404	MAX 852	MAX 466	MAX 952	AVW 0.259	AVW 5.65		AVW 11.50	AVW 8.50		AVW 17.30	MAX 7.3	GM7 7	AVW 0.35	
Limits						45		188	45		188	9	200		

AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
GM7=highest 7-day Geometric Mean

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John Duback WWTP Operator

Name and Title Signature Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 **Month:** August **Year:** 2008

Facility Name: City of Ridgefield **County:** Clark

Receiving Water: LAKE RIVER **Plant operators:** John Duback 3/7102 Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection **Population:** 4099 **Schools & Industries**

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	CONT	CONT	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	1/WK	DAILY	1/WK	1/MO	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/ 100 ML	TOTAL AMMONIA NITR MG/L	RAIN FALL INCHES
1					0.257							7.1	2	0.30	0.00
2					0.241							7.0			0.00
3					0.258							7.0			0.00
4					0.242							7.0			0.00
5	274	516	291	548	0.226	2.3	99.2%	4.3	3.0	99.0%	5.7	7.1			0.00
6					0.241							7.0	1	0.30	0.00
7	295	608	307	632	0.247	2.1	99.3%	4.3	2.1	99.3%	4.3	6.9			0.00
8					0.250							7.0	3	0.03	0.20
9					0.260							6.9			0.05
10					0.269							7.0			0.00
11					0.254							6.9			0.00
12	296	615	338	702	0.249	2.8	99.1%	5.8	3.5	99.0%	7.3	7.0			0.00
13					0.249							7.0	2	0.30	0.00
14	346	701	463	938	0.243	3.2	99.1%	6.5	3.9	99.2%	7.9	7.2			0.00
15					0.230							7.0	22	0.10	0.00
16					0.229							6.9			0.00
17					0.247							6.9			0.01
18					0.261							6.9			0.23
19	414	946	588	1344	0.274	5.8	98.6%	13.3	4.0	99.3%	9.1	7.0			0.25
20					0.283							7.0	3	0.20	0.20
21	245	574	291	682	0.281	1.9	99.2%	4.5	2.1	99.3%	4.9	6.9			0.01
22					0.243							7.0	1	0.03	0.00
23					0.226							6.9			0.00
24					0.266							6.9			0.00
25					0.261							7.0			0.00
26	383	827	380	821	0.259	3.8	99.0%	8.2	3.5	99.1%	7.6	6.9			0.00
27					0.273							7.0	1	0.03	0.00
28	278	619	323	719	0.267	2.2	99.2%	4.9	2.1	99.3%	4.7	7.1			0.00
29					0.255							7.0	32	0.03	0.00
30					0.254							7.0			0.00
31					0.255							7.0			0.20
Total	2531	5407	2981	6387	7.850	24.1		51.8	24.2		51.5	216.5	67	1.32	1.15
	AVG 316	AVG 676	AVG 373	AVG 798	AVG 0.253	AVG 3.01	AVG 99.1	AVG 6.47	AVG 3.03	AVG 99.2	AVG 6.43	MIN 6.9	GEM 4	AVG 0.15	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 414	MAX 946	MAX 588	MAX 1344	AVW 0.262	AVW 3.85		AVW 8.90	AVW 3.70		AVW 7.60	MAX 7.2	GM7 7	AVW 0.30	
Limits						45		188	45		188	9	200		

PAGE 1 0F 1

AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
GM7=highest 7-day Geometric Mean

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John Duback WWTP Operator

Name and Title

Signature Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 **Month:** September **Year:** 2008

Facility Name: City of Ridgefield **County:** Clark

Receiving Water: LAKE RIVER **Plant operators:** John Duback 3/7102 Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection **Population:** 4099 **Schools &** **Industries**

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	CONT	CONT	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	1/WK	DAILY	1/WK	1/MO	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/ 100 ML	TOTAL AMMONIA NITR MG/L	RAIN FALL INCHES
1					0.292							6.9			0.00
2	400	964	480	1157	0.289	3.3	99.2%	8.0	2.8	99.4%	6.7	7.0			0.00
3					0.275							7.0	16	0.03	0.00
4	300	671	356	796	0.268	1.7	99.4%	3.8	1.2	99.7%	2.7	7.0			0.00
5					0.259							6.9	26	0.03	0.00
6					0.256							6.9			0.00
7					0.260							6.9			0.00
8					0.270							7.0			0.00
9	292	636	300	653	0.261	2.8	99.0%	6.1	3.4	98.9%	7.4	7.0			0.00
10					0.256							7.0	5	0.03	0.00
11	267	530	310	615	0.238	3.5	98.7%	6.9	4.5	98.5%	8.9	7.0			0.00
12					0.255							6.9	6	0.03	0.00
13					0.258							6.9			0.00
14					0.260							7.0			0.00
15					0.252							7.0			0.00
16	366	763	453	945	0.250	4.1	98.9%	8.5	5.0	98.9%	10.4	7.0			0.00
17					0.264							7.0	1	0.03	0.00
18	255	578	283	642	0.272	2.4	99.1%	5.4	4.4	98.4%	10.0	6.9			0.00
19					0.253							7.0	1	0.03	0.00
20					0.271							6.8			0.00
21					0.302							6.8			0.00
22					0.280							7.0			0.00
23	292	684	271	635	0.281	3.5	98.8%	8.2	4.8	98.2%	11.2	6.9			0.00
24					0.283							6.9	6	0.20	0.00
25	298	674	267	603	0.271	2.5	99.2%	5.7	3.2	98.8%	7.2	7.0			0.00
26					0.284							6.9	1	0.20	0.00
27					0.272							6.9			0.00
28					0.282							7.0			0.00
29					0.260							6.7			0.00
30	442	973	274	603	0.264	4.6	99.0%	10.1	4.6	98.3%	10.1	6.8			0.00
Total	2912	6473	2994	6649	8.038	28.4		62.8	33.9		74.8	208.0	62	0.58	0.00
	AVG 324	AVG 719	AVG 333	AVG 739	AVG 0.268	AVG 3.16	AVG 99.0	AVG 6.97	AVG 3.77	AVG 98.8	AVG 8.31	MIN 6.7	GEM 4	AVG 0.07	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 442	MAX 973	MAX 480	MAX 1157	AVW 0.282	AVW 3.25		AVW 6.95	AVW 4.70		AVW 10.20	MAX 7.0	GM7 20	AVW 0.20	
Limits						45		70	45		188	9	200		

AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
GM7=highest 7-day Geometric Mean

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John Duback WWTP Operator

Name and Title | Signature | Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 **Month:** October **Year:** 2008

Facility Name: City of Ridgefield **County:** Clark

Receiving Water: LAKE RIVER **Plant operators:** John Duback 3/7102 Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection **Population:** 4142 **Schools & Industries**

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	CONT	CONT	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	1/WK	DAILY	1/WK	1/MO	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/ 100 ML	TOTAL AMMONIA NITR MG/L	RAIN FALL INCHES
1					0.259							7.0	84	0.30	0.00
2	380	881	276	640	0.278	7.8	97.9%	18.1	4.4	98.4%	10.2	6.9			0.34
3					0.296							7.1	7	0.50	0.60
4					0.308							7.1			0.05
5					0.314							7.0			0.15
6					0.342							7.1			0.15
7	230	551	221	529	0.287	3.5	98.5%	8.4	5.3	97.6%	12.7	7.1			0.00
8					0.294							7.0	8	0.20	0.00
9	283	670	260	616	0.284	5.4	98.1%	12.8	3.7	98.6%	8.8	7.0			0.07
10					0.283							7.0	1	0.20	0.00
11					0.291							7.1			0.00
12					0.300							7.0			0.00
13					0.291							7.1			0.01
14	264	616	261	609	0.280	6.4	97.6%	14.9	5.6	97.9%	13.1	7.1			0.00
15					0.288							7.0	9	0.70	0.01
16	320	750	321	752	0.281	6.0	98.1%	14.1	4.7	98.5%	11.0	7.0			0.00
17					0.285							7.0	11	0.40	0.01
18					0.283							7.0			0.00
19					0.303							7.1			0.0[illegible]
20					0.293							7.0			0.06
21	275	654	264	628	0.285	5.6	98.0%	13.3	5.6	97.9%	13.3	7.0			0.00
22					0.270							7.0	11	1.00	0.00
23	259	618	248	592	0.286	4.5	98.3%	10.7	4.0	98.4%	9.5	7.0			0.00
24					0.276							7.0	3	0.40	0.00
25					0.282							6.9			0.00
26					0.284							6.9			0.00
27					0.283							7.0			0.00
28	252	580	251	578	0.276	5.7	97.7%	13.1	5.7	97.7%	13.1	7.0			0.00
29					0.272							7.0	1	0.40	0.00
30	356	831	356	831	0.280	5.2	98.5%	12.1	4.5	98.7%	10.5	7.1			0.22
31					0.281							7.0	1	0.90	0.10
Total	2619	6151	2458	5775	8.915	50.1		117.6	43.5		102.2			5.00	1.81
	AVG 291	AVG 683	AVG 273	AVG 642	AVG 0.288	AVG 5.57	AVG 98.1	AVG 13.06	AVG 4.83	AVG 98.2	AVG 11.36	MIN 6.9	GEM 5	AVG 0.50	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 380	MAX 881	MAX 356	MAX 831	AVW 0.299	AVW 6.20		AVW 14.50	AVW 5.15		AVW 12.05	MAX 7.1	GM7 24	AVW 0.70	
Limits						45		188	45		188	9	200		

AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
GM7=highest 7-day Geometric Mean

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John Duback WWTP Operator

Name and Title

Signature Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 **Month:** November **Year:** 2008

Facility Name: City of Ridgefield **County:** Clark

Receiving Water: LAKE RIVER **Plant operators:** John Duback 3/7102 Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection **Population:** 4142 Schools & Industries

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	CONT	CONT	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	1/WK	DAILY	1/WK	1/MO	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/ 100 ML	TOTAL AMMONIA MG/L NITR	RAIN FALL INCHES
1					0.294							7.1			0.37
2					0.332							7.1			0.31
3					0.347							7.0			0.68
4	226	694	258	792	0.368	5.6	97.5%	17.2	6.3	97.6%	19.3	7.0			0.13
5					0.339							6.9	5	0.90	0.58
6	228	709	239	743	0.373	6.5	97.1%	20.2	8.3	96.5%	25.8	6.9			0.01
7					0.312							6.9	4	0.60	0.05
8					0.351							6.9			0.40
9					0.364							6.9			0.28
10					0.352							6.9			0.38
11	191	687	244	877	0.431	3.9	98.0%	14.0	6.4	97.4%	23.0	7.0			0.59
12					0.468							6.9	15	0.90	0.86
13	212	690	218	709	0.390	2.7	98.7%	8.8	3.3	98.5%	10.7	6.9			0.01
14					0.344							6.9	18	0.60	0.00
15					0.325							6.9			0.00
16					0.339							6.9			0.00
17					0.320							6.9			0.00
18	308	773	270	678	0.301	3.0	99.0%	7.5	4.0	98.5%	10.0	6.9			0.00
19					0.312							6.9	2	0.30	0.12
20	308	853	257	712	0.332	4.4	98.6%	12.2	6.1	97.6%	16.9	7.1			0.22
21					0.319							7.0	29	0.20	0.01
22					0.306							6.9			0.00
23	283	767	209	566	0.325	4.6	98.4%	12.5	3.9	98.1%	10.6	6.9			0.00
24					0.303							7.0	9	0.50	0.00
25	345	863	269	673	0.300	3.4	99.0%	8.5	4.1	98.5%	10.3	7.1			0.02
26					0.309							6.9	2	0.30	0.03
27					0.311							7.0			0.05
28					0.269							7.1			0.02
29					0.296							7.0			0.01
30					0.309							7.1			0.01
Total	2101	6035	1964	5750	10.041	34.1		100.9	42.4		126.7	208.9	84	4.30	5.14
	AVG 263	AVG 754	AVG 246	AVG 719	AVG 0.335	AVG 4.26	AVG 98.3	AVG 12.61	AVG 5.30	AVG 97.8	AVG 15.84	MIN 6.9	GEM 8	AVG 0.54	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 345	MAX 863	MAX 270	MAX 877	AVW 0.382	AVW 6.05		AVW 18.70	AVW 7.30		AVW 22.55	MAX 7.1	GM7 16	AVW 0.75	
Limits						45		70	45		188	9	200		

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AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
GM7=highest 7-day Geometric Mean

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John Duback WWTP Operator

ame and Title

Signature Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 **Month:** DECEMBER **Year:** 2008

Facility Name: City of Ridgefield **County:** Clark

Receiving Water: LAKE RIVER **Plant operators:** John Duback 3/7102 Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection **Population:** 4142 Schools & Industries

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	CONT	CONT	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	1/WK	DAILY	1/WK	1/MO	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/ 100 ML	TOTAL AMMONIA NITR MG/L	RAIN FALL INCHES
1					0.312							7.0			0.05
2	337	843	284	711	0.300	4.8	98.6%	12.0	5.5	98.1%	13.8	7.0			0.05
3					0.315							7.0	2	0.20	0.00
4	342	907	269	713	0.318	5.2	98.5%	13.8	4.4	98.4%	11.7	7.1			0.00
5					0.298							7.0	7	0.10	0.00
6					0.299							7.1			0.00
7					0.345							7.1			0.19
8					0.321							7.1			0.01
9	272	687	154	389	0.303	2.6	99.0%	6.6	2.4	98.4%	6.1	7.0			0.00
10					0.309							7.0	2	0.20	0.00
11	451	1170	315	817	0.311	2.2	99.5%	5.7	2.8	99.1%	7.3	7.0			0.00
12					0.318							7.1	1	0.20	0.75
13					0.349							7.0			0.10
14					0.339							6.9			0.07
15					0.340							7.0			0.00
16	417	1127	296	800	0.324	3.6	99.1%	9.7	4.0	98.6%	10.8	6.9			0.00
17					0.333							7.0	2	0.50	0.32
18	297	914	224	689	0.369	3.3	98.9%	10.2	3.9	98.3%	12.0	7.0			0.06
19					0.351							6.9	1	0.10	0.10
20					0.354							7.0			0.90
21					0.490							6.9			0.50
22	213	846	172	683	0.476	7.4	96.5%	29.4	7.1	95.9%	28.2	6.9			0.03
23	250	876	203	711	0.420	5.9	97.6%	20.7	6.6	96.7%	23.1	7.0	7	2.70	0.25
24					0.402							6.9	5	3.10	0.30
25					0.415							7.0			0.45
26					0.402							6.9			0.30
27					0.585							6.9			0.30
28					0.602							6.8			0.25
29					0.548							6.9			0.23
30	137	513	238	891	0.449	2.9	97.9%	10.9	7.2	97.0%	27.0	6.9			0.15
31					0.488							6.9	3	0.10	1.00
Total	2716	7882	2155	6404	11.785	37.9		118.9	43.9		139.8	216.2	30	7.20	6.36
	AVG 302	AVG 876	AVG 239	AVG 712	AVG 0.380	AVG 4.21	AVG 98.4	AVG 13.21	AVG 4.88	AVG 97.8	AVG 15.54	MIN 6.8	GEM 3	AVG 0.80	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 451	MAX 1170	MAX 315	MAX 891	AVW 0.456	AVW 6.65		AVW 25.05	AVW 6.85		AVW 25.65	MAX 7.1	GM7 6	AVW 2.90	
Limits						45		188	45		188	9	200		

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AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
GM7=highest 7-day Geometric Mean

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John Duback WWTP Operator

Name and Title

Signature Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 **Month:** January **Year:** 2009

Facility Name: City of Ridgefield **County:** Clark

Receiving Water: LAKE RIVER **Plant operators:** John Duback 3/7102 Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection **Population:** 4150 **Schools &** **Industries**

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	CONT	CONT	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	1/WK	DAILY	1/WK	1/MO	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/ 100 ML	TOTAL AMMONIA MG/L NITR	RAIN FALL INCHES
1	64	391	113	690	0.732	2.8	95.6%	17.1	7.7	93.2%	47.0	6.7			1.80
2					0.824							6.8	1	0.10	0.10
3					0.518							6.7			0.02
4					0.457							6.8			0.68
5					0.561							6.9			0.15
6	171	740	148	641	0.519	4.0	97.7%	17.3	5.6	96.2%	24.2	6.9			0.18
7					0.496							7.0	2	1.70	0.47
8	147	684	142	661	0.558	3.4	97.7%	15.8	4.7	96.7%	21.9	6.9			0.10
9					0.434							6.9	1	1.10	0.00
10					0.415							6.8			0.22
11					0.435							6.9			0.10
12					0.414							6.9			0.01
13	126	406	184	592	0.386	4.7	96.3%	15.1	4.6	97.5%	14.8	6.9			0.00
14					0.365							6.9	1	2.10	0.00
15	203	593	214	625	0.350	5.3	97.4%	15.5	4.8	97.8%	14.0	6.9			0.00
16					0.332							7.0	21	1.60	0.00
17					0.334							7.0			0.00
18					0.334							6.9			0.00
19					0.336							6.9			0.00
20	298	793	259	689	0.319	10.1	96.6%	26.9	8.4	96.8%	22.3	7.0			0.00
21					0.310							7.0	22	1.30	0.00
22	334	841	280	705	0.302	9.7	97.1%	24.4	9.3	96.7%	23.4	6.9			0.00
23					0.302							7.0	1	1.20	0.00
24					0.306							7.0			0.30
25					0.332							7.0			0.01
26					0.311							7.0			0.05
27	267	717	257	690	0.322	11.0	95.9%	29.5	17.8	93.1%	47.8	7.0			0.21
28					0.319							7.1	104	12.10	0.03
29	276	720	231	603	0.313	20.4	92.6%	53.3	26.4	88.6%	68.9	7.2			0.01
30					0.305							7.2	24	13.60	0.00
31					0.307							7.2			0.00
Total	1886	5885	1828	5896	12.548	71.4		214.9	89.3		284.4	215.3	177	34.80	4.44
	AVG 210	AVG 654	AVG 203	AVG 655	AVG 0.405	AVG 7.93	AVG 96.3	AVG 23.88	AVG 9.92	AVG 95.2	AVG 31.60	MIN 6.7	GEM 7	AVG 3.87	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 334	MAX 841	MAX 280	MAX 705	AVW 0.591	AVW 15.70		AVW 41.35	AVW 22.10		AVW 58.35	MAX 7.2	GM7 50	AVW 12.85	
Limits						45		188	45		188	9	200		

PAGE 1 0F 1

AVG=Average AVW =Highest Weekly Average GEM=Geometric Mean MAX=Maximum MIN=Minimum
GM7=highest 7-day Geometric Mean

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John Duback WWTP Operator
Name and Title

John Duback 2-9-09
Signature Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 **Month:** February **Year: 2009**

Facility Name: City of Ridgefield **County:** Clark

Receiving Water: LAKE RIVER **Plant operators:** John Duback 3/7102 Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection **Population:** 4150 Schools & Industries

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	CONT	CONT	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	1/WK	DAILY	1/WK	1/MO	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/ 100 ML	TOTAL AMMONIA NITR MG/L	RAIN FALL INCHES
1					0.324							7.3			0.00
2					0.316							7.4			0.00
3	307	745	269	653	0.291	24.0	92.2%	58.2	24.8	90.8%	60.2	7.3			0.00
4					0.288							7.4	8	21.20	0.00
5	435	1030	293	694	0.284	22.0	94.9%	52.1	30.5	89.6%	72.2	7.4			0.01
6					0.276							7.4	168	22.60	0.00
7					0.290							7.3			0.00
8					0.299							7.4			0.01
9					0.295							7.4			0.08
10	230	591	265	681	0.308	31.0	86.5%	79.6	33.5	87.4%	86.1	7.4			0.28
11					0.310							7.3	64	37.20	0.00
12	315	801	274	697	0.305	16.1	94.9%	41.0	23.2	91.5%	59.0	7.3			0.02
13					0.293							7.3	8	35.00	0.00
14					0.298							7.3			0.00
15					0.319							7.3			0.06
16					0.318							7.3			0.00
17	277	702	234	593	0.304	33.0	88.1%	83.7	37.3	84.1%	94.6	7.4			0.00
18					0.288							7.3	88	33.00	0.00
19	341	856	309	776	0.301	24.5	92.8%	61.5	22.4	92.8%	56.2	7.3			[illegible]
20					0.277							7.2	28	31.50	[illegible]
21					0.287							7.3			0.00
22					0.310							7.3			0.01
23					0.321							7.4			0.43
24	332	905	274	747	0.327	15.9	95.2%	43.4	8.6	96.9%	23.5	7.4			0.13
25					0.332							7.4	3	31.50	0.11
26	329	908	245	676	0.331	10.8	96.7%	29.8	10.9	95.6%	30.1	7.3			0.00
27					0.297							7.4	58	30.30	0.00
28					0.302							7.2			0.00
Total	2566	6539	2163	5517	8.491	177.3		449.3	191.2		481.8	205.4	425	242.30	1.14
	AVG 321	AVG 817	AVG 270	AVG 690	AVG 0.303	AVG 22.16	AVG 92.7	AVG 56.16	AVG 23.90	AVG 91.1	AVG 60.23	MIN 7.2	GEM 27	AVG 30.29	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 435	MAX 1030	MAX 309	MAX 776	AVW 0.317	AVW 28.75		AVW 72.60	AVW 29.85		AVW 75.40	MAX 7.4	GM7 50	AVW 36.10	
Limits						45		188	45		188	9	200		

PAGE 1 0F 1

AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
GM7=highest 7-day Geometric Mean

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John Duback WWTP Operator
Name and Title

Signature Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 **Month:** March **Year:** 2009

Facility Name: City of Ridgefield **County:** Clark

Receiving Water: LAKE RIVER **Plant operators:** John Duback 3/7102 Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection **Population:** 4191 **Schools &** **Industries**

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	CONT	CONT	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	1/WK	DAILY	1/WK	1/MO	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/ 100 ML	TOTAL AMMONIA NITR MG/L	RAIN FALL INCHES
1					0.332							7.4			0.26
2					0.332							7.4			0.22
3	276	771	290	810	0.335	11.5	95.8%	32.1	8.8	97.0%	24.6	7.4			0.00
4					0.319							7.4	22	28.10	0.08
5	282	767	247	672	0.326	9.8	96.5%	26.6	6.7	97.3%	18.2	7.4			0.03
6					0.306							7.2	14	26.40	0.00
7					0.312							7.4			0.02
8					0.321							7.3			0.07
9					0.319							7.4			0.01
10	245	646	243	640	0.316	5.6	97.7%	14.8	8.6	96.5%	22.7	7.4			0.00
11					0.307							7.4	17	29.40	0.00
12	261	653	276	691	0.300	4.7	98.2%	11.8	6.3	97.7%	15.8	7.4			0.00
13					0.290							7.4	1	32.20	0.00
14					0.318							7.3			0.72
15					0.413							7.3			0.42
16					0.352							7.4			0.05
17	165	461	194	542	0.335	5.0	97.0%	14.0	5.3	97.3%	14.8	7.4			0.05
18					0.326							7.4	22	24.40	0.00
19	183	507	224	620	0.332	5.5	97.0%	15.2	4.0	98.2%	11.1	7.4			0.01
20					0.313							7.4	56	24.80	0.02
21					0.322							7.4			0.00
22					0.317							7.4			0.00
23					0.327							7.4			0.17
24	221	553	243	608	0.300	2.4	98.9%	6.0	3.0	98.8%	7.5	7.1			0.14
25					0.328							7.3	20	17.40	0.01
26	210	545	244	633	0.311	2.8	98.7%	7.3	2.7	98.9%	7.0	7.1			0.00
27					0.313							7.2	1		0.02
28					0.350							7.1			0.40
29					0.347							7.1			0.03
30					0.304							7.0			0.02
31	203	523	236	608	0.309	3.6	98.2%	9.3	3.3	98.6%	8.5	7.0			0.07
Total	2046	5426	2197	5824	10.032	50.9		137.1	48.7		130.2	226.6	153	182.70	2.82
	AVG 227	AVG 603	AVG 244	AVG 647	AVG 0.324	AVG 5.66	AVG 97.6	AVG 15.23	AVG 5.41	AVG 97.8	AVG 14.47	MIN 7.0	GEM 9	AVG 26.10	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 282	MAX 771	MAX 290	MAX 810	AVW 0.342	AVW 10.65		AVW 29.35	AVW 7.75		AVW 21.40	MAX 7.4	GM7 35	AVW 30.80	
Limits						45		188	45		188	9	200		

PAGE 1 0F 1

AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
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ohn Duback WWTP Operator

Name and Title | Signature | Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 **Month:** April **Year:** 2009

Facility Name: City of Ridgefield **County:** Clark

Receiving Water: LAKE RIVER **Plant operators:** John Duback 3/7102 Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection **Population:** 4191 **Schools & Industries**

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	CONT	CONT	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	1/WK	DAILY	1/WK	1/MO	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/100 ML	TOTAL AMMONIA NITR MG/L	RAIN FALL INCHES
1					0.352							7.0	72	1.05	0.52
2	167	526	205	646	0.378	3.5	97.9%	11.0	3.6	98.2%	11.3	7.0			0.02
3					0.329							6.9	1	0.95	0.00
4					0.326							6.8			0.00
5					0.322							6.9			0.00
6					0.306							6.9			0.00
7	250	621	234	582	0.298	4.1	98.4%	10.2	4.6	98.0%	11.4	7.0			0.00
8					0.311							6.9	56	0.80	0.03
9	323	819	237	601	0.304	4.8	98.5%	12.2	5.1	97.8%	12.9	6.9			0.32
10					0.339							7.1	2	0.30	0.01
11					0.312							7.1			0.01
12					0.348							6.9			0.43
13					0.362							7.2			0.06
14	282	800	234	664	0.340	6.9	97.6%	19.6	8.2	96.5%	23.3	7.0			0.00
15					0.326							7.0	28	0.20	0.01
16	265	709	261	699	0.321	6.7	97.5%	17.9	9.6	96.3%	25.7	7.0			0.19
17					0.334							6.9	10	0.70	0.08
18					0.323							7.1			0.00
19					0.309							7.3			0.00
20					0.301							7.3			0.00
21	283	647	310	708	0.274	6.4	97.7%	14.6	5.5	98.2%	12.6	6.8			0.00
22					0.293							7.1	2	4.20	0.01
23	285	718	256	645	0.302	8.6	97.0%	21.7	7.9	96.9%	19.9	7.1			0.00
24					0.286							7.1	17	2.90	0.00
25					0.291							7.1			0.01
26					0.302							7.1			0.00
27					0.324							7.0			0.40
28	239	688	231	665	0.345	6.7	97.2%	19.3	4.7	98.0%	13.5	7.0			0.36
29					0.370							6.9	22	1.00	0.02
30	243	667	254	697	0.329	4.0	98.4%	11.0	3.3	98.7%	9.1	6.9			0.00
Total	2337	6195	2222	5906	9.657	51.7		137.4	52.5		139.7	210.3	210	12.10	2.48
	AVG 260	AVG 688	AVG 247	AVG 656	AVG 0.322	AVG 5.74	AVG 97.8	AVG 15.27	AVG 5.83	AVG 97.6	AVG 15.52	MIN 6.8	GEM 11	AVG 1.34	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 323	MAX 819	MAX 310	MAX 708	AVW 0.336	AVW 7.50		AVW 18.75	AVW 8.90		AVW 24.50	MAX 7.3	GM7 17	AVW 3.55	
Limits						45		188	45		188	9	200		

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AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
GM7=highest 7-day Geometric Mean

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John Duback WWTP Operator

Name and Title

Signature Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 **Month:** May **Year:** 2009

Facility Name: City of Ridgefield **County:** Clark

Receiving Water: LAKE RIVER **Plant operators:** John Duback 3/7102 Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection **Population:** 4191 **Schools &** **Industries**

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	2/week	2/week	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	2/WK	DAILY	2/WK	2/WK	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/ 100 ML	TOTAL AMMONIA MG/L NITR	RAIN FALL INCHES
1					0.305							6.9	12	0.20	0.25
2					0.370							6.9			0.25
3					0.354							6.9			0.00
4					0.418							7.0			0.83
5	216	739	222	759	0.410	4.5	97.9%	15.4	6.2	97.2%	21.2	7.0			0.14
6					0.413							6.9	10	0.10	0.17
7	224	716	274	875	0.383	3.5	98.4%	11.2	4.5	98.4%	14.4	6.9			0.00
8					0.345							6.9	2	0.10	0.00
9					0.358							6.8			0.00
10					0.350							6.9			0.00
11					0.336							6.9			0.04
12	274	814	268	796	0.356	4.1	98.5%	12.2	4.7	98.2%	14.0	7.1			0.05
13					0.359							7.0	4	0.10	0.31
14	297	845	275	782	0.341	4.1	98.6%	11.7	4.6	98.3%	13.1	7.0			0.00
15					0.311							6.9	11	0.30	0.00
16					0.292							6.9			0.00
17					0.301							6.9			0.00
18					0.304							7.0			0.24
19	325	919	282	797	0.339	6.4	98.0%	18.1	10.3	96.3%	29.1	6.9			0.30
20					0.325							7.0	2	0.10	0.00
21	284	744	266	697	0.314	6.6	97.7%	17.3	6.9	97.4%	18.1	6.9			0.00
22					0.300							6.9	4	0.20	0.00
23					0.274							6.9			0.00
24					0.265							7.0			0.00
25					0.303							6.9			0.00
26	249	615	335	827	0.296	6.7	97.3%	16.5	7.5	97.8%	18.5	6.9			0.00
27					0.287							6.9	4	0.50	0.00
28	315	704	280	626	0.268	5.2	98.3%	11.6	6.7	97.6%	15.0	6.9			0.00
29					0.252							6.9	7	0.30	0.00
30					0.278							7.0			0.00
31					0.281							7.0			0.00
Total	2184	6094	2202	6159	10.088	41.1		113.9	51.4		143.3		56	1.90	2.58
	AVG 273	AVG 762	AVG 275	AVG 770	AVG 0.325	AVG 5.14	AVG 98.1	AVG 14.24	AVG 6.43	AVG 97.7	AVG 17.91	MIN 6.8	GEM 5	AVG 0.21	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 325	MAX 919	MAX 335	MAX 875	AVW 0.383	AVW 6.50		AVW 17.70	AVW 8.60		AVW 23.60	MAX 7.1	GM7 16	AVW 0.60	
Limits						45		188	45		.	9	200		

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AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
GM7=highest 7-day Geometric Mean

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John Duback WWTP Operator

Name and Title

Signature Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 **Month:** June **Year:** 2009

Facility Name: City of Ridgefield **County:** Clark

Receiving Water: LAKE RIVER **Plant operators:** John Duback 3/7102 Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection **Population:** 4191 **Schools & Industries**

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	2/week	2/week	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	2/WK	DAILY	2/WK	2/WK	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/100 ML	TOTAL AMMONIA NITR MG/L	RAIN FALL INCHES
1					0.284							6.9			0.01
2	308	724	318	748	0.282	3.5	98.9%	8.2	3.4	98.9%	8.0	7.0			0.01
3					0.263							7.1	8	0.20	0.00
4	341	788	301	695	0.277	3.1	99.1%	7.2	3.4	98.9%	7.9	7.0			0.05
5					0.287							7.0	1	0.20	0.03
6					0.296							7.0			0.00
7					0.322							7.0			0.00
8					0.291							7.0			0.00
9	330	806	258	630	0.293	4.6	98.6%	11.2	3.9	98.5%	9.5	7.0			0.00
10					0.297							7.1	48	0.20	0.05
11	273	663	270	655	0.291	2.6	99.0%	6.3	2.1	99.2%	5.1	6.9			0.00
12					0.280							7.0	2	0.10	0.03
13					0.292							7.0			0.00
14					0.293							7.0			0.00
15					0.298							7.0			0.00
16	310	742	313	749	0.287	4.0	98.7%	9.6	4.3	98.6%	10.3	7.0			0.00
17					0.281							7.0	4	0.30	0.00
18	351	820	286	668	0.280	3.1	99.1%	7.2	3.0	99.0%	7.0	7.0			0.13
19					0.298							7.1	6	0.30	0.2(
20					0.296							7.0			0.05
21					0.288							7.0			0.00
22					0.288							7.0			0.00
23	341	802	315	741	0.282	2.9	99.1%	6.8	2.3	99.3%	5.4	7.0			0.00
24					0.262							7.0	4	0.30	0.00
25	332	723	296	644	0.261	2.2	99.3%	4.8	2.1	99.3%	4.6	7.1			0.00
26					0.265							7.0	2	0.30	0.00
27					0.260							6.9			0.00
28					0.275							6.9			0.00
29					0.285							7.0			0.00
30	311	726	298	696	0.280	3.6	98.8%	8.4	2.8	99.1%	6.5	6.9			0.00
Total	2897	6794	2655	6227	8.534	29.6		69.8	27.3		64.3	209.9	75	1.90	0.56
	AVG 322	AVG 755	AVG 295	AVG 692	AVG 0.284	AVG 3.29	AVG 99.0	AVG 7.75	AVG 3.03	AVG 99.0	AVG 7.14	MIN 6.9	GEM	AVG 0.24	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 351	MAX 820	MAX 318	MAX 749	AVW 0.295	AVW 3.60		AVW 8.75	AVW 3.65		AVW 8.65	MAX 7.1	GM7	AVW 0.30	
Limits						45		188	45		188	9	200		

PAGE 1 0F 1

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John Duback WWTP Operator

Name and Title

Signature Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 **Month:** July **Year:** 2009

Facility Name: City of Ridgefield **County:** Clark

Receiving Water: LAKE RIVER **Plant operators:** John Duback 3/7102 Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection **Population:** 4215 **Schools & Industries**

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	2/week	2/week	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	2/WK	DAILY	2/WK	2/WK	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/ 100 ML	TOTAL AMMONIA NITR MG/L	RAIN FALL INCHES
1					0.272							7.0	10	0.30	0.00
2	328	681	335	696	0.249	2.7	99.2%	5.6	2.1	99.4%	4.4	7.1			0.00
3					0.277							7.0	6	0.30	0.00
4					0.252							7.0			0.00
5					0.280							7.0			0.00
6					0.287							7.1			0.00
7	371	832	316	709	0.269	2.7	99.3%	6.1	1.7	99.5%	3.8	7.1			0.00
8					0.255							7.2	34	0.30	0.00
9	301	655	299	651	0.261	2.3	99.2%	5.0	1.8	99.4%	3.9	7.1			0.00
10					0.251							7.2	1	0.30	0.00
11					0.262							7.1			0.00
12					0.274							7.0			0.08
13					0.288							7.1			0.00
14	344	760	290	641	0.265	3.7	98.9%	8.2	3.3	98.9%	7.3	7.0			0.00
15					0.263							7.2	1	0.30	0.00
16	369	785	321	683	0.255	2.3	99.4%	4.9	2.7	99.2%	5.7	7.1			0.00
17					0.260							7.2	4	0.30	0.00
18					0.258							7.1			0.00
19					0.301							7.0			0.00
20					0.279							7.0			0.00
21	328	771	323	760	0.282	4.1	98.8%	9.6	3.7	98.9%	8.7	7.0			0.00
22					0.274							7.2	26	0.30	0.00
23	331	759	278	638	0.275	3.0	99.1%	6.9	3.2	98.8%	7.3	7.1			0.00
24					0.267							7.2	22	0.30	0.00
25					0.256							7.1			0.00
26					0.261							7.1			0.00
27					0.245							7.2			0.00
28	288	536	272	506	0.223	5.5	98.1%	10.2	4.9	98.2%	9.1	7.3			0.00
29					0.224							7.2	8	0.70	0.00
30	338	719	272	578	0.255	4.2	98.8%	8.9	4.6	98.3%	9.8	7.2			0.00
31					0.248							7.1	1	0.50	0.00
Total	2998	6499	2706	5861	8.168	30.5		65.4	28.0		60.1	220.3	113	3.60	0.08
	AVG 333	AVG 722	AVG 301	AVG 651	AVG 0.263	AVG 3.39	AVG 99.0	AVG 7.27	AVG 3.11	AVG 99.0	AVG 6.67	MIN 7.0	GEM 6	AVG 0.36	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 371	MAX 832	MAX 335	MAX 760	AVW 0.276	AVW 4.85		AVW 9.55	AVW 4.75		AVW 9.45	MAX 7.3	GM7 24	AVW 0.60	
Limits						45		188	45		188	9	200		

PAGE 1 0F 1

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ohn Duback WWTP Operator

Name and Title Signature Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 **Month:** August **Year:** 2009

Facility Name: City of Ridgefield **County:** Clark

Receiving Water: LAKE RIVER **Plant operators:** John Duback 3/7102 Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection **Population:** 4215 Schools & Industries

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	2/week	2/week	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	2/WK	DAILY	2/WK	2/WK	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/ 100 ML	TOTAL AMMONIA MG/L NITR	RAIN FALL INCHES
1					0.250							7.2			0.00
2					0.263							7.0			0.00
3					0.273							7.2			0.00
4	256	562	262	575	0.263	4.2	98.4%	9.2	6.6	97.5%	14.5	7.1			0.00
5					0.256							7.2	3	0.50	0.00
6	378	709	310	582	0.225	5.0	98.7%	9.4	7.6	97.5%	14.3	7.2			0.00
7					0.273							7.2	76	0.50	0.00
8					0.266							7.3			0.00
9					0.270							7.1			0.00
10					0.264							7.2			0.00
11	330	765	385	893	0.278	6.6	98.0%	15.3	8.9	97.7%	20.6	7.1			0.81
12					0.304							7.2	1	2.10	0.05
13	285	658	272	628	0.277	4.7	98.4%	10.9	4.6	98.3%	10.6	7.2			0.15
14					0.284							7.3	1	0.70	0.00
15					0.274							7.2			0.00
16					0.282							7.1			0.00
17					0.265							7.2			0.00
18	302	635	305	641	0.252	6.8	97.7%	14.3	5.5	98.2%	11.6	7.2			0.00
19					0.249							7.2	5	0.80	0.00
20	303	697	327	753	0.276	5.6	98.2%	12.9	4.6	98.6%	10.6	7.2			0.00
21					0.279							7.3	6	1.00	0.00
22					0.282							7.2			0.00
23					0.302							7.2			0.00
24					0.287							7.2			0.00
25	299	676	295	667	0.271	4.2	98.6%	9.5	4.2	98.6%	9.5	7.2			0.00
26					0.267							7.2	2	0.50	0.00
27	340	749	274	603	0.264	4.5	98.7%	9.9	4.0	98.5%	8.8	7.2			0.00
28					0.260							7.3	13	0.40	0.01
29					0.260							7.2			0.00
30					0.276							7.2			0.00
31					0.286							7.2			0.00
Total	2493	5451	2430	5341	8.378	41.6		91.3	46.0		100.4	223.0	107	6.50	1.02
	AVG 312	AVG 681	AVG 304	AVG 668	AVG 0.270	AVG 5.20	AVG 98.3	AVG 11.42	AVG 5.75	AVG 98.1	AVG 12.56	MIN 7.0	GEM 5	AVG 0.81	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 378	MAX 765	MAX 385	MAX 893	AVW 0.279	AVW 6.20		AVW 13.60	AVW 7.10		AVW 15.60	MAX 7.3	GM7 15	AVW 1.40	
Limits						45		188	45		188	9	200		

PAGE 1 0F 1

AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
GM7=highest 7-day Geometric Mean

I certify under penalty of law that I have personally examined the information submitted herein; and based on my inquiry of those individuals immediately responsible, I believe the information to be accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and/or imprisonment. (Penalties under statutes 18 & 33 U.S.C. may include fines up to $10,000 and/or maximum imprisonment of five years.)

Please Circle ALL Permit Violations Mail to P.O. Box 47775, Olympia WA 98504-7775

John Duback WWTP Operator

Name and Title

Signature Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No.: WA0023272 Month: September Year: 2009

Facility Name: City of Ridgefield County: Clark

Receiving Water: LAKE RIVER Plant operators: John Duback 3/7102 Frederick Crippen 3/6838

Plant Type: Activated Sludge W/UV Disinfection Population: 4215 Schools & Industries

	INFLUENT					EFFLUENT									
Frequency	2/week	2/week	2/week	2/week	CONT	2/WK	2/WK	2/WK	2/WK	2/WK	2/WK	DAILY	2/WK	2/WK	Daily
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	Ph STANDARD UNITS	FECAL COLIFORM #/ 100 ML	TOTAL AMMONIA NITR MG/L	RAIN FALL INCHES
1	287	699	310	755	0.292	4.5	98.4%	11.0	4.5	98.5%	11.0	7.2			0.00
2					0.303							7.3	23	0.40	0.06
3	225	522	267	619	0.278	2.3	99.0%	5.3	2.2	99.2%	5.1	7.3			0.00
4					0.268							7.2	2	0.40	0.39
5					0.294							7.2			0.35
6					0.314							7.2			0.25
7					0.327							7.2			0.01
8	272	690	314	796	0.304	2.8	99.0%	7.1	4.0	98.7%	10.1	7.1			0.00
9					0.302							7.2	33	0.40	0.00
10	331	803	333	808	0.291	3.6	98.9%	8.7	4.0	98.8%	9.7	7.1			0.00
11					0.265							7.2	15	0.40	0.00
12					0.261							7.1			0.00
13					0.291							7.1			0.00
14					0.291							7.2			0.00
15	360	844	308	722	0.281	5.4	98.5%	12.7	5.2	98.3%	12.2	7.2			0.00
16					0.299							7.2	27	0.30	0.20
17	390	986	319	806	0.303	3.8	99.0%	9.6	4.1	98.7%	10.4	7.2			0.00
18					0.304							7.3	26	0.30	0.05
19					0.307							7.2			0.05
20					0.331							7.1			0.00
21					0.309							7.2			0.00
22	257	632	285	701	0.295	4.0	98.4%	9.8	4.7	98.4%	11.6	7.2			0.00
23					0.305							7.2	32	0.40	0.00
24	260	648	270	673	0.299	2.8	98.9%	7.0	4.0	98.5%	10.0	7.1			0.00
25					0.299							7.1	57	0.30	0.00
26					0.308							6.9			0.00
27					0.323							7.0			0.00
28					0.312							7.2			0.10
29	301	803	291	777	0.320	4.5	98.5%	12.0	3.7	98.7%	9.9	7.1			0.03
30					0.319							7.2	69	0.30	0.21
Total	2683	6627	2697	6657	8.995	33.7		83.2	36.4		89.9	215.0	284	3.20	1.70
	AVG 298	AVG 736	AVG 300	AVG 740	AVG 0.300	AVG 3.74	AVG 98.7	AVG 9.25	AVG 4.04	AVG 98.6	AVG 9.99	MIN 6.9	GEM 23	AVG 0.36	
Permit		1,083		1,083	0.5	30	85	125	30	85	125	6.0	100		
	MAX 390	MAX 986	MAX 333	MAX 808	AVW 0.307	AVW 4.60		AVW 11.15	AVW 4.65		AVW 11.30	MAX 7.3	GM7 43	AVW 0.40	
Limits						45		70	45		188	9	200		

PAGE 1 0F 1

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Please Circle ALL Permit Violations Mail to P.O. Box 47775, Olympia WA 98504-7775

John Duback WWTP Operator John Duback 10-12-09

Name and Title Signature Date

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272
Month: October Year: 2009

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT
County: CLARK

Receiving Water LAKE RIVER
Plant Operator: : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION
Population: 4215

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1	307	597	316	614			0.233	4.3	98.6%	8.4	3.0	99.1%	5.8	7.1	
2					59.1	108.9	0.221						0.0	7.2	38
3							0.226						0.0	7.1	
4							0.240						0.0	7.1	
5							0.240						0.0	7.1	
6	235	443	303	571			0.226	4.9	97.9%	9.2	4.2	98.6%	7.9	7.0	
7					51.3	96.7	0.226						0.0	7.0	6
8	321	594	333	617			0.222	4.4	98.6%	8.1	4.4	98.7%	8.1	7.1	
9					60.1	109.8	0.219						0.0	7.0	12
10							0.224						0.0	7.0	
11							0.235						0.0	7.0	
12							0.242						0.0	7.1	
13	357	726	339	690			0.244	5.5	98.5%	11.2	4.1	98.8%	8.3	7.1	
14					48.0	102.9	0.257						0.0	7.0	14
15	312	593	335	637			0.228	5.0	98.4%	9.5	4.2	98.7%	8.0	7.0	
16					53.2	100.3	0.226						0.0	7.0	52
17							0.232						0.0	7.0	
18							0.230						0.0	7.0	
19							0.253						0.0	7.1	
20	366	690	391	737			0.226	5.6	98.5%	10.6	5.8	98.5%	10.9	7.1	
21					35.9	70.4	0.235						0.0	7.1	14
22	307	579	299	564			0.226	6.0	98%	11.3	4.7	98.4%	8.9	7.0	
23					48.0	104.9	0.262						0.0	7.1	16
24							0.236						0.0	6.9	
25							0.240						0.0	6.9	
26							0.284						0.0	7.1	
27	320	699	270	590			0.262	5.7	98%	12.5	6.8	97.5%	14.9	7.0	
28					45.7	96.8	0.254						0.0	7.0	8
29	372	856	300	691			0.276	3.5	99%	8.1	3.8	98.7%	8.7	7.0	
30					46.2	94.0	0.244						0.0	6.9	10
31							0.270						0.0	6.8	
TOTAL	2897	5778	2886	5710	448	885	7.439	45		89	41		81.6	218	170
	AVG 322	AVG 642	AVG 321	AVG 634	AVG 49.7	AVG 98.3	AVG 0.240	AVG 4.99	AVG 98.4	AVG 9.87	AVG 4.56	AVG 98.6	AVG 9.06	MIN 6.8	GEM 17
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 372	MAX 856	MAX 391	MAX 737	MAX 60.1	MAX 109.8	MAX 0.284	AVW 5.80		AVW 10.95	AVW 5.30		AVW 11.80	MAX 7.2	GM7 51
Limits								45		263	45		263	9.0	200

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** October **Year:** 2009

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 4215

	PHASE 1 - EFFLUENT CONT			RECEIVING WATER*											
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT				
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TOTAL AMMONIA MG/L	pH STANDARD UNITS	ALAKLINITY AS CACO3 MG/L	HARDNESS MG/L	DISSOLVED OXYGEN MG/L	BOD 5-DAY MG/L	CBOD MG/L	TEMPERATURE DEG. C	RAIN FALL Inches			
1			105.0									0.00			
2	0.30	0.55										0.00			
3												0.00			
4												0.00			
5												0.00			
6			102.5									0.00			
7	0.30	0.57										0.00			
8			105.0									0.00			
9	0.30	0.55										0.00			
10												0.00			
11												0.00			
12												0.01			
13			105.5									0.70			
14	0.30	0.64										0.05			
15			103.5									0.01			
16	0.30	0.57										0.20			
17												0.20			
18												0.41			
19												0.01			
20			103.5									0.15			
21	0.40	0.78										0.02			
22			99.5									0.10			
23	0.40	0.87										0.50			
24												0.00			
25												0.19			
26												0.42			
27			82.5									0.03			
28	0.60	1.27										0.32			
29			85									0.14			
30	0.30	0.61										0.2			
31												0.05			
TOTAL	3.2	6.41	892									3.71			
	AVG 0.36	AVG 0.71	AVG 99.1	AVG	MIN	AVG	AVG	AVG	AVG	AVG	AVG				
Permit	1.4	8.2													
	MAX 0.60	MAX 1.27	MAX 105.5	MAX 0	MAX 0	AVW	AVW	AVW	AVW	AVW	MAX 0				
Limits	3.14														

***Receiving Water is to be sampled May - October**

Please Circle ALL Permit Violations Mail to P.O. Box 47775, Olympia WA 98504-7775

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=highest 7-day Geometric Mean

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: November | Year: 2009

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water: LAKE RIVER | Plant Operator: John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4215

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1							0.273							6.9	
2							0.258							7.0	
3	261	544	278	580			0.250	7.8	97.0%	16.3	8.0	97.1%	16.7	7.0	
4					37.4	75.5	0.242							6.9	76
5	322	658	311	635			0.245	8.7	97.3%	17.8	8.0	97.4%	16.3	7.1	
6					37.5	89.8	0.287							6.8	100
7							0.340							6.8	
8							0.311							6.9	
9							0.307							7.0	
10	270	628	300	698			0.279	8.5	96.9%	19.8	8.0	97.3%	18.6	7.0	
11					41.4	96.7	0.280							6.7	10
12	292	687	287	675			0.282	5.7	98.0%	13.4	7.4	97.4%	17.4	7.0	
13					45.6	109.1	0.287							7.1	42
14							0.276							6.8	
15							0.286							6.7	
16							0.271							7.0	
17	296	736	265	659			0.298	5.1	98.3%	12.7	5.6	97.9%	13.9	7.0	
18					36.7	89.1	0.291							7.0	15
19	200	579	248	718			0.347	5.1	97.5%	14.8	6.1	97.5%	17.7	7.0	
20					38	107.4	0.339							6.8	26
21							0.323							6.8	
22							0.461							6.7	
23	224	637	236	671			0.341	4.3	98.1%	12.2	6.1	97.4%	17.3	6.8	
24	244	615	234	589	33.2	83.6	0.302	3.7	98.5%	9.3	5.4	97.7%	13.6	6.9	79
25					28.5	72.0	0.303							6.9	6
26							0.372							6.9	
27							0.377							7.0	
28							0.322							6.8	
29							0.305							6.8	
30							0.293							6.8	
31															
TOTAL	2109	5083	2159	5225	298	723	9.148	48.9		116	54.6		131.6	207	354
	AVG 264	AVG 635	AVG 270	AVG 653	AVG 37.29	AVG 90.4	AVG 0.305	AVG 6.11	AVG 97.7	AVG 14.53	AVG 6.83	AVG 97.5	AVG 16.45	MIN 6.7	GEM 30
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 322	MAX 736	MAX 311	MAX 718	MAX 45.60	MAX 109.1	MAX 0.461	AVW 8.25		AVW 17.05	AVW 8.00		AVW 18.00	MAX 7.1	GM7 87
Limits								45		263	45		263	9.0	200

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Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: November | Year: 2009

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water LAKE RIVER | Plant Operator: : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4215

	PHASE 1 - EFFLUENT CONT			RECEIVING WATER*											
...equency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT				
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TOTAL AMMONIA MG/L	pH STANDARD UNITS	ALAKLINITY AS CACO3 MG/L	HARDNESS MG/L	DISSOLVED OXYGEN MG/L	BOD 5-DAY MG/L	CBOD MG/L	TEMPERATURE DEG. C	RAIN FALL Inches			
1												0.00			
2												0.01			
3			86.5									0.00			
4	0.30	0.61										0.00			
5			83.0									0.24			
6	0.30	0.72										1.00			
7												0.40			
8												0.10			
9												0.31			
10			84.5									0.07			
11	0.40	0.93										0.10			
12			91.5									0.08			
13	0.30	0.72										0.18			
14												0.06			
15												0.03			
16												0.25			
17			88.5									0.11			
18	0.30	0.73										0.58			
19			89.0									0.18			
20	0.30	0.85										0.20			
21												1.00			
22												0.09			
23			77.0									0.00			
24	0.3	0.76	77.5									0.00			
25	0.3	0.76										0.05			
26												1.15			
27												0.00			
28												0.00			
29												0.00			
30												0.00			
31															
TOTAL	2.50	6.08	677.5												
	AVG 0.31	AVG 0.76	AVG 84.7	AVG	MIN	AVG	AVG	AVG	AVG	AVG	AVG	6.19			
Permit	1.4	8.2													
	MAX 0.40	MAX 0.93	MAX 91.5	MAX	MAX	AVW	AVW	AVW	AVW	AVW	MAX				
Limits	3.14														

Receiving Water is to be sampled May - October

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G... =highest 7-day Geometric Mean

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Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272

Month: December Year: 2009

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT

County: CLARK

Receiving Water LAKE RIVER

Plant Operator: : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION

Population: 4242

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1	300	646	320	689			0.258	9.9	96.7%	21.3	9.5	97.0%	20.4	6.8	
2					38.3	97.1	0.304							6.7	10
3	341	734	315	678			0.258	8.9	97.4%	19.2	8.9	97.2%	19.2	6.9	
4					51.3	110.0	0.257							7.0	28
5							0.251							6.9	
6							0.256							6.9	
7							0.259							7.0	
8	308	645	317	664			0.251	11.2	96.4%	23.4	11.3	96.4%	23.7	7.0	
9					40.6	84.7	0.250							7.0	36
10	295	590	268	536			0.240	9.5	96.8%	19.0	11.8	95.6%	23.6	7.0	
11					59.3	117.2	0.237							6.9	23
12							0.239							6.8	
13							0.254							6.9	
14							0.282							7.1	
15	166	676	161	655			0.488	8.6	94.8%	35.0	9.8	93.9%	39.9	7.0	
16					31.8	124.9	0.471							6.9	19
17	209	654	215	672			0.375	6.2	97.0%	19.4	7.6	96.5%	23.8	6.9	
18					45.6	127.8	0.336							6.7	11
19							0.312							6.7	
20							0.326							6.7	
21	188	670	205	730			0.427	9.7	94.8%	34.5	12	94.1%	42.7	6.8	
22					23.6	67.5	0.343							6.8	2
23	282	701	251	624			0.298	7.1	97.5%	17.6	7.3	97.1%	18.1	6.8	
24					41.1	102.5	0.299							6.9	1
25							0.264							7.0	
26							0.269							7.0	
27							0.259							7.0	
28							0.246							7.0	
29	302	632	258	540			0.251	5.3	98.2%	11.1	6.3	97.6%	13.2	7.1	
30					34.9	85.9	0.295							7.0	1
31	281	959	222	757			0.409	7.9	97.2%	26.9	7.5	96.6%	25.6	7.1	
TOTAL	2672	6905	2532	6545	367	917	9.264	84		228	92		250	214	131
	AVG 267	AVG 690	AVG 253	AVG 655	AVG 40.72	AVG 101.9	AVG 0.299	AVG 8.43	AVG 96.8	AVG 22.75	AVG 9.20	AVG 96.3	AVG 25.02	MIN 6.7	GEM 8
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 341	MAX 959	MAX 320	MAX 757	MAX 59.30	MAX 127.8	MAX 0.488	AVW 10.35		AVW 27.20	AVW 11.55		AVW 31.85	MAX 7.1	GM7 29
Limits								45		263	45		263	9.0	200

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GM7=highest 7-day Geometric Mean

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: December | Year: 2009

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water LAKE RIVER | Plant Operator : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4242

	PHASE 1 - EFFLUENT CONT			RECEIVING WATER*												
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT					
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TOTAL AMMONIA MG/L	pH STANDARD UNITS	ALKALINITY AS CACO3 MG/L	HARDNESS MG/L	DISSOLVED OXYGEN MG/L	BOD 5-DAY MG/L	CBOD MG/L	TEMPERATURE DEG. C	RAINFALL Inches				
1			83.5									0.00				
2	1.00	2.54										0.00				
3			86.0									0.00				
4	0.50	1.07										0.00				
5												0.00				
6												0.00				
7												0.00				
8			96.0									0.00				
9	0.50	1.04										0.00				
10			88.0									0.00				
11	0.40	0.79										0.00				
12												0.00				
13												0.05				
14												1.30				
15			90.0									0.90				
16	0.90	3.54										0.42				
17			88.0									0.08				
18	0.80	2.24										0.03				
19												0.01				
20												0.50				
21			86.5									0.20				
22	0.70	2.00										0.00				
23			88.0									0.00				
24	0.90	2.24										0.00				
25												0.00				
26												0.00				
27												0.00				
28												0.00				
29			104.0									0.85				
30	2.90	7.13										0.05				
31			97.0									1.10				
TOTAL	8.6	22.59	907									5.49				
	AVG 0.96	AVG 2.51	AVG 90.7	AVG	MIN	AVG	AVG	AVG	AVG	AVG	AVG					
Permit	1.4	8.2														
	MAX 2.90	MAX 7.13	MAX 104.0	MAX 0	MAX 0	AVW	AVW	AVW	AVW	AVW	MAX 0					
Limits	3.14															

**Receiving Water is to be sampled May - October*

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'=highest 7-day Geometric Mean

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John Duback   WWTPO

Name and Title   Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** January **Year:** 2010

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 4242

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1					14.6	53.8	0.442						0.0	6.7	10
2							0.363						0.0	6.7	
3							0.352						0.0	6.7	
4							0.372						0.0	7.0	
5	221	695	205	645			0.377	3.3	98.5%	10.4	3.8	98.1%	11.9	7.0	
6					29	94.1	0.389						0.0	6.9	1
7	325	908	220	615			0.335	3.5	98.9%	9.8	4.2	98.1%	11.7	6.9	
8					38.6	115.9	0.360						0.0	7.0	28
9							0.406						0.0	6.7	
10							0.357						0.0	6.8	
11							0.336						0.0	7.0	
12	262	894	204	696			0.409	5.1	98.1%	17.4	4.2	97.9%	14.3	7.0	
13					34.9	115.6	0.397						0.0	6.9	5
14	389	1132	233	678			0.349	3.9	99.0%	11.4	3.8	98.4%	11.1	6.9	
15					43.1	140.5	0.391						0.0	7.0	10
16							0.450						0.0	6.7	
17							0.435						0.0	6.7	
18							0.404						0.0	6.8	
19	299	878	217	637			0.352	4.4	98.5%	12.9	4.5	97.9%	13.2	6.9	
20					31.1	87.4	0.337						0.0	6.9	6
21	286	761	234	623			0.319	3.4	98.8%	9.0	3.7	98.4%	9.8	6.9	
22					42.4	107.9	0.305						0.0	6.9	9
23							0.310						0.0	6.7	
24							0.387						0.0	6.7	
25							0.469						0.0	6.7	
26	255	772	230	696			0.363	3	98.8%	9.1	3.6	98.4%	10.9	6.7	
27					36.8	103.4	0.337						0.0	6.7	1
28			283	725			0.307				3.2	98.9%	8.2	6.7	
29					38.4	95.1	0.297						0.0	6.7	4
30							0.291						0.0	6.8	
31							0.310						0.0	6.9	
TOTAL	2037	6039	1826	5314	309	914	11.308	27		80	31		91	212	74
	AVG 291	AVG 863	AVG 228	AVG 664	AVG 34.32	AVG 101.5	AVG 0.365	AVG 3.80	AVG 96.8	AVG 11.42	AVG 3.88	AVG 98.3	AVG 2.94	MIN 6.7	GEM 4
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 389	MAX 1132	MAX 283	MAX 725	MAX 43.10	MAX 140.5	MAX 0.469	AVW		AVW	AVW 4.10		AVW	MAX 7.0	GM7 7
Limits								45		263	45		263	9.0	200

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 Month: January Year: 2010

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT County: CLARK

Receiving Water LAKE RIVER Plant Operator : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION Population: 4242

	PHASE 1 - EFFLUENT CONT			RECEIVING WATER*											
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT				
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TOTAL AMMONIA MG/L	pH STANDARD UNITS	ALAKLINITY AS CACO3 MG/L	HARDNESS MG/L	DISSOLVED OXYGEN MG/L	BOD 5-DAY MG/L	CBOD MG/L	TEMPERATURE DEG. C	RAINFALL Inches			
1	3.0	8.34										0.10			
2												0.02			
3												0.06			
4												0.45			
5			91.0									0.48			
6	2.2	7.14										0.03			
7			88.0									0.25			
8	1.7	5.10										0.55			
9												0.08			
10												0.05			
11			91.0									0.41			
12	1.9	6.29										0.37			
13			88.0									0.10			
14	0.7	2.28										0.00			
15												0.75			
16												0.18			
17												0.40			
18												0.02			
19			79.0									0.08			
20	0.3	0.84										0.01			
21			82.0									0.00			
22	0.3	0.76										0.15			
23												0.01			
24												1.10			
25												0.05			
26												0.05			
27	0.3	0.84													
28															
29	0.3	0.74													
30															
31															
TOTAL	10.7	32.33	519												
	AVG 1.19	AVG 3.59	AVG 86.5	AVG	MIN	AVG	AVG	AVG	AVG	AVG	AVG				
Permit	1.4	8.2													
	MAX 3.00	MAX 8.34	MAX 91.0	MAX 0	MAX 0	AVW	AVW	AVW	AVW	AVW	MAX 0				
Limits	3.14														

Receiving Water is to be sampled May - October

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highest 7-day Geometric Mean

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: February | Year: 2010

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water: LAKE RIVER | Plant Operator: : John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4245

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT									
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1							0.309						0.0	7.0	
2	410	1057	238	613			0.309	3.0	99.3%	7.7	2.8	98.8%	7.2	6.9	
3					37.7	104.1	0.331						0.0	7.0	1
4	280	831	328	974			0.356	2.5	99.1%	7.4	2.6	99.2%	7.7	6.9	
5					42.5	129.0	0.364						0.0	6.9	12
6							0.341						0.0	6.7	
7							0.333						0.0	6.7	
8							0.313						0.0	6.9	
9	231	601	228	593			0.312	2.9	98.7%	7.5	3.1	98.6%	8.1	6.8	
10					32.2	103.1	0.384						0.0	6.8	31
11	243	758	208	649			0.374	3.8	98.4%	11.9	3.5	98.3%	10.9	6.9	
12					29.7	96.4	0.389						0.0	6.6	8
13							0.352						0.0	7.0	
14							0.376						0.0	6.9	
15							0.368						0.0	6.8	
16	237	721	255	776			0.365	3.1	98.7%	9.4	3.5	98.6%	10.7	6.9	
17					33.4	93.6	0.336						0.0	6.8	5
18	257	675	221	581			0.315	2.6	99.0%	6.8	2.9	98.7%	7.6	7.0	
19					45.7	109.8	0.288						0.0	7.0	5
20							0.292						0.0	6.8	
21							0.280						0.0	6.8	
22							0.279						0.0	6.9	
23	284	682	249	598			0.288	3.0	98.9%	7.2	3.4	98.6%	8.2	7.0	
24					22.9	58.4	0.306						0.0	7.0	8
25	306	720	248	583			0.282	2.6	99%	6.1	2.5	99.0%	5.9	7.0	
26					33.6	118.5	0.423						0.0	7.0	5
27							0.362						0.0	6.6	
28							0.338						0.0	6.7	
TOTAL	2248	6045	1975	5367	278	813	9.365	23.5		64	24.3		66.2	192	75
	AVG 281	AVG 756	AVG 247	AVG 671	AVG 34.71	AVG 101.6	AVG 0.334	AVG 2.94	AVG 98.9	AVG 8.02	AVG 3.04	AVG 98.7	AVG 2.37	MIN 6.6	GEM 6
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 410	MAX 1057	MAX 328	MAX 974	MAX 45.70	MAX 129.0	MAX 0.423	AVW 3.35		AVW 9.70	AVW 3.30		AVW 9.50	MAX 7.0	GM7 16
Limits								45		263	45		263	9.0	200

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Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 — Month: February — Year: 2010

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT — County: CLARK

Receiving Water: LAKE RIVER — Plant Operator: : John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION — Population: 4269

	PHASE 1 - EFFLUENT CONT			RECEIVING WATER*											
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT				
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TOTAL AMMONIA MG/L	pH STANDARD UNITS	ALAKLINITY AS CACO3 MG/L	HARDNESS MG/L	DISSOLVED OXYGEN MG/L	BOD 5-DAY MG/L	CBOD MG/L	TEMPERATURE DEG. C	RAIN FALL Inches			
1												0.23			
2			88.0									0.13			
3	0.3	0.83										0.28			
4			86.3									0.35			
5	0.3	0.91										0.00			
6												0.02			
7												0.01			
8												0.00			
9			84.0									0.00			
10	0.3	0.96										0.27			
11			81.0									0.50			
12	0.3	0.97										0.25			
13												0.30			
14												0.05			
15												0.30			
16			79.0									0.00			
17	0.3	0.84										0.00			
18			88.0									0.00			
19	0.3	0.72										0.00			
20												0.00			
21												0.00			
22												0.00			
23			82.5									0.34			
24	0.3	0.77										0.06			
25			81.3									0.50			
26	0.3	1.06										0.48			
27												0.00			
28												0.00			
TOTAL	2.40	7.06	670.1												
	AVG 0.30	AVG 0.88	AVG 83.8	AVG	MIN	AVG	AVG	AVG	AVG	AVG	AVG	4.07			
Permit	1.4	8.2													
	MAX 0.30	MAX 1.06	MAX 88.0	MAX	MAX	AVW	AVW	AVW	AVW	AVW	MAX				
Limits	3.14														

Receiving Water is to be sampled May - October

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Name and Title ____________________   Signature ____________________

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 — **Month:** March **Year:** 2010

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT — **County:** CLARK

Receiving Water LAKE RIVER — **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION — **Population:** 4269

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1							0.319						0.0	6.8	
2	280	691	216	533			0.296	3.4	98.8%	8.4	3.8	98.2%	9.4	6.9	
3					34.4	82.9	0.289						0.0	6.8	8
4	263	608	272	628			0.277	4.0	98.5%	9.2	3.7	98.6%	8.5	6.8	
5					35.8	76.4	0.256						0.0	6.8	4
6							0.259						0.0	6.8	
7							0.283						0.0	6.9	
8							0.274						0.0	7.0	
9	324	759	319	748			0.281	4.3	98.7%	10.1	6.2	98.1%	14.5	7.0	
10					29.4	70.9	0.289						0.0	7.0	310
11	307	886	293	845			0.346	4.6	98.5%	13.3	5.2	98.2%	15.0	7.0	
12					23.3	86.7	0.446						0.0	6.7	7
13							0.372						0.0	6.7	
14							0.356						0.0	6.7	
15							0.296						0.0	6.9	
16	331	806	274	667			0.292	4.5	98.6%	11.0	5.9	97.8%	14.4	7.0	
17					49.1	112.6	0.275						0.0	7.1	8
18	287	646	296	667			0.270	5.8	98.0%	13.1	7.0	97.6%	15.8	7.1	
19					43.6	93.8	0.258						0.0	7.1	4
20							0.256						0.0	7.0	
21							0.291						0.0	7.1	
22							0.264						0.0	7.1	
23	384	826	388	835			0.258	8.7	97.7%	18.7	10.2	97.4%	21.9	7.1	
24					42.5	90.4	0.255						0.0	7.2	250
25	285	708	301	748			0.298	7.3	97.4%	18.1	9.1	97.0%	22.6	7.2	
26					44.7	112.6	0.302						0.0	7.0	340
27							0.270						0.0	7.0	
28							0.333						0.0	7.1	
29							0.427						0.0	7.0	
30	229	707	228	704			0.370	6.0	97.4%	18.5	8.6	96.2%	26.5	7.0	
31					32.2	91.6	0.341						0.0	7.0	840
TOTAL	2690	6638	2587	6375	335	818	9.399	49		120	60		148.7	216	1771
	AVG 299	AVG 738	AVG 287	AVG 708	AVG 37.2	AVG 90.9	AVG 0.303	AVG 5.40	AVG 98.2	AVG 13.38	AVG 6.63	AVG 97.7	AVG 9.06	MIN 6.7	GEM 38
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 384	MAX 886	MAX 388	MAX 845	MAX 49.1	MAX 112.6	MAX 0.446	AVW 8.00		AVW 18.40	AVW 9.65		AVW 22.25	MAX 7.2	GM7 292
Limits								45		263	45		263	9.0	200

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GM7=highest 7-day Geometric Mean

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John Duback WWTP Operator
Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 Month: March Year: 2010

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT County: CLARK

Receiving Water LAKE RIVER Plant Operator: : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION Population: 4269

	PHASE 1 - EFFLUENT CONT			RECEIVING WATER*												
...equency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT				
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TOTAL AMMONIA MG/L	pH STANDARD UNITS	ALKALINITY AS CACO3 MG/L	HARDNESS MG/L	DISSOLVED OXYGEN MG/L	BOD 5-DAY MG/L	CBOD MG/L	TEMPERATURE DEG. C	RAIN FALL Inches			
1												0.00			
2			84.0									0.05			
3	0.3	0.72										0.00			
4			83.1									0.00			
5	0.3	0.64										0.00			
6												0.00			
7												0.10			
8												0.01			
9			88.8									0.28			
10												0.07			
11			86.0									1.00			
12	0.3	1.1										0.20			
13	0.30	0.93										0.00			
14												0.00			
15												0.00			
16			78.8									0.01			
17	0.3	0.7										0.00			
18			89.5									0.00			
19	0.3	0.7										0.00			
20												0.01			
21												0.25			
22												0.00			
23			100.0									0.00			
24	0.3	0.64										0.35			
25			101.3									0.23			
26	0.3	0.76										0.05			
27												0.30			
28												0.60			
29												0.28			
30												0.20			
31												0.30			
TOTAL	2.4	6.15	711.5									4.29			
	AVG 0.30	AVG 0.77	AVG 88.9	AVG	MIN	AVG	AVG	AVG	AVG	AVG	AVG				
Permit	1.4	8.2													
	MAX 0.30	MAX 1.12	MAX 101.3	MAX 0	MAX 0	AVW	AVW	AVW	AVW	AVW	MAX 0				
Limits	3.14														

Receiving Water is to be sampled May - October

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G =highest 7-day Geometric Mean

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 — Month: April — Year: 2010

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT — County: CLARK

Receiving Water: LAKE RIVER — Plant Operator: : John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION — Population: 4269

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1	245	617	276	695			0.302	5.0	98.0%	12.6	7.0	97.5%	17.6	7.1	
2					36.8	126.1	0.411						0.0	7.1	1
3							0.395						0.0	6.9	
4							0.369						0.0	7.0	
5							0.354						0.0	7.1	
6	237	747	202	637			0.378	4.5	98.1%	14.2	4.8	97.6%	15.1	7.0	
7					34.7	96.4	0.333						0.0	6.9	4
8	240	691	226	650			0.345	3.7	98.5%	10.6	4.6	98.0%	13.2	7.0	
9					41.3	110.6	0.321						0.0	6.9	4
10							0.316						0.0	7.0	
11							0.307						0.0	7.0	
12							0.31						0.0	7.0	
13	278	682	319	782			0.294	5.0	98.2%	12.3	5.2	98.4%	12.8	7.0	
14					40.6	94.8	0.280						0.0	7.1	1
15	271	637	277	651			0.282	3.6	98.7%	8.5	3.9	98.6%	9.2	7.0	
16					51.5	116.0	0.270						0.0	7.0	8
17							0.266						0.0	7.0	
18							0.273						0.0	7.0	
19							0.255						0.0	7.2	
20	294	642	265	579			0.262	4.0	98.6%	8.7	5.1	98.1%	11.1	7.1	
21					41.8	93.4	0.268						0.0	7.1	5
22	376	797	376	797			0.254	4.8	98.7%	10.2	5.9	98.4%	12.5	7.1	
23					51.0	103.4	0.243						0.0	7.1	2
24							0.253						0.0	7.1	
25							0.260						0.0	7.1	
26							0.279						0.0	7.1	
27	296	787	298	793			0.319	3.7	98.8%	9.8	5.1	98.3%	13.6	7.0	
28					44.0	118	0.321						0.0	7.1	5
29	254	657	286	739			0.310	3.3	98.7%	8.5	4.7	98.4%	12.2	7.0	
30					46.3	109.3	0.283						0.0	7.0	1
TOTAL	2491	6257	2525	6324	388	968	9.113	38		95	46		117	211	31
	AVG 277	AVG 695	AVG 281	AVG 703	AVG 43.11	AVG 107.5	AVG 0.304	AVG 4.18	AVG 98.5	AVG 10.60	AVG 5.14	AVG 98.1	AVG 3.91	MIN 6.9	GEM 5
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 376	MAX 797	MAX 376	MAX 797	MAX 51.50	MAX 126.1	MAX 0.411	AVW 5.50		AVW 15.55	AVW 7.80		AVW 22.15	MAX 7.2	GM7 29
Limits								45		263	45		263	9.0	200

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: April | Year: 2010

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water LAKE RIVER | Plant Operator : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4269

	PHASE 1 - EFFLUENT CONT			RECEIVING WATER*											
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT				
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TOTAL AMMONIA MG/L	pH STANDARD UNITS	ALAKLINITY AS CACO3 MG/L	HARDNESS MG/L	DISSOLVED OXYGEN MG/L	BOD 5-DAY MG/L	CBOD MG/L	TEMPERATURE DEG. C	RAINFALL Inches			
1			88.0									0.35			
2	0.30	1.03										0.42			
3												0.00			
4												0.10			
5												0.38			
6			86.3									0.10			
7	0.30	0.83										0.10			
8			85.0									0.20			
9	0.30	0.80										0.03			
10												0.00			
11												0.20			
12												0.05			
13			91.0									0.00			
14	0.30	0.70										0.12			
15			92.0									0.00			
16	0.30	0.68										0.00			
17												0.00			
18												0.01			
19												0.03			
20			97.0									0.00			
21	0.30	0.67										0.00			
22			100.5									0.00			
23	0.30	0.61										0.04			
24												0.00			
25												0.00			
26												0.58			
27			93.0									0.28			
28	0.30	0.80										0.35			
29			87.5									0.02			
30	0.30	0.71										0.00			
31															
TOTAL	2.7	6.83	820.3									3.36			
	AVG 0.30	AVG 0.76	AVG 91.1	AVG	MIN	AVG	AVG	AVG	AVG	AVG	AVG				
Permit	1.4	8.2													
	MAX 0.30	MAX 1.03	MAX 100.5	MAX 0	MAX 0	AVW	AVW	AVW	AVW	AVW	MAX 0				
Limits	3.14														

**Receiving Water is to be sampled May - October*

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: May | Year: 2010

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water: LAKE RIVER | Plant Operator: : John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4347

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT									
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1							0.275							6.9	
2							0.277							7.0	
3							0.289							7.0	
4	227	632	199	554			0.334	1.7	99.3%	4.7	4.5	97.7%	12.5	7.0	
5					41.6	112.4	0.324							7.1	42
6	278	679	278	679			0.293	2.7	99.0%	6.6	4.1	98.5%	10.0	6.9	
7					49.3	115.9	0.282							7.0	4
8							0.268							6.9	
9							0.269							7.0	
10							0.294							7.0	
11	266	599	294	662			0.270	4.6	98.3%	10.4	5.5	98.1%	12.4	7.0	
12					52.1	110.8	0.255							7.0	4
13	289	610	361	762			0.253	3.5	98.8%	7.4	4.3	98.8%	9.1	7.0	
14					57.6	118.2	0.246							7.1	6
15							0.234							7.0	
16							0.244							7.0	
17							0.238							7.2	
18	378	763	502	1013			0.242	23.8	93.7%	48.0	17.1	96.6%	34.5	7.4	
19					43	91.4	0.255							7.3	26
20	334	702	366	769			0.252	3.4	99.0%	7.1	3.8	99.0%	8.0	7.1	
21					44.1	109.2	0.297							7.1	1
22							0.305							7.0	
23							0.294							6.9	
24							0.279							7.1	
25	322	704	312	682			0.262	3.9	98.8%	8.5	5.4	98.3%	11.8	7.2	
26					54.7	136.9	0.300							7.1	2
27	258	590	391	893			0.274	2.7	99.0%	6.2	3.5	99.1%	8.0	7.1	
28					38.5	97.0	0.302							7.1	1
29							0.365							6.9	
30							0.298							6.9	
31							0.378							6.9	
TOTAL	2352	5278	2703	6015	381	892	8.748	46		99	48		106.3	218	86
	AVG 294	AVG 660	AVG 338	AVG 752	AVG 47.6	AVG 111.5	AVG 0.282	AVG 5.79	AVG 98.2	AVG 12.37	AVG 6.03	AVG 98.3	AVG 13.29	MIN 6.9	GEM 5
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 378	MAX 763	MAX 502	MAX 1013	MAX 57.6	MAX 136.9	MAX 0.378	AVW 13.60		AVW 27.55	AVW 10.45		AVW 21.25	MAX 7.4	GM7 13
Limits								45		263	45		263	9.0	200

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: May | Year: 2010

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water LAKE RIVER | Plant Operator: : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4347

	PHASE 1 - EFFLUENT CONT			RECEIVING WATER*											
..equency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT				
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TOTAL AMMONIA MG/L	pH STANDARD UNITS	ALAKLINITY AS CACO3 MG/L	HARDNESS MG/L	DISSOLVED OXYGEN MG/L	BOD 5-DAY MG/L	CBOD MG/L	TEMPERATURE DEG. C	RAIN FALL Inches			
1												0.00			
2												0.20			
3												0.05			
4			94.0									0.45			
5	0.30	0.81										0.05			
6			88.3									0.00			
7	0.30	0.71										0.00			
8												0.00			
9												0.23			
10												0.00			
11			89.0									0.00			
12	0.30	0.64										0.00			
13			95.0									0.00			
14	0.30	0.62										0.00			
15												0.00			
16												0.03			
17												0.25			
18			236.9									0.11			
19	12.90	27.40										0.34			
20			101.5									0.30			
21	0.70	1.73										0.35			
22												0.10			
23												0.10			
24												0.02			
25			91.0									0.24			
26	0.30	0.75										0.24			
27			91.3									0.01			
28	0.30	0.76										0.80			
29												0.05			
30												0.35			
31												0.30			
TOTAL	15.4	33.42	887									4.57			
	AVG 1.93	AVG 4.18	AVG 110.9	AVG	MIN	AVG	AVG	AVG	AVG	AVG	AVG				
Permit	1.4	8.2													
	MAX 12.90	MAX 27.40	MAX 236.9	MAX 0	MAX 0	AVW	AVW	AVW	AVW	AVW	MAX 0				
Limits	3.14														

Receiving Water is to be sampled May - October

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G[illegible]highest 7-day Geometric Mean

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: June | Year: 2010

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water: LAKE RIVER | Plant Operator: : John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4347

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1	268	711	309	820			0.318	3.3	98.8%	8.8	3.3	98.9%	8.8	7.0	
2					41.7	127.6	0.367						0.0	7.0	4
3	240	665	250	692			0.332	2.6	98.9%	7.2	3.0	98.8%	8.3	6.9	
4					40.3	136.1	0.405						0.0	6.8	3
5							0.331						0.0	6.9	
6							0.511						0.0	6.9	
7							0.411						0.0	6.9	
8	207	603	240	699			0.349	3.3	98.4%	9.6	4.2	98.3%	12.2	7.0	
9					33.1	96.1	0.348						0.0	7.1	1
10	212	605	217	619			0.342	3.2	98.5%	9.1	2.8	98.7%	8.0	7.0	
11					41.1	106.3	0.310						0.0	6.8	2
12							0.300						0.0	6.9	
13							0.298						0.0	7.0	
14							0.287						0.0	6.9	
15	289	742	305	783			0.308	3.4	98.8%	8.7	5.7	98.1%	14.6	7.1	
16					42.6	118.7	0.334						0.0	7.0	9
17	289	694	349	838			0.288	3.4	98.8%	8.2	5.5	98.4%	13.2	6.9	
18					54.1	123.2	0.273						0.0	7.1	5
19							0.279						0.0	7.0	
20							0.288						0.0	7.0	
21							0.271						0.0	7.1	
22	286	615	304	654			0.258	3.7	98.7%	8.0	5.2	98.3%	11.2	7.0	
23					44.7	92.1	0.247						0.0	7.1	2
24	312	640	327	671			0.246	3.2	99.0%	6.6	4.8	98.5%	9.8	7.0	
25					45.1	92.5	0.246						0.0	7.0	2
26							0.257						0.0	6.9	
27							0.261						0.0	7.0	
28							0.253						0.0	7.1	
29	348	734	400	844			0.253	5.3	98.5%	11.2	7.9	98.0%	16.7	6.9	
30					45.2	95.0	0.252						0.0	7.0	4
TOTAL	2451	6009	2701	6620	388	988	9.223	31		77	42		103	209	32
	AVG 272	AVG 668	AVG 300	AVG 736	AVG 43.10	AVG 109.7	AVG 0.307	AVG 3.49	AVG 98.7	AVG 8.59	AVG 4.71	AVG 98.4	AVG 3.43	MIN 6.8	GEM 3
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 348	MAX 742	MAX 400	MAX 844	MAX 54.10	MAX 136.1	MAX 0.511	AVW 3.45		AVW 9.35	AVW 5.60		AVW 13.90	MAX 7.1	GM7 7
Limits								45		263	45		263	9.0	200

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 — Month: June — Year: 2010

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT — County: CLARK

Receiving Water: LAKE RIVER — Plant Operator : John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION — Population: 4347

	PHASE 1 - EFFLUENT CONT			RECEIVING WATER*											
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT				
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TOTAL AMMONIA MG/L	pH STANDARD UNITS	ALAKLINITY AS CACO3 MG/L	HARDNESS MG/L	DISSOLVED OXYGEN MG/L	BOD 5-DAY MG/L	CBOD MG/L	TEMPERATURE DEG. C	RAINFALL Inches			
1			90.8									0.36			
2	0.30	0.92										0.21			
3			84.3									0.60			
4	0.30	1.01										0.25			
5												0.60			
6												0.60			
7												0.00			
8			83.8									0.17			
9	0.30	0.87										0.15			
10			87.0									0.10			
11	0.30	0.76										0.00			
12												0.00			
13												0.00			
14												0.01			
15			89.0									0.72			
16	0.30	0.84										0.01			
17			91.0									0.00			
18	0.30	0.68										0.11			
19												0.02			
20												0.08			
21												0.00			
22			98.3									0.00			
23	0.30	0.62										0.00			
24			103.0									0.00			
25	0.30	0.62										0.00			
26												0.00			
27												0.00			
28												0.00			
29			98.0									0.00			
30	0.30	0.63										0.00			
31															
TOTAL	2.7	6.95	825.2												
	AVG 0.30	AVG 0.77	AVG 91.7	AVG	MIN	AVG	AVG	AVG	AVG	AVG	AVG	3.99			
Permit	1.4	8.2													
	MAX 0.30	MAX 1.01	MAX 103.0	MAX 0	MAX 0	AVW	AVW	AVW	AVW	AVW	MAX 0				
Limits	3.14														

Receiving Water is to be sampled May - October

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: July | Year: 2010

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water: LAKE RIVER | Plant Operator: : John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4347

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1	318	652	325	667			0.246	3.9	98.8%	8.0	6.3	98.1%	12.9	7.1	
2					61	135.3	0.266						0.0	7.1	1
3							0.255						0.0	7.0	
4							0.242						0.0	7.0	
5							0.242						0.0	7.0	
6	294	554	406	765			0.226	6.5	97.8%	12.3	12.1	97.0%	22.8	7.1	
7					45.5	83.1	0.219						0.0	7.0	3
8	370	694	380	713			0.225	7.3	98.0%	13.7	9.9	97.4%	18.6	7.1	
9					57.4	108.7	0.227						0.0	7.0	1
10							0.240						0.0	7.0	
11							0.262						0.0	7.0	
12							0.256						0.0	7.1	
13	441	945	420	900			0.257	5.2	98.8%	11.1	8.8	97.9%	18.9	7.0	
14					46.9	95.0	0.243						0.0	6.9	8
15	453	922	368	749			0.244	3.5	99.2%	7.1	7.4	98.0%	15.1	7.0	
16					66.3	130.5	0.236						0.0	7.0	4
17							0.244						0.0	7.0	
18							0.255						0.0	7.0	
19							0.250						0.0	7.1	
20	403	837	382	793			0.249	4.9	98.8%	10.2	8.0	97.9%	16.6	7.0	
21					46.4	90.2	0.233						0.0	7.1	1
22	359	686	342	653			0.229	3.7	99.0%	7.1	4.4	98.7%	8.4	7.2	
23					48.8	90.8	0.223						0.0	7.2	1
24							0.229						0.0	7.1	
25							0.241						0.0	7.0	
26							0.235						0.0	7.1	
27	368	740	373	750			0.241	4.1	98.9%	8.2	4.4	98.8%	8.8	6.9	
28					47.3	95.5	0.242						0.0	7.1	3
29	386	837	448	971			0.260	3.3	99.1%	7.2	3.9	99.1%	8.5	6.9	
30					54.4	107.1	0.236						0.0	6.9	3
31							0.245						0.0	6.9	
TOTAL	3392	6867	3444	6962	474	936	7.498	42		85	65		130.5	218	25
	AVG 377	AVG 763	AVG 383	AVG 774	AVG 52.7	AVG 104.0	AVG 0.242	AVG 4.71	AVG 98.7	AVG 9.43	AVG 7.24	AVG 98.1	AVG 4.21	MIN 6.9	GEM 2
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 453	MAX 945	MAX 448	MAX 971	MAX 66.3	MAX 135.3	MAX 0.266	AVW 6.90		AVW 13.00	AVW 11.00		AVW 20.70	MAX 7.2	GM7 6
Limits								45		263	45		263	9.0	200

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: July | Year: 2010

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water: LAKE RIVER | Plant Operator: John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4347

	PHASE 1 - EFFLUENT CONT			RECEIVING WATER*											
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT				
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TOTAL AMMONIA MG/L	pH STANDARD UNITS	ALAKLINITY AS CACO3 MG/L	HARDNESS MG/L	DISSOLVED OXYGEN MG/L	BOD 5-DAY MG/L	CBOD MG/L	TEMPERATURE DEG. C	RAIN FALL Inches			
1			104.3									0.15			
2	0.30	0.67										0.05			
3			111.3									0.00			
4												0.00			
5												0.00			
6												0.00			
7	0.30	0.55										0.00			
8			109.9									0.00			
9	0.30	0.57										0.00			
10												0.00			
11												0.00			
12												0.00			
13			108.7									0.00			
14	0.30	0.61										0.00			
15			116.3									0.00			
16	0.30	0.59										0.00			
17												0.00			
18												0.00			
19												0.00			
20			106.3									0.00			
21	0.30	0.58										0.00			
22			125.0									0.00			
23	0.90	1.67										0.00			
24												0.00			
25												0.00			
26												0.00			
27			85.3									0.00			
28	0.30	0.61										0.00			
29			88.5									0.00			
30	0.30	0.59										0.00			
31												0.00			
TOTAL	3.30	6.44	955.6									0.20			
	AVG 0.37	AVG 0.72	AVG 106.2	AVG	MIN	AVG	AVG	AVG	AVG	AVG	AVG				
Permit	1.4	8.2													
	MAX 0.90	MAX 1.67	MAX 125.0	MAX 0	MAX 0	AVW	AVW	AVW	AVW	AVW	MAX 0				
Limits	3.14														

Receiving Water is to be sampled May - October

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** August **Year:** 2010

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 4400

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1							0.243						0.0	6.9	
2							0.263						0.0	7.0	
3	336	664	345	682			0.237	3	99.1%	5.9	3.1	99.1%	6.1	6.9	
4					58.8	99.5	0.203						0.0	7.1	1
5	364	683	367	689			0.225	2.7	99.3%	5.1	2.7	99.3%	5.1	7.1	
6					64.1	128.8	0.241						0.0	7.0	1
7							0.236						0.0	6.9	
8							0.240						0.0	6.9	
9							0.243						0.0	7.1	
10	320	603	345	650			0.226	3.1	99.0%	5.8	3.5	99.0%	6.6	7.0	
11					59.3	111.8	0.226						0.0	7.0	2
12	383	719	355	666			0.225	4	99.0%	7.5	3.7	99.0%	6.9	6.9	
13					42.0	75.3	0.215						0.0	7.0	5
14							0.214						0.0	6.9	
15							0.232						0.0	6.9	
16							0.221						0.0	7.0	
17	364	674	332	615			0.222	5.3	98.5%	9.8	9.2	97.2%	17.0	7.0	
18					57.2	113	0.236						0.0	7.0	2
19	327	545	286	477			0.200	8.1	97.5%	13.5	10.2	96.4%	17.0	6.9	
20					47.6	93	0.235						0.0	7.1	2
21							0.234						0.0	6.9	
22							0.258						0.0	6.9	
23							0.258						0.0	6.8	
24	318	684	310	667			0.258	3.5	98.9%	7.5	7.1	97.7%	15.3	6.8	
25					48.1	97	0.242						0.0	6.8	5
26	280	595	273	581			0.255	2.8	99.0%	6.0	4.5	98.4%	9.6	6.9	
27					49.3	101	0.245						0.0	6.9	6
28							0.247						0.0	6.8	
29							0.256						0.0	6.9	
30							0.276						0.0	7.0	
31	280	668	282	673			0.286	4.6	98.4%	11.0	5.4	98.1%	12.9	6.8	
TOTAL	2972	5836	2895	5699	426	819	7.398	37		72	49		96.5	215	24
	AVG 330	AVG 648	AVG 322	AVG 633	AVG 53.3	AVG 102.4	AVG 0.239	AVG 4.12	AVG 98.7	AVG 8.01	AVG 5.49	AVG 98.2	AVG 3.11	MIN 6.8	GEM 2
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 383	MAX 719	MAX 367	MAX 689	MAX 64.1	MAX 128.8	MAX 0.286	AVW 6.70		AVW 11.65	AVW 9.70		AVW 17.00	MAX 7.1	GM7 5
Limits								45		263	45		263	9.0	200

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: August | Year: 2010

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water: LAKE RIVER | Plant Operator: John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4400

	PHASE 1 - EFFLUENT CONT			RECEIVING WATER*											
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT				
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TOTAL AMMONIA MG/L	pH STANDARD UNITS	ALAKLINITY AS CACO3 MG/L	HARDNESS MG/L	DISSOLVED OXYGEN MG/L	BOD 5-DAY MG/L	CBOD MG/L	TEMPERATURE DEG. C	RAIN FALL Inches			
1												0.00			
2												0.00			
3			92.5									0.00			
4	0.30	0.51										0.00			
5			90.0									0.00			
6	0.30	0.60										0.00			
7												0.00			
8												0.00			
9												0.00			
10			81.5									0.00			
11	0.30	0.57										0.00			
12			87.0									0.00			
13	0.30	0.54										0.00			
14												0.00			
15												0.00			
16												0.00			
17			83.8									0.00			
18	0.30	0.59										0.00			
19			111.0									0.00			
20	7.60	14.90										0.00			
21												0.00			
22												0.00			
23												0.00			
24			82.5									0.00			
25	0.30	0.61										0.00			
26			95.8									0.00			
27	0.30	0.61										0.00			
28												0.00			
29												0.01			
30												0.00			
31			91.5									0.91			
TOTAL	9.7	18.93	815.6									0.92			
	AVG 1.21	AVG 2.37	AVG 90.6	AVG	MIN	AVG	AVG	AVG	AVG	AVG	AVG				
Permit	1.4	8.2													
	MAX 7.60	MAX 14.90	MAX 111.0	MAX 0	MAX 0	AVW	AVW	AVW	AVW	AVW	MAX 0				
Limits	3.14														

Receiving Water is to be sampled May - October

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John Duback   WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: September | Year: 2010

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water: LAKE RIVER | Plant Operator: : John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4400

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT									
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WE...
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1					47.2	113.0	0.287						0.0	7.0	12
2	292	660	254	574			0.271	3.4	98.8%	7.7	2.4	99.1%	5.4	7.0	
3					64.4	121.9	0.227						0.0	7	11
4							0.220						0.0	6.8	
5							0.222						0.0	6.9	
6							0.268						0.0	6.9	
7	300	698	282	656			0.279	2.5	99.2%	5.8	2.4	99.1%	5.6	7.1	
8					45.2	98.4	0.261						0.0	7.1	20
9	288	608	297	627			0.253	2.2	99.2%	4.6	1.4	99.5%	3.0	7.1	
10					62.8	120.5	0.230						0.0	7.1	1
11							0.227						0.0	6.9	
12							0.244						0.0	6.9	
13							0.249						0.0	6.9	
14	279	558	268	536			0.240	4.0	98.6%	8.0	4.0	98.5%	8.0	6.9	
15					54.3	109.1	0.241						0.0	6.8	1
16	309	637	270	556			0.247	2.4	99.2%	4.9	3.9	98.6%	8.0	7.1	
17					52.8	111.0	0.252						0.0	7.0	1
18							0.271						0.0	6.9	
19							0.288						0.0	6.8	
20							0.246						0.0	7.1	
21	362	737	287	584			0.244	2.4	99.3%	4.9	2.4	99.2%	4.9	6.9	
22					47.7	90.3	0.227						0.0	7.1	3
23	267	566	259	549			0.254	2.4	99.1%	5.1	2.2	99.2%	4.7	7.1	
24					61.1	123.3	0.242						0.0	7.0	6
25							0.252						0.0	6.9	
26							0.262						0.0	6.8	
27							0.250						0.0	7.0	
28	373	771	336	695			0.248	3.8	99.0%	7.9	3.9	98.8%	8.1	6.9	
29					59.5	117.6	0.237						0.0	7.1	1
30	343	707	284	585			0.247	3.4	99.0%	7.0	3.6	98.7%	7.4	7.1	
TOTAL	2813	5941	2537	5362	495	1005	7.486	27		56	26		55	209	56
	AVG 313	AVG 660	AVG 282	AVG 596	AVG 55.00	AVG 111.7	AVG 0.250	AVG 2.94	AVG 99.0	6.21	AVG 2.91	AVG 99.0	AVG 1.83	MIN 6.8	GEM 3
Permit		**1,240**		**1,240**		**160**	**0.7**	**30**	**85**	**175**	**30**	**85**	**175**	**6.0**	**100**
	MAX 373	MAX 771	MAX 336	MAX 695	MAX 64.40	MAX 123.3	MAX 0.288	AVW 4.00		AVW 9.35	AVW 3.95		9.15	MAX 7.1	GM7 11
Limits								**45**		**263**	**45**		**263**	**9.0**	**200**

Please Circle ALL Permit Violations   Mail to P.O. Box 47775, Olympia WA 98504-7775

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John Duback   WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 Month: September Year: 2010

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT County: CLARK

Receiving Water LAKE RIVER Plant Operator : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION Population: 4400

	PHASE 1 - EFFLUENT CONT			RECEIVING WATER*											
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT				
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TOTAL AMMONIA MG/L	pH STANDARD UNITS	ALAKLINITY AS CACO3 MG/L	HARDNESS MG/L	DISSOLVED OXYGEN MG/L	BOD 5-DAY MG/L	CBOD MG/L	TEMPERATURE DEG. C	RAINFALL Inches			
1	0.30	0.72										0.00			
2			93.3									0.00			
3	0.30	0.57										0.00			
4												0.00			
5												0.00			
6												0.06			
7			90.0									0.40			
8	0.30	0.65										0.10			
9			88.8									0.01			
10	0.30	0.58										0.00			
11												0.00			
12												0.00			
13												0.00			
14			91.0									0.00			
15	0.30	0.60										0.19			
16			100.5									0.01			
17	0.30	0.63										0.18			
18												0.70			
19												0.12			
20												0.00			
21			89.0									0.00			
22	0.30	0.58										0.00			
23			93.8									0.15			
24	0.30	0.61										0.01			
25												0.01			
26												0.00			
27												0.00			
28			88.8									0.00			
29	0.3	0.59										0.00			
30			90.0									0.00			
TOTAL	2.7	5.53	825.2									1.94			
	AVG 0.30	AVG 0.61	AVG 91.7	AVG	MIN	AVG	AVG	AVG	AVG	AVG	AVG				
Permit	1.4	8.2													
	MAX 0.30	MAX 0.72	MAX 100.5	MAX 0	MAX 0	AVW	AVW	AVW	AVW	AVW	MAX 0				
Limits	3.14														

Receiving Water is to be sampled May - October

Please Circle ALL Permit Violations Mail to P.O. Box 47775, Olympia WA 98504-7775

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=highest 7-day Geometric Mean

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John Duback WWTPO

Name and Title Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** October **Year:** 2010

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 4215

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1					60.4	122.4	0.243						0.0	6.9	8
2							0.240						0.0	6.9	
3							0.249						0.0	6.9	
4							0.244						0.0	6.9	
5	274	555	277	561			0.243	4.5	98.4%	9.1	5.5	98.0%	11.1	6.9	
6					64.6	130.9	0.243						0.0	6.9	280
7	315	617	325	637			0.235	3.7	98.8%	7.3	2.8	99.1%	5.5	6.8	
8					63.9	129.0	0.242						0.0	6.8	2
9							0.266						0.0	6.9	
10							0.293						0.0	6.9	
11							0.266						0.0	7.0	
12	334	702	321	675			0.252	2.8	99.2%	5.9	2.3	99.3%	4.8	6.9	
13					57.4	126.4	0.264						0.0	7.1	6
14	317	672	297	629			0.254	3.6	98.9%	7.6	4.1	98.6%	8.7	6.9	
15					60.1	119.8	0.239						0.0	7.1	3
16							0.240						0.0	6.9	
17							0.267						0.0	6.7	
18							0.257						0.0	7.1	
19	288	545	280	530			0.227	3.6	98.8%	6.8	4.0	98.6%	7.6	7.1	
20					56.9	113.4	0.239						0.0	7.1	3
21	266	552	285	592			0.249	2.8	98.9%	5.8	2.9	99.0%	6.0	7.1	
22					60.2	116.5	0.232						0.0	6.9	38
23							0.261						0.0	6.7	
24							0.334						0.0	6.9	
25							0.339						0.0	7.0	
26	318	833	263	689			0.314	2.5	99.2%	6.5	3.0	98.9%	7.9	7.0	
27					39.6	91.8	0.278						0.0	6.8	5
28	291	701	255	615			0.289	3.1	98.9%	7.5	3.9	98.5%	9.4	6.9	
29					48.9	111.3	0.273						0.0	7.0	2
30							0.294						0.0	6.8	
31							0.318						0.0	6.8	
TOTAL	2403	5178	2303	4927	512	1062	8.184	27		57	29		61.0	215	347
	AVG 300	AVG 647	AVG 288	AVG 616	AVG 56.9	AVG 117.9	AVG 0.264	AVG 3.33	AVG 98.9	AVG 7.07	AVG 3.56	AVG 98.8	AVG 1.97	MIN 6.7	GEM 8
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 334	MAX 833	MAX 325	MAX 689	MAX 64.6	MAX 130.9	MAX 0.339	AVW 4.10		AVW 8.20	AVW 4.15		AVW 8.65	MAX 7.1	GM7 24
Limits								45		263	45		263	9.0	200

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** October **Year:** 2010

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 4400

	PHASE 1 - EFFLUENT CONT			RECEIVING WATER*											
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT				
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TOTAL AMMONIA MG/L	pH STANDARD UNITS	ALAKLINITY AS CACO3 MG/L	HARDNESS MG/L	DISSOLVED OXYGEN MG/L	BOD 5-DAY MG/L	CBOD MG/L	TEMPERATURE DEG. C	RAIN FALL Inches			
1	0.30	0.61										0.00			
2												0.00			
3												0.00			
4												0.00			
5			87.3									0.00			
6	0.30	0.61										0.00			
7			92.5									0.00			
8	0.30	0.61										0.20			
9												0.50			
10												0.05			
11												0.00			
12			87.8									0.00			
13	0.30	0.66										0.00			
14			89.5									0.00			
15	0.30	0.60										0.00			
16												0.00			
17												0.00			
18												0.00			
19			89.8									0.00			
20	0.30	0.60										0.00			
21			90.5									0.00			
22	0.30	0.58										0.03			
23												1.00			
24												0.58			
25												0.31			
26			85.5									0.20			
27	0.30	0.70										0.09			
28			93.5									0.23			
29	0.30	0.68										0.04			
30												0.38			
31												0.01			
TOTAL	2.7	5.65	716.4									3.62			
	AVG 0.30	AVG 0.63	AVG 89.6	AVG	MIN	AVG	AVG	AVG	AVG	AVG	AVG				
Permit	1.4	8.2													
	MAX 0.30	MAX 0.70	MAX 93.5	MAX 0	MAX 0	AVW	AVW	AVW	AVW	AVW	MAX 0				
Limits	3.14														

Receiving Water is to be sampled May - October

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272

Month: November Year: 2010

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT

County: CLARK

Receiving Water LAKE RIVER

Plant Operator: : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION

Population: 4400

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1							0.384						0.0	6.8	
2	265	749	277	783			0.339	2.7	99.0%	7.6	3.1	98.9%	8.8	6.8	
3					52.7	125.3	0.285						0.0	6.9	3
4	263	605	246	566			0.276	2.1	99.2%	4.8	3.3	98.7%	7.6	6.9	
5					58.8	127.0	0.259						0.0	6.8	3
6							0.296						0.0	6.8	
7							0.394						0.0	6.8	
8							0.353						0.0	7.0	
9	191	610	205	655			0.383	3.4	98.2%	10.9	3.7	98.2%	11.8	6.9	
10					35.6	112.5	0.379						0.0	7.0	20
11	270	775	246	706			0.344	2.9	98.9%	8.3	2.3	99.1%	6.6	6.7	
12					38.6	102.0	0.317						0.0	6.7	1
13							0.327						0.0	6.8	
14							0.402						0.0	6.8	
15							0.350						0.0	6.8	
16	263	715	240	653			0.326	4.7	98.2%	12.8	5.0	97.9%	13.6	6.7	
17					42.6	145.0	0.408						0.0	6.8	13
18	160	665	201	835			0.498	4.2	97.4%	17.4	5.9	97.1%	24.5	6.7	
19					39.6	136.4	0.413						0.0	6.6	12
20							0.410						0.0	6.6	
21							0.391						0.0	6.7	
22	265	939	209	741			0.425	4.5	98.3%	16.0	5.0	97.6%	17.7	7.0	
23	231	709	216	663	28.9	88.7	0.368	5.0	97.8%	15.3	4.0	98.1%	12.3	6.7	20
24					44.6	129.4	0.348						0.0	7.0	2
25							0.347						0.0	6.8	
26							0.317						0.0	6.8	
27							0.338						0.0	6.7	
28							0.358						0.0	6.8	
29							0.328						0.0	6.8	
30	184	698	220	835			0.455	5.1	97.2%	19.4	7.9	96.4%	30.0	6.9	
TOTAL	2092	6465	2060	6436	341	966	10.818	34.6		113	40.2		132.9	204	74
	AVG 232	AVG 718	AVG 229	AVG 715	AVG 42.68	AVG 120.8	AVG 0.361	AVG 3.84	AVG 98.2	AVG 12.50	AVG 4.47	AVG 98.0	AVG 4.43	MIN 6.6	GEM 6
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 270	MAX 939	MAX 277	MAX 835	MAX 58.80	MAX 145.0	MAX 0.498	AVW 4.75		AVW 15.65	AVW 5.46		AVW 19.05	MAX 7.0	GM7 12
Limits								45		263	45		263	9.0	200

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Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** November **Year:** 2010

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 4400

	PHASE 1 - EFFLUENT CONT			RECEIVING WATER*											
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT				
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TOTAL AMMONIA MG/L	pH STANDARD UNITS	ALAKLINITY AS CACO3 MG/L	HARDNESS MG/L	DISSOLVED OXYGEN MG/L	BOD 5-DAY MG/L	CBOD MG/L	TEMPERATURE DEG. C	RAIN FALL Inches			
1												1.00			
2			81.4									0.01			
3	0.30	0.71										0.00			
4			85.8									0.00			
5	0.30	0.65										0.05			
6												0.81			
7												0.38			
8												0.05			
9			84.6									0.65			
10	0.30	0.95										0.00			
11			82.8									0.08			
12	0.30	0.79										0.10			
13												0.45			
14												0.10			
15												0.07			
16			82.6									0.00			
17	0.30	1.02										1.20			
18			74.4									0.30			
19	0.30	1.03										0.38			
20												0.05			
21												0.24			
22			77.9									0.42			
23	0.30	0.92	78.8									0.00			
24	0.30	0.87										0.00			
25												0.03			
26												0.17			
27												0.10			
28												0.00			
29												0.37			
30			79.6									0.70			
TOTAL	2.40	6.94	727.9									7.71			
	AVG 0.30	AVG 0.87	AVG 80.9	AVG	MIN	AVG	AVG	AVG	AVG	AVG	AVG				
Permit	1.4	8.2													
	MAX 0.30	MAX 1.03	MAX 85.8	MAX	MAX	AVW	AVW	AVW	AVW	AVW	MAX				
Limits	3.14														

Receiving Water is to be sampled May - October

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highest 7-day Geometric Mean

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Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** December **Year:** 2010

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 4400

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1					23.6	84.0	0.427						0.0	6.6	10
2	259	786	214	650			0.364	4.4	98.3%	13.4	5.7	97.3%	17.3	6.7	
3					37.6	105.1	0.335						0.0	6.7	16
4							0.320						0.0	6.8	
5							0.326						0.0	6.7	
6							0.320						0.0	7.0	
7	312	830	284	756			0.319	4.2	98.7%	11.2	7.7	97.3%	20.5	7.4	
8					36.0	137.8	0.459						0.0	7.2	29
9	156	736	181	854			0.566	5.9	96.2%	27.9	6.9	96.2%	32.6	7.0	
10					22.3	92.1	0.495						0.0	7.4	19
11							0.587						0.0	7.5	
12							0.507						0.0	7.2	
13							0.447						0.0	7.2	
14	222	954	185	795			0.515	5.9	97.3%	25.3	6.0	96.8%	25.8	7.1	
15					29.0	112.0	0.463						0.0	6.9	5
16	209	697	204	681			0.400	3.6	98.3%	12.0	3.8	98.1%	12.7	7.0	
17					20.4	59.5	0.350						0.0	7.0	[illegible]
18							0.369						0.0	7.0	
19							0.370						0.0	7.0	
20							0.440						0.0	6.9	
21	217	747	186	641			0.413	3.4	98.4%	11.7	4.9	97.4%	16.9	7.0	
22					33.8	102.0	0.362						0.0	7.0	1
23	260	742	246	702			0.342	5.4	97.9%	15.4	6.0	97.6%	17.1	7.0	
24					31.3	95.8	0.367						0.0	7.0	10
25							0.336						0.0	7.1	
26							0.362						0.0	7.1	
27							0.426						0.0	7.1	
28	161	827	150	771			0.616	9.1	94.3%	46.8	10.3	93.1%	52.9	6.9	
29					12.8	57.6	0.540						0.0	6.9	15
30	225	788	189	662			0.420	4.1	98.2%	14.4	4.8	97.5%	16.8	6.9	
31					17.6	55.2	0.376						0.0	7.0	9
TOTAL	2021	7108	1839	6510	264	901	12.939	46		178	56		213	217	119
	AVG 225	AVG 790	AVG 204	AVG 723	AVG 26.44	AVG 90.1	AVG 0.417	AVG 5.11	AVG 97.0	AVG 19.77	AVG 6.23	AVG 96.8	AVG 6.86	MIN 6.6	GEM 9
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 312	MAX 954	MAX 284	MAX 854	MAX 37.60	MAX 137.8	MAX 0.616	AVW 6.60		AVW 30.60	AVW 7.55		AVW 34.85	7.5	GM7 23
Limits								45		263	45		263	9.0	200

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GM7=highest 7-day Geometric Mean

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 — Month: December — Year: 2010

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT — County: CLARK

Receiving Water: LAKE RIVER — Plant Operator: John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION — Population: 4400

	PHASE 1 - EFFLUENT CONT			RECEIVING WATER*											
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT				
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TOTAL AMMONIA MG/L	pH STANDARD UNITS	ALAKLINITY AS CACO3 MG/L	HARDNESS MG/L	DISSOLVED OXYGEN MG/L	BOD 5-DAY MG/L	CBOD MG/L	TEMPERATURE DEG. C	RAINFALL Inches			
1	0.3	1.07										0.05			
2			78.8									0.05			
3	0.3	0.84										0.00			
4												0.00			
5												0.04			
6												0.03			
7			85.3									0.80			
8	0.30	1.15										0.68			
9			75.3									0.75			
10	0.30	1.24										0.35			
11												0.90			
12												0.17			
13												0.39			
14			74.8									0.32			
15	0.30	1.16										0.07			
16			77.1									0.00			
17	0.30	0.88										0.20			
18												0.06			
19												0.42			
20												0.40			
21			83.5									0.02			
22	0.30	0.91										0.03			
23			91.6									0.00			
24	0.30	0.92										0.15			
25												0.12			
26												0.25			
27												0.90			
28			87.9									0.85			
29	0.9	4.05										0.07			
30			86.4									0.00			
31	0.8	2.51										0.00			
TOTAL	4.10	14.73	740.7									8.07			
	AVG 0.41	AVG 1.47	AVG 82.3	AVG	MIN	AVG	AVG	AVG	AVG	AVG	AVG				
Permit	1.4	8.2													
	MAX 0.90	MAX 4.05	MAX 91.6	MAX 0	MAX 0	AVW	AVW	AVW	AVW	AVW	MAX 0				
Limits	3.14														

Receiving Water is to be sampled May - October

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272

Month: January Year: 2011

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT

County: CLARK

Receiving Water LAKE RIVER

Plant Operator: : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION

Population: 4400

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1							0.353						0.0	7.1	
2							0.353						0.0	7.1	
3							0.336						0.0	7.2	
4	246	634	219	564			0.309	6.0	97.6%	15.5	6.6	97.0%	17.0	7.0	
5					33.0	99.4	0.361						0.0	7.1	17
6	239	718	210	631			0.360	5.3	97.8%	15.9	6.3	97.0%	18.9	7.1	
7					39.8	115.5	0.348						0.0	7.0	22
8							0.349						0.0	7.0	
9							0.358						0.0	7.0	
10							0.346						0.0	7.0	
11	275	720	251	657			0.314	4.2	98.5%	11.0	5.1	98.0%	13.4	7.1	
12					33.5	124.6	0.446						0.0	7.0	43
13	238	1133	247	1176			0.571	5.1	97.9%	24.3	6.7	97.3%	31.9	6.9	
14					30.7	108.3	0.423						0.0	6.9	5
15							0.514						0.0	7.4	
16							0.678						0.0	7.0	
17							0.524						0.0	7.1	
18	239	997	153	638			0.500	7.1	97.0%	29.6	5.9	96.1%	24.6	7.0	
19					26.7	100.4	0.451						0.0	7.0	2
20	204	698	178	609			0.410	2.9	98.6%	9.9	3.4	98.1%	11.6	6.9	
21					29.5	122.0	0.496						0.0	7.0	2
22							0.444						0.0	7.1	
23							0.415						0.0	7.0	
24							0.385						0.0	6.9	
25	226	662	217	635			0.351	3.7	98.4%	10.8	4.7	97.8%	13.8	7.0	
26					37.9	109.0	0.345						0.0	6.9	1
27	250	673	278	749			0.323	2.9	98.8%	7.8	3.6	98.7%	9.7	7.0	
28					37.7	100.0	0.318						0.0	7.0	3
29							0.302						0.0	7.0	
30							0.322						0.0	7.1	
31							0.314						0.0	7.1	
TOTAL	1917	6234	1753	5659	269	879	12.319	37		125	42		141	218	95
	AVG 240	AVG 779	AVG 219	AVG 707	AVG 33.60	AVG 109.9	AVG 0.397	AVG 4.65	AVG 98.1	AVG 15.60	AVG 5.29	AVG 97.5	AVG 4.54	MIN 6.9	GEM 6
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 275	MAX 1133	MAX 278	MAX 1176	MAX 39.80	MAX 124.6	MAX 0.678	AVW 5.65		AVW 19.75	AVW 6.45		AVW 22.65	MAX 7.4	GM7 19
Limits								45		263	45		263	9.0	200

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 Month: January Year: 2011

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT County: CLARK

Receiving Water LAKE RIVER Plant Operator : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION Population: 4400

	PHASE 1 - EFFLUENT CONT			
Frequency	2/WEEK	2/WEEK	2/WEEK	
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	RAINFALL Inches
1				0.00
2				0.00
3				0.00
4			110.6	0.10
5	1.70	5.12		0.40
6			103.5	0.07
7	1.20	3.48		0.01
8				0.10
9				0.07
10				0.00
11			98.6	0.58
12	0.90	3.35		0.84
13			81.9	0.01
14	0.40	1.41		0.05
15				1.40
16				0.10
17				0.08
18			90.8	0.32
19	0.30	1.13		0.01
20			83.9	0.35
21	0.30	1.24		0.35
22				0.00
23				0.05
24				0.03
25			79.5	0.00
26	0.30	0.86		0.00
27			85.0	0.00
28	0.30	0.80		0.01
29				0.00
30				0.05
31				0.00
TOTAL	5.4	17.39	733.8	4.98
	AVG 0.68	AVG 2.17	AVG 91.7	
Permit	1.4	8.2		
	MAX 1.70	MAX 5.12	MAX 110.6	
Limits	3.14			

Receiving Water is to be sampled May - October

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: February | Year: 2011

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water: LAKE RIVER | Plant Operator: John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4400

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1	300	716	303	723			0.286	6.1	98.0%	14.5	6.1	98.0%	14.5	7.1	
2					33.2	81.1	0.293						0.0	7.0	86
3	305	738	294	711			0.290	3.7	98.8%	8.9	3.9	98.7%	9.4	7.0	
4					45.6	105.3	0.277						0.0	7.0	5
5							0.284						0.0	7.1	
6							0.300						0.0	7.1	
7							0.301						0.0	7.0	
8	288	689	264	632			0.287	3.2	98.9%	7.7	3.1	98.8%	7.4	7.1	
9					38.1	90.9	0.286						0.0	7.1	2
10	341	745	282	616			0.262	2.9	99.1%	6.3	3.7	98.7%	8.1	7.2	
11					48.1	105.1	0.262						0.0	7.1	3
12							0.278						0.0	7.1	
13							0.303						0.0	7.0	
14							0.344						0.0	7.0	
15	191	745	183	714			0.468	3.6	98.1%	14.1	3.7	98.0%	14.4	6.9	
16					15.7	55.0	0.420						0.0	7.0	1
17	199	609	217	664			0.367	2.4	98.8%	7.3	2.3	98.9%	7.0	7.0	
18					32.1	94.8	0.354						0.0	7.0	1
19							0.364						0.0	7.0	
20							0.354						0.0	6.9	
21							0.351						0.0	7.0	
22	265	718	270	732			0.325	4.8	98.2%	13.0	3.1	98.9%	8.4	7.0	
23					33.6	93.9	0.335						0.0	7.0	2
24	307	845	285	784			0.330	3.3	98.9%	9.1	3.2	98.9%	8.8	7.0	
25					42.1	109.9	0.313						0.0	7.0	4
26							0.303						0.0	7.0	
27							0.330						0.0	7.0	
28							0.570						0.0	6.9	
TOTAL	2196	5806	2098	5577	289	736	9.237	30.0		81	29.1		78.2	197	104
	AVG 275	AVG 726	AVG 262	AVG 697	AVG 36.06	AVG 92.0	AVG 0.330	AVG 3.75	AVG 98.6	AVG 10.12	AVG 3.64	AVG 98.6	AVG 2.79	MIN 6.9	GEM 3
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 341	MAX 845	MAX 303	MAX 784	MAX 48.10	MAX 109.9	MAX 0.570	AVW 4.90		AVW 11.70	AVW 4.55		AVW 11.95	MAX 7.2	GM7 21
Limits								45		263	45		263	9.0	200

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 — Month: February — Year: 2011

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT — County: CLARK

Receiving Water: LAKE RIVER — Plant Operator: : John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION — Population: 4400

	PHASE 1 - EFFLUENT CONT														
Frequency	2/WEEK	2/WEEK	2/WEEK												
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3									RAIN FALL Inches			
1			90.3									0.00			
2	0.30	0.73										0.00			
3			93.8									0.00			
4	0.30	0.69										0.03			
5												0.08			
6												0.15			
7												0.05			
8			90.8									0.00			
9	0.30	0.72										0.00			
10			96.4									0.00			
11	0.30	0.66										0.00			
12												0.30			
13												0.12			
14												0.86			
15			79.0									0.30			
16	0.47	1.65										0.14			
17			80.0									0.00			
18	0.30	0.89										0.35			
19												0.00			
20												0.00			
21												0.03			
22			83.0									0.08			
23	0.30	0.84										0.10			
24			80.3									0.02			
25	0.30	0.78										0.00			
26												0.00			
27												0.89			
28												1.18			
TOTAL	2.57	6.96	693.6									4.68			
	AVG 0.32	AVG 0.87	AVG 86.7												
Permit	1.4	8.2													
	MAX 0.47	MAX 1.65	MAX 96.4												
Limits	3.14														

Receiving Water is to be sampled May - October

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 — **Month:** March — **Year:** 2011

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT — **County:** CLARK

Receiving Water LAKE RIVER — **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION — **Population:** 4400

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1	142	775	137	747			0.654	4.4	96.9%	24.0	5.1	96.3%	27.8	7.0	
2					15.5	70.5	0.545						0.0	7.0	55
3	172	674	187	733			0.470	4.1	97.6%	16.1	6.9	96.3%	27.0	7.0	
4					36.6	134.6	0.441						0.0	7.0	5
5							0.444						0.0	6.7	
6							0.413						0.0	6.7	
7							0.374						0.0	6.9	
8	253	791	247	772			0.375	5.3	97.9%	16.6	4.7	98.1%	14.7	6.9	
9					28.7	102.0	0.426						0.0	6.9	2
10	193	868	193	868			0.539	3.4	98.2%	15.3	3.4	98.2%	15.3	6.9	
11					30.4	105.5	0.416						0.0	6.8	6
12							0.449						0.0	6.8	
13							0.528						0.0	6.8	
14							0.521						0.0	6.9	
15	147	640	170	740			0.522	5.0	96.6%	21.8	5.3	96.9%	23.1	6.8	
16					19.7	79.4	0.483						0.0	6.9	4
17	181	657	181	657			0.435	6.2	96.6%	22.5	5.6	96.9%	20.3	6.9	
18					22.8	82.3	0.433						0.0	6.8	2
19							0.408						0.0	6.8	
20							0.404						0.0	6.8	
21							0.384						0.0	6.9	
22	224	673	217	652			0.360	6.6	97.1%	19.8	5.6	97.4%	16.8	6.9	
23					35.4	104.2	0.353						0.0	6.9	1
24	223	697	219	685			0.375	6.7	97.0%	21.0	6.0	97.3%	18.8	6.8	
25					39.7	122.2	0.369						0.0	7.0	25
26							0.408						0.0	6.8	
27							0.436						0.0	6.8	
28							0.413						0.0	6.9	
29	191	664	178	619			0.417	7.4	96.1%	25.7	6.9	96.1%	24.0	6.7	
30					30.7	107.3	0.419						0.0	6.8	3
31	197	628	192	612			0.382	6.0	97.0%	19.1	5.5	97.1%	17.5	6.8	
TOTAL	1923	7066	1921	7084	260	908	13.596	55		202	55		205.3	213	103
	AVG 192	AVG 707	AVG 192	AVG 708	AVG 28.8	AVG 100.9	AVG 0.439	AVG 5.51	AVG 97.1	AVG 20.18	AVG 5.50	AVG 97.1	AVG 9.06	MIN 6.7	GEM 5
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 253	MAX 868	MAX 247	MAX 868	MAX 39.7	MAX 134.6	MAX 0.654	AVW 6.70		AVW 22.40	AVW 6.20		AVW 27.40	MAX 7.0	GM7 17
Limits								45		263	45		263	9.0	200

Please Circle ALL Permit Violations **Mail to P.O. Box 47775, Olympia WA 98504-7775**

AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
GM7=highest 7-day Geometric Mean

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 — Month: March — Year: 2011

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT — County: CLARK

Receiving Water: LAKE RIVER — Plant Operator: : John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION — Population: 4400

	PHASE 1 - EFFLUENT CONT														
Frequency	2/WEEK	2/WEEK	2/WEEK												
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3									RAIN FALL Inches			
1			74.6									0.34			
2	0.30	1.36										0.15			
3			73.8									0.05			
4	0.30	1.10										0.40			
5												0.05			
6												0.00			
7												0.13			
8			80.9									0.10			
9	0.30	1.07										0.90			
10			74.6									0.05			
11	0.30	1.04										0.03			
12												0.55			
13												0.65			
14												0.34			
15			75.3									0.05			
16	0.30	1.21										0.05			
17			76.4									0.07			
18	0.30	1.08										0.19			
19												0.02			
20												0.08			
21												0.04			
22			81.8									0.03			
23	0.30	0.88										0.17			
24			78.1									0.17			
25	0.30	0.92										0.30			
26												0.20			
27												0.26			
28												0.18			
29			79.6									0.25			
30	0.30	1.05										0.05			
31			80									0.00			
TOTAL	2.7	9.71	775.1									5.85			
	AVG 0.30	AVG 1.08	AVG 77.5												
Permit	1.4	8.2													
	MAX 0.30	MAX 1.36	MAX 81.8												
Limits	3.14														

Receiving Water is to be sampled May - October

Please Circle ALL Permit Violations Mail to P.O. Box 47775, Olympia WA 98504-7775

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** April **Year:** 2011

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 4400

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1					40.3	119.7	0.356						0.0	6.9	10
2							0.350						0.0	6.8	
3							0.332						0.0	6.8	
4							0.414						0.0	6.9	
5	175	587	154	516			0.402	5.2	97.0%	17.4	4.7	96.9%	15.8	6.9	
6					39.7	131.8	0.398						0.0	7.0	10
7	184	566	167	514			0.369	5.4	97.1%	16.6	4.5	97.3%	13.8	6.8	
8					34.0	97.3	0.343						0.0	6.9	1
9							0.328						0.0	6.7	
10							0.362						0.0	6.8	
11							0.352						0.0	7.0	
12	193	538	211	588			0.334	7.3	96.2%	20.3	5.0	97.6%	13.9	7.0	
13					38.6	103.3	0.321						0.0	6.9	4
14	216	737	200	682			0.409	7.4	96.6%	25.2	6.2	96.9%	21.1	6.8	
15					36.3	148.9	0.492						0.0	6.9	5
16							0.447						0.0	6.7	
17							0.415						0.0	6.7	
18							0.400						0.0	7.0	
19	226	663	210	616			0.352	6.5	97.1%	19.1	7.4	96.5%	21.7	6.7	
20					39.1	111.5	0.342						0.0	6.9	9
21	278	744	241	645			0.321	7.5	97.3%	20.1	6.8	97.2%	18.2	6.8	
22					47.6	121.9	0.307						0.0	6.8	4
23							0.299						0.0	6.8	
24							0.336						0.0	6.8	
25							0.427						0.0	6.9	
26	205	660	208	670			0.386	5.5	97.3%	17.7	5.6	97.3%	18.0	6.9	
27					26.5	80.2	0.363						0.0	6.8	6
28	213	666	251	785			0.375	5.9	97.2%	18.5	7.4	97.1%	23.1	6.8	
29					38	110.6	0.349						0.0	6.8	4
30							0.328						0.0	6.7	
TOTAL	1690	5161	1642	5017	340	1025	11.009	51		155	48		146	205	53
	AVG 211	AVG 645	AVG 205	AVG 627	AVG 37.79	AVG 113.9	AVG 0.367	AVG 6.34	AVG 97.0	AVG 19.37	AVG 5.95	AVG 97.1	AVG 4.86	MIN 6.7	GEM 5
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 278	MAX 744	MAX 251	MAX 785	MAX 47.60	MAX 148.9	MAX 0.492	AVW 7.35		AVW 22.75	AVW 7.10		AVW 20.55	MAX 7.0	GM7 6
Limits								45		263	45		263	9.0	200

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 — Month: April — Year: 2011

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT — County: CLARK

Receiving Water: LAKE RIVER — Plant Operator: John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION — Population: 4400

	PHASE 1 - EFFLUENT CONT			
Frequency	2/WEEK	2/WEEK	2/WEEK	
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	RAINFALL Inches
1	0.30	0.89		0.02
2				0.04
3				0.21
4				0.63
5			79.9	0.07
6	0.30	1.00		0.17
7			80.1	0.00
8	0.30	0.86		0.00
9				0.06
10				0.10
11				0.01
12			86.5	0.04
13	0.40	1.07		0.31
14			88.8	0.55
15	1.00	4.10		0.40
16				0.04
17				0.01
18				0.03
19			84.6	0.00
20	0.30	0.86		0.00
21			86.0	0.05
22	0.30	0.77		0.00
23				0.16
24				0.70
25				0.30
26			78.6	0.15
27	0.30	0.91		0.05
28			81.0	0.20
29	0.30	0.87		0.05
30				0.00
TOTAL	3.5	11.33	665.5	4.35
	AVG 0.39	AVG 1.26	AVG 83.2	
Permit	1.4	8.2		
	MAX 1.00	MAX 4.10	MAX 88.8	
Limits	3.14			

***Receiving Water is to be sampled May - October**

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | **Month:** May | **Year:** 2011

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT | **County:** CLARK

Receiving Water LAKE RIVER | **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | **Population:** 4400

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1							0.332							6.8	
2							0.318							6.9	
3	266	663	250	623			0.299	6.2	97.7%	15.5	6.8	97.3%	17.0	6.8	
4					40.8	98.3	0.289							6.8	4
5	259	652	252	635			0.302	5.5	97.9%	13.9	6.8	97.3%	17.1	6.9	
6					48.2	122.6	0.305							7.0	1
7							0.320							6.7	
8							0.339							6.7	
9							0.323							6.9	
10	230	564	209	512			0.294	5.7	97.5%	14.0	7.7	96.3%	18.9	6.7	
11					54.4	142.0	0.313							6.8	2
12	281	719	242	620			0.307	6.7	97.6%	17.2	8.2	96.6%	21.0	6.9	
13					65.2	157.7	0.290							6.8	10
14							0.290							6.8	
15							0.402							6.8	
16							0.372							6.8	
17	236	657	239	666			0.334	6.2	97.4%	17.3	8.9	96.3%	24.8	6.7	
18					44.8	122.2	0.327							7.0	15
19	272	715	266	699			0.315	6.5	97.6%	17.1	7.4	97.2%	19.4	6.8	
20					52.6	133.8	0.305							6.7	3
21							0.309							6.8	
22							0.309							6.8	
23							0.302							6.9	
24	284	675	275	654			0.285	7.1	97.5%	16.9	7.7	97.2%	18.3	6.9	
25					46.9	111.1	0.284							6.9	1
26	272	669	237	583			0.295	7.6	97.2%	18.7	10.3	95.7%	25.3	6.7	
27					58.1	130.3	0.269							7.0	5
28							0.274							6.8	
29							0.265							6.8	
30							0.284							6.9	
31	237	557	239	562			0.282	5.4	97.7%	12.7	6.6	97.2%	15.5	6.9	
TOTAL	2337	5873	2209	5554	411	1018	9.534	57		143	70		177.4	212	41
	AVG 260	AVG 653	AVG 245	AVG 617	AVG 51.4	AVG 127.3	AVG 0.308	AVG 6.32	AVG 97.6	AVG 15.90	AVG 7.82	AVG 96.8	AVG 19.71	MIN 6.7	GEM 3
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 284	MAX 719	MAX 275	MAX 699	MAX 65.2	MAX 157.7	MAX 0.402	AVW 7.35		AVW 17.80	AVW 9.00		AVW 22.10	MAX 7.0	GM7 7
Limits								45		263	45		263	9.0	200

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** May **Year:** 2011

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 4400

	PHASE 1 - EFFLUENT CONT														
Frequency	2/WEEK	2/WEEK	2/WEEK												
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3									RAIN FALL Inches			
1												0.00			
2												0.03			
3			80.3									0.00			
4	0.30	0.72										0.06			
5			90.0									0.03			
6	0.30	0.76										0.30			
7												0.15			
8												0.05			
9												0.00			
10			88.0									0.00			
11	0.30	0.78										0.40			
12			89.0									0.00			
13	0.30	0.73										0.00			
14												0.38			
15												0.65			
16												0.03			
17			79.9									0.00			
18	0.30	0.82										0.00			
19			85.3									0.00			
20	0.30	0.76										0.00			
21												0.10			
22												0.01			
23												0.15			
24			85.1									0.08			
25	0.30	0.71										0.08			
26			91.3									0.05			
27	0.30	0.67										0.05			
28												0.02			
29												0.00			
30												0.04			
31			91.3									0.06			
TOTAL	2.4	5.95	780.2									2.72			
	AVG 0.30	AVG 0.74	AVG 86.7												
Permit	1.4	8.2													
	MAX 0.30	MAX 0.82	MAX 91.3												
Limits	3.14														

***Receiving Water is to be sampled May - October**

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John Duback WWTP Operator

Name and Title Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: June | Year: 2011

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water: LAKE RIVER | Plant Operator: : John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4400

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1					40.1	96.3	0.288							6.8	2
2	321	779	294	714			0.291	6.2	98.1%	15.0	7.5	97.4%	18.2	6.7	
3					52.4	115.4	0.264							7.0	4
4							0.256							6.7	
5							0.277							6.8	
6							0.272							6.9	
7	315	725	297	684			0.276	7.3	97.7%	16.8	8.2	97.2%	18.9	6.9	
8					45.5	100.9	0.266							6.8	5
9	396	892	327	736			0.270	7.1	98.2%	16.0	9.0	97.2%	20.3	6.8	
10					48.3	108.0	0.268							7.1	6
11							0.265							7.2	
12							0.287							7.3	
13							0.275							7.1	
14	354	788	302	672			0.267	5.7	98.4%	12.7	6.1	98.0%	13.6	7.3	
15					50.9	120.1	0.283							7.2	4
16	296	649	278	610			0.263	5.8	98.0%	12.7	7.0	97.5%	15.4	7.2	
17					61.6	131.0	0.255							7.1	3
18							0.276							7.1	
19							0.277							7.1	
20							0.274							7.1	
21	335	710	350	741			0.254	6.3	98.1%	13.3	8.8	97.5%	18.6	7.0	
22					40.3	91.4	0.272							7.1	2
23	305	664	355	773			0.261	5.2	98.3%	11.3	7.5	97.9%	16.3	7.1	
24					53.7	112.9	0.252							7.1	5
25							0.248							7.3	
26							0.252							7.2	
27	308	642	300	626			0.250	4.0	98.7%	8.3	5.9	98.0%	12.3	7.0	
28					51.2	113.6	0.266							7.2	1
29							0.253							7.2	
30	330	696	319	673			0.253	3.8	98.8%	8.0	5.3	98.3%	11.2	7.1	
TOTAL	2960	6545	2822	6229	444	990	8.011	51		114	65		145	212	60
	AVG 329	AVG 727	AVG 314	AVG 692	AVG 49.33	AVG 110.0	AVG 0.267	AVG 5.71	AVG 98.2	AVG 12.70	AVG 7.26	AVG 97.7	AVG 16.08	MIN 6.7	GEM 4
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 396	MAX 892	MAX 355	MAX 773	MAX 61.60	MAX 131.0	MAX 0.291	AVW 7.20		AVW 16.40	AVW 8.60		AVW 19.60	MAX 7.3	GM7 11
Limits								45		263	45		263	9.0	200

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 — Month: June — Year: 2011

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT — County: CLARK

Receiving Water: LAKE RIVER — Plant Operator: John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION — Population: 4400

	PHASE 1 - EFFLUENT CONT				
Frequency	2/WEEK	2/WEEK	2/WEEK	CONT	CONT
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TEMPERATURE DEGREES C	RAINFALL Inches
1	0.30	0.72		17.2	0.29
2			86.9	17.5	0.01
3	0.30	0.66		17.3	0.00
4				17.7	0.00
5				18.3	0.00
6				18.6	0.00
7			86.1	18.5	0.00
8	0.30	0.67		18.4	0.00
9			90.1	16.2	0.00
10	0.30	0.67		18.5	0.00
11				18.3	0.00
12				18.5	0.03
13				18.3	0.00
14			113.5	18.6	0.00
15	0.30	0.71		18.5	0.01
16			100.9	19.1	0.00
17	0.30	0.64		19.3	0.02
18				18.8	0.20
19				18.8	0.03
20				19.5	0.00
21			100.5	20.1	0.00
22	0.30	0.68		20.0	0.00
23			101.1	19.8	0.00
24	0.30	0.63		19.6	0.00
25				19.1	0.00
26				19.5	0.00
27			102.5	20.0	0.07
28	0.30	0.67		19.9	0.13
29				19.9	0.01
30			96.0	19.8	0.00
TOTAL	2.7	6.05	877.6	563.6	0.80
	AVG 0.30	AVG 0.67	AVG 97.5	AVG 18.8	
Permit	**1.4**	**8.2**			
	MAX 0.30	MAX 0.72	MAX 113.5	MAX 20.1	
Limits	**3.14**				

***Receiving Water is to be sampled May - October**

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=highest 7-day Geometric Mean

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: July | Year: 2011

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water: LAKE RIVER | Plant Operator: : John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4400

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1					46.9	95.4	0.244						0.0	7.0	1
2							0.241						0.0	7.1	
3							0.242						0.0	7.2	
4							0.259						0.0	7.1	
5	289	593	300	615			0.246	3.7	98.7%	7.6	3.2	98.9%	6.6	7.1	
6					49.9	94.5	0.227						0.0	7.1	1800
7	306	605	357	706			0.237	3.2	99.0%	6.3	3.5	99.0%	6.9	7.2	
8					48.2	95.7	0.238						0.0	7.2	1
9							0.242						0.0	7.2	
10							0.235						0.0	7.3	
11							0.238						0.0	7.4	
12	339	681	336	675			0.241	3.5	99.0%	7.0	5.1	98.5%	10.3	7.2	
13					55.8	115.4	0.248						0.0	7.1	3
14	298	649	292	636			0.261	3.7	98.8%	8.1	5	98.3%	10.9	7.2	
15					43.7	87.1	0.239						0.0	7.2	3
16							0.245						0.0	7.3	
17							0.294						0.0	7.3	
18							0.272						0.0	7.1	
19	261	559	296	634			0.257	2.9	98.9%	6.2	3.8	98.7%	8.1	7.2	
20					43.4	90.5	0.250						0.0	7.2	3
21	272	581	302	645			0.256	4.8	98.2%	10.2	4.5	98.5%	9.6	7.2	
22					36.4	75.0	0.247						0.0	7.2	1
23							0.234						0.0	7.2	
24							0.242						0.0	7.2	
25							0.248						0.0	7.3	
26	250	502	292	587			0.241	2.7	98.9%	5.4	2.5	99.1%	5.0	7.3	
27					40.9	81.9	0.240						0.0	7.2	10
28	307	586	335	640			0.229	4.5	98.5%	8.6	0.4	99.9%	0.8	7.3	
29					44.2	88.5	0.240						0.0	7.3	1
30							0.235						0.0	7.3	
31							0.250						0.0	7.3	
TOTAL	2322	4757	2510	5138	409	824	7.618	29		59	28		58.2	224	1823
	AVG 290	AVG 595	AVG 314	AVG 642	AVG 45.49	AVG 91.5	AVG 0.246	AVG 3.63	AVG 98.8	AVG 7.44	AVG 3.50	AVG 98.9	AVG 1.88	MIN 7.0	GEM 4
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 339	MAX 681	MAX 357	MAX 706	MAX 55.80	MAX 115.4	MAX 0.294	AVW 3.85		AVW 8.20	AVW 5.05		AVW 10.60	MAX 7.4	GM7 42
Limits								45		263	45		263	9.0	200

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** July **Year:** 2011

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 4400

	PHASE 1 - EFFLUENT CONT				
Frequency	2/WEEK	2/WEEK	2/WEEK	CONT	
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TEMPERATURE DEGREES C	RAIN FALL Inches
1	0.30	0.61		20.1	0.00
2				19.9	0.02
3				20.0	0.02
4				20.2	0.00
5			104.5	20.8	0.00
6	0.30	0.57		21.1	0.00
7			101.5	20.4	0.00
8	0.30	0.60		19.8	0.00
9				20.0	0.00
10				20.2	0.00
11				21.5	0.02
12			105.4	20.6	0.04
13	0.43	0.89		20.8	0.07
14			106.8	20.5	0.00
15	0.30	0.60		20.6	0.15
16				20.7	0.02
17				20.6	0.37
18				20.8	0.01
19			107.4	20.7	0.00
20	0.30	0.63		21.2	0.01
21			111.3	21.0	0.00
22	0.30	0.62		21.0	0.00
23				20.9	0.00
24				21.2	0.00
25				21.5	0.00
26			118.1	21.3	0.00
27	1.10	2.20		21.5	0.00
28			125.9	21.5	0.00
29	0.36	0.72		21.6	0.00
30				21.1	0.00
31				21.8	0.00
TOTAL	3.69	7.44	880.9	644.9	0.73
	AVG 0.41	AVG 0.83	AVG 110.1	AVG 20.8	
Permit	1.4	8.2			
	MAX 1.10	MAX 2.20	MAX 125.9	MAX 21.8	
Limits	3.14				

Receiving Water is to be sampled May - October

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** August **Year:** 2011

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 4900

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1							0.244						0.0	7.2	
2	330	683	324	670			0.248	2.8	99.2%	5.8	3.0	99.1%	6.2	7.3	
3					47.3	93.9	0.238						0.0	7.2	8
4	264	548	305	633			0.249	3.1	98.8%	6.4	3.0	99.0%	6.2	7.4	
5					51.9	105.6	0.244						0.0	7.3	5
6							0.244						0.0	7.3	
7							0.250						0.0	7.2	
8							0.244						0.0	7.2	
9	285	554	327	635			0.233	2.8	99.0%	5.4	3.3	99.0%	6.4	7.2	
10					43.5	84.5	0.233						0.0	7.2	1
11	300	545	324	589			0.218	2.2	99.3%	4.0	2.2	99.3%	4.0	7.2	
12					47.7	90.3	0.227						0.0	7.2	3
13							0.228						0.0	7.3	
14							0.235						0.0	7.3	
15							0.235						0.0	7.2	
16	278	628	287	649			0.271	9.2	96.7%	20.8	8.6	97.0%	19.4	7.2	
17					45.0	94.6	0.252						0.0	7.2	7
18	284	578	307	625			0.244	8.4	97.0%	17.1	9.1	97.0%	18.5	7.2	
19					52.7	105.9	0.241						0.0	7.2	3
20							0.227						0.0	7.2	
21							0.244						0.0	7.1	
22							0.253						0.0	7.2	
23	327	655	326	653			0.240	7.6	97.7%	15.2	9.2	97.2%	18.4	7.1	
24					55.4	110.4	0.239						0.0	7.1	1
25	311	630	317	642			0.243	8.4	97.3%	17.0	6.7	97.9%	13.6	7.1	
26					56.1	111.8	0.239						0.0	7.2	2
27							0.231						0.0	7.2	
28							0.246						0.0	7.1	
29							0.236						0.0	7.2	
30	334	708	396	839			0.254	5.6	98.3%	11.9	6.2	98.4%	13.1	7.2	
31					41.1	87.1	0.254						0.0	7.0	4
TOTAL	2713	5529	2913	5935	441	884	7.484	50		104	51		105.9	223	34
	AVG 301	AVG 614	AVG 324	AVG 659	AVG 49.0	AVG 98.2	AVG 0.241	AVG 5.57	AVG 98.2	AVG 11.52	AVG 5.70	AVG 98.2	AVG 3.42	MIN 7.0	GEM 3
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 334	MAX 708	MAX 396	MAX 839	MAX 56.1	MAX 111.8	MAX 0.271	AVW 8.80		AVW 18.95	AVW 8.85		AVW 18.95	MAX 7.4	GM7 6
Limits								45		263	45		263	9.0	200

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: August | Year: 2011

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water LAKE RIVER | Plant Operator: : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4900

	PHASE 1 - EFFLUENT			CONT	
Frequency	2/WEEK	2/WEEK	2/WEEK	CONT	
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TEMPERATURE DEGREES C	RAIN FALL Inches
1				21.9	0.00
2			119.3	21.9	0.00
3	0.30	0.60		22.0	0.00
4			127.1	22.3	0.00
5	0.60	1.22		22.0	0.00
6				21.5	0.00
7				21.3	0.00
8				21.9	0.00
9			121.5	21.4	0.00
10	0.30	0.58		21.8	0.00
11			122.8	22.2	0.00
12	0.30	0.57		22.2	0.00
13				21.4	0.00
14				21.4	0.00
15				21.6	0.00
16			129.3	22.3	0.00
17	0.80	1.68		22.2	0.00
18			119.0	22.1	0.00
19	0.40	0.80		21.8	0.00
20				21.9	0.00
21				22.8	0.00
22				22.9	0.05
23			116.6	23.1	0.00
24	0.70	1.40		23.3	0.00
25			131.8	23.2	0.00
26	2.10	4.19		23.1	0.00
27				22.7	0.00
28				22.5	0.00
29				22.7	0.00
30			119.3	22.4	0.01
31	1.60	3.39		22.5	0.00
TOTAL	7.1	14.43	1107	688.3	0.06
	AVG 0.79	AVG 1.60	AVG 123.0	AVG 22.2	
Permit	1.4	8.2			
	MAX 2.10	MAX 4.19	MAX 131.8	MXD 23.3	
Limits	3.14				

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** September **Year:** 2011

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 4763

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1	318	679	357	762			0.256	5.9	98.1%	12.6	7.2	98.0%	15.4	7.1	
2					41.8	86.1	0.247						0.0	7.2	55
3							0.221						0.0	7.1	
4							0.219						0.0	7.2	
5							0.256						0.0	7.1	
6	246	533	297	644			0.260	12.5	94.9%	27.1	20.0	93.3%	43.4	7.2	
7					49.7	108.6	0.262						0.0	7.2	1640
8	276	587	368	783			0.255	8.7	96.8%	18.5	18.2	95.1%	38.7	7.1	
9					52.8	108.3	0.246						0.0	7.2	10
10							0.243						0.0	7.2	
11							0.252						0.0	7.2	
12							0.276						0.0	7.1	
13	270	570	319	673			0.253	8.1	97.0%	17.1	8.1	97.5%	17.1	7.1	
14					45.9	98.4	0.257						0.0	7.2	2
15	291	612	341	717			0.252	4.6	98.4%	9.7	5.2	98.5%	10.9	7.2	
16					63.8	125.6	0.236						0.0	7.2	65
17							0.246						0.0	7.1	
18							0.318						0.0	7.1	
19							0.286						0.0	7.2	
20	310	652	291	612			0.252	3.2	99.0%	6.7	1.9	99.3%	4.0	7.2	
21					53.9	114.2	0.254						0.0	7.2	1
22	278	589	290	614			0.254	2.2	99.2%	4.7	2.0	99.3%	4.2	7.2	
23					62.8	128.3	0.245						0.0	7.2	1
24							0.25						0.0	7.1	
25							0.272						0.0	7.1	
26							0.267						0.0	7.1	
27	301	678	319	718			0.270	2.7	99.1%	6.1	3.1	99.0%	7.0	7.2	
28					55.6	127	0.274						0.0	7.2	3
29	229	483	256	540			0.253	1.9	99.2%	4.0	3.4	98.7%	7.2	7.2	
30					59.6	126.8	0.255						0.0	7.2	2
TOTAL	2519	5382	2838	6063	486	1023	7.687	50		106	69		148	215	1779
	AVG 280	AVG 598	AVG 315	AVG 674	AVG 53.99	AVG 113.7	AVG 0.256	AVG 5.53	AVG 98.0	11.83	AVG 7.68	AVG 97.6	AVG 4.93	MIN 7.1	GEM 10
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 318	MAX 679	MAX 368	MAX 783	MAX 63.80	MAX 128.3	MAX 0.318	AVW 10.60		AVW 22.80	AVW 19.10		41.05	MAX 7.2	GM7 128
Limits								45		263	45		263	9.0	200

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: September | Year: 2011

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water LAKE RIVER | Plant Operator : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4763

	PHASE 1 - EFFLUENT CONT															
Frequency	2/WEEK	2/WEEK	2/WEEK													
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TEMPERATURE DEGREES C									RAINFALL Inches			
1			117.1	22.4									0.00			
2	1.00	2.06		22.5									0.00			
3				21.8									0.00			
4				22.0									0.00			
5				22.1									0.00			
6			121.1	22.6									0.00			
7	0.50	1.09		23.4									0.00			
8			110.8	22.7									0.00			
9	0.40	0.82		22.8									0.00			
10				22.2									0.00			
11				22.8									0.00			
12				23.0									0.00			
13			128.3	22.3									0.00			
14	0.70	1.50		22.2									0.00			
15			115.8	22.7									0.00			
16	0.50	0.98		22.5									0.05			
17				22.0									0.10			
18				21.4									0.05			
19				21.7									0.00			
20			116.3	22.4									0.00			
21	0.30	0.64		22.4									0.00			
22			122.0	22.3									0.00			
23	0.30	0.61		22.8									0.00			
24				22.3									0.03			
25				22.0									0.31			
26				21.6									0.11			
27			115.8	21.5									0.15			
28	0.30	0.69		21.5									0.00			
29			114.1	21.5									0.00			
30	0.30	0.64		21.4									0.00			
TOTAL	4.3	9.03	1061	666.8									0.80			
	AVG 0.48	AVG 1.00	AVG 117.9	AVG 22.2												
Permit	1.4	8.2														
	MAX 1.00	MAX 2.06	MAX 128.3	MAX 23.4												
Limits	3.14															

Please Circle ALL Permit Violations Mail to P.O. Box 47775, Olympia WA 98504-7775

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highest 7-day Geometric Mean

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: October | Year: 2011

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water: LAKE RIVER | Plant Operator: : John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4763

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1							0.257						0.0	7.1	
2							0.272						0.0	7.2	
3							0.274						0.0	7.3	
4	228	580	241	613			0.305	3.6	98.4%	9.2	5.6	97.7%	14.2	7.3	
5					45.7	117.8	0.309						0.0	7.3	2
6	232	567	240	586			0.293	3.7	98.4%	9.0	5.6	97.7%	13.7	7.1	
7					53.4	117.6	0.264						0.0	7.1	1
8							0.267						0.0	7.1	
9							0.290						0.0	7.1	
10							0.299						0.0	7.2	
11	243	576	254	602			0.284	2.5	99.0%	5.9	3.3	98.7%	7.8	7.1	
12					52.7	123.1	0.280						0.0	7.2	2
13	293	667	290	660			0.273	3.0	99.0%	6.8	4.6	98.4%	10.5	7.1	
14					53.3	112.9	0.254						0.0	7.3	10
15							0.262						0.0	7.1	
16							0.272						0.0	7.2	
17							0.270						0.0	7.2	
18	281	649	260	601			0.277	3.5	98.8%	8.1	5.4	97.9%	12.5	7.1	
19					41.2	93.5	0.272						0.0	7.0	26
20	292	655	269	603			0.269	3	99.0%	6.7	3.8	98.6%	8.5	7.2	
21					54.1	115.5	0.256						0.0	7.1	2
22							0.252						0.0	7.1	
23							0.272						0.0	7.1	
24							0.277						0.0	7.2	
25	279	603	274	592			0.259	3.2	98.9%	6.9	2.7	99.0%	5.8	7.1	
26					51.4	115.7	0.270						0.0	7.1	1
27	285	635	291	648			0.267	2.3	99.2%	5.1	3.0	99.0%	6.7	7.1	
28					55.4	129.4	0.280						0.0	7.2	9
29							0.277						0.0	7.1	
30							0.279						0.0	7.1	
31							0.268						0.0	7.2	
TOTAL	2133	4931	2119	4905	407	925	8.500	25		58	34		79.7	222	53
	AVG 267	AVG 616	AVG 265	AVG 613	AVG 50.9	AVG 115.7	AVG 0.274	AVG 3.10	AVG 98.8	AVG 7.23	AVG 4.25	AVG 98.4	AVG 2.57	MIN 7.0	GEM 3
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 293	MAX 667	MAX 291	MAX 660	MAX 55.4	MAX 129.4	MAX 0.309	AVW 3.65		AVW 9.10	AVW 5.60		AVW 13.95	MAX 7.3	GM7 7
Limits								45		263	45		263	9.0	200

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: October | Year: 2011

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water LAKE RIVER | Plant Operator: : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4763

	PHASE 1 - EFFLUENT CONT														
Frequency	2/WEEK	2/WEEK	2/WEEK												
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TEMPERATURE DEGREES C								RAIN FALL Inches			
1				21.0								0.00			
2				21.1								0.20			
3				21.4								0.10			
4			114.5	20.8								0.37			
5	0.30	0.8		20.4								0.33			
6			106.8	20.1								0.05			
7	0.30	0.66		20.1								0.02			
8				20.1								0.05			
9				20.5								0.08			
10				20.5								0.20			
11			112.6	20.2								0.05			
12	0.30	0.7		20.3								0.00			
13			108.0	19.8								0.00			
14	0.30	0.64		19.8								0.01			
15				19.7								0.00			
16				19.4								0.00			
17				19.6								0.00			
18			114.4	19.7								0.00			
19	0.30	0.68		19.6								0.00			
20			119.3	19.8								0.02			
21	0.30	0.64		19.7								0.05			
22				19.9								0.05			
23				20.2								0.01			
24				19.9								0.00			
25			115.1	19.4								0.00			
26	0.30	0.68		18.8								0.00			
27			117.0	18.7								0.00			
28	0.30	0.70		18.5								0.20			
29				18.2								0.10			
30				18.8								0.02			
31				19.4								0.02			
TOTAL	2.4	5.47	907.7	615.4								1.93			
	AVG 0.30	AVG 0.68	AVG 113.5	AVG 19.9											
Permit	1.4	8.2													
	MAX 0.30	MAX 0.77	MAX 119.3	MAX 21.4											
Limits	3.14														

Receiving Water is to be sampled May - October

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272

Month: November Year: 2011

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT

County: CLARK

Receiving Water LAKE RIVER

Plant Operator: : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION

Population: 4763

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1	273	649	257	611			0.285	3.3	98.8%	7.8	2.9	98.9%	6.9	7.1	
2					46.0	111.6	0.291						0.0	7.0	1
3	210	539	225	578			0.308	2.7	98.7%	6.9	3.1	98.6%	8.0	7.1	
4					49.4	118.7	0.288						0.0	7.1	5
5							0.298						0.0	7.1	
6							0.306						0.0	7.1	
7							0.300						0.0	7.2	
8	289	680	306	720			0.282	3.3	98.9%	7.8	2.7	99.1%	6.4	7.1	
9					50.5	116.2	0.276						0.0	7.2	21
10	271	594	244	535			0.263	6.9	97.5%	15.1	6.3	97.4%	13.8	7.2	
11					55.1	130.5	0.284						0.0	7.1	6
12							0.309						0.0	7.0	
13							0.313						0.0	7.0	
14							0.317						0.0	7.2	
15	260	627	247	595			0.289	4.7	98.2%	11.3	4.8	98.1%	11.6	7.1	
16					43.1	123.7	0.344						0.0	7.1	2
17	183	557	208	633			0.365	5.5	97.0%	16.7	5.8	97.2%	17.7	7.0	
18					31.2	90.0	0.346						0.0	7.1	7
19							0.326						0.0	6.9	
20							0.318						0.0	6.9	
21	263	823	216	676			0.375	8.7	96.7%	27.2	9.0	95.8%	28.1	7.1	
22	124	635	110	563	21.9	112.1	0.614	9.1	92.7%	46.6	15.0	86.4%	76.8	7.0	540
23					22.1	111.3	0.604						0.0	7.0	14
24							0.600						0.0	6.9	
25							0.420						0.0	6.9	
26							0.361						0.0	6.8	
27							0.392						0.0	6.9	
28							0.378						0.0	6.9	
29	212	619	212	619			0.350	5.4	97.5%	15.8	6.8	96.8%	19.8	6.9	
30					36.2	105.4	0.349						0.0	6.8	5
TOTAL	2085	5723	2025	5530	356	1020	10.551	49.6		155	56.4		189.1	211	601
	AVG 232	AVG 636	AVG 225	AVG 614	AVG 39.50	AVG 113.3	AVG 0.352	AVG 5.51	AVG 97.3	AVG 17.26	AVG 6.27	AVG 96.5	AVG 6.30	MIN 6.8	GEM 9
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 289	MAX 823	MAX 306	MAX 720	MAX 55.10	MAX 130.5	MAX 0.614	AVW 8.90		AVW 36.90	AVW 12.00		AVW 52.45	MAX 7.2	GM7 87
Limits								45		263	45		263	9.0	200

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** November **Year:** 2011

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 4763

	PHASE 1 - EFFLUENT CONT				
Frequency	2/WEEK	2/WEEK	2/WEEK	CONT	
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TEMPERATURE DEGREES C	RAIN FALL Inches
1			110.5	18.2	0.00
2	0.30	0.73		17.6	0.63
3			114.6	18.0	0.03
4	0.30	0.72		17.5	0.18
5				17.4	0.11
6				17.0	0.00
7				17.3	0.00
8			119.4	17.6	0.00
9	0.30	0.69		17.7	0.00
10			122.3	17.7	0.00
11	0.30	0.71		16.9	0.20
12				16.4	0.25
13				17.0	0.10
14				17.2	0.02
15			116.4	16.9	0.05
16	0.30	0.86		16.4	0.80
17			98.0	15.5	0.55
18	0.30	0.87		16.1	0.05
19				15.3	0.00
20				15.1	0.18
21			92.3	15.3	1.14
22	0.30	1.54	77.0	15.3	1.90
23	0.30	1.51		14.6	0.39
24				14.9	0.58
25				14.9	0.00
26				15.2	0.00
27				15.2	0.38
28				15.3	0.03
29			80.9	15.1	0.07
30	0.3	0.87		15.0	0.00
TOTAL	2.70	8.50	931.4	489.6	7.64
	AVG 0.30	AVG 0.94	AVG 103.5	AVG 16.3	
Permit	1.4	8.2			
	MAX 0.30	MAX 1.54	MAX 122.3	MAX 18.2	
Limits	3.14				

***Receiving Water is to be sampled May - October**

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272

Month: December Year: 2011

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT

County: CLARK

Receiving Water LAKE RIVER

Plant Operator: : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION

Population: 4763

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT									
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1	250	655	253	663			0.314	6.7	97.3%	17.5	5.3	97.9%	13.9	6.8	
2					45.7	120.4	0.316							6.9	1
3							0.300							7.0	
4							0.307							6.9	
5							0.317							6.8	
6	230	575	230	575			0.300	3.2	98.6%	8.0	4.5	98.0%	11.3	6.9	
7					48.3	116.8	0.290							7.1	1
8	249	604	260	631			0.291	2.7	98.9%	6.6	3.8	98.5%	9.2	6.9	
9					60.8	144.5	0.285							6.9	2
10							0.290							6.9	
11							0.311							7.0	
12							0.288							6.9	
13	294	682	228	529			0.278	3.9	98.7%	9.0	4.1	98.2%	9.5	7.0	
14					53.8	123.8	0.276							7	6
15	243	600	230	568			0.296	3.5	98.6%	8.6	4.6	98.0%	11.4	7.1	
16					59.4	142.2	0.287							7.0	2
17							0.282							6.9	
18							0.296							7.0	
19							0.291							7.0	
20	262	601	240	550			0.275	6.3	97.6%	14.4	7.4	96.9%	17.0	7.1	
21					41.3	96.8	0.281							7.2	70
22	312	744	276	658			0.286	4.0	98.7%	9.5	5.0	98.2%	11.9	7.2	
23					49.1	111.8	0.273							7.0	5
24							0.290							7.1	
25							0.263							7.1	
26							0.277							7.2	
27	290	728	287	720			0.301	7.1	97.6%	17.8	8.7	97.0%	21.8	7.1	
28					40.7	122.9	0.362							7.1	1
29	235	778	202	669			0.397	5.8	97.5%	19.2	8.2	95.9%	27.2	7.0	
30					26.2	107.3	0.491							7.0	2
31							0.410							7.0	
TOTAL	2365	5967	2206	5563	425	1087	9.521	43		111	52		133	217	90
	AVG 263	AVG 663	AVG 245	AVG 618	AVG 47.26	AVG 120.7	AVG 0.307	AVG 4.80	AVG 98.2	AVG 12.31	AVG 5.73	AVG 97.6	AVG 14.79	MIN 6.8	GEM 3
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 312	MAX 778	MAX 287	MAX 720	MAX 60.80	MAX 144.5	MAX 0.491	AVW 6.45		AVW 17.15	AVW 8.45		AVW 24.25	7.2	GM7 19
Limits								45		263	45		263	9.0	200

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 Month: December Year: 2011

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT County: CLARK

Receiving Water LAKE RIVER Plant Operator : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION Population: 4763

	PHASE 1 - EFFLUENT CONT														
Frequency	2/WEEK	2/WEEK	2/WEEK	CONT											
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TEMPERATURE DEGREES C								RAINFALL Inches			
1			85.5	14.7								0.01			
2	0.30	0.79		14.7								0.00			
3				14.4								0.00			
4				14.4								0.00			
5				14.4								0.00			
6			94.5	14.2								0.00			
7	0.30	0.73		14.3								0.00			
8			93.6	14.3								0.00			
9	0.60	1.43		14.4								0.00			
10				13.9								0.01			
11				14.4								0.00			
12				14.4								0.00			
13			98.0	14.2								0.00			
14	0.90	2.07		14.2								0.07			
15			97.5	14.4								0.01			
16	0.90	2.15		14.7								0.05			
17				14.5								0.02			
18				14.7								0.03			
19				14.8								0.05			
20			96.8	14.7								0.02			
21	0.50	1.17		14.5								0.00			
22			95.5	14.1								0.00			
23	1.30	2.96		14.0								0.00			
24				14.4								0.00			
25				14.4								0.10			
26				14.3								0.05			
27			107.8	14.5								0.32			
28	0.70	2.1		14.6								0.45			
29			93.3	14.4								1.10			
30	0.50	2.05		14.0								0.07			
31				13.3								0.01			
TOTAL	6	15.46	862.5	445.2								2.37			
	AVG 0.67	AVG 1.72	AVG 95.8	AVG 14.4											
Permit	1.4	8.2													
	MAX 1.30	MAX 2.96	MAX 107.8	MAX 14.8											
Limits	3.14														

Receiving Water is to be sampled May - October

Please Circle ALL Permit Violations Mail to P.O. Box 47775, Olympia WA 98504-7775

AVG=Average AVW =Highest Weekly Average GEM=Geometric Mean MAX=Maximum MIN=Minimum
=highest 7-day Geometric Mean

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John Duback WWTPO

Name and Title Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** January **Year:** 2012

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 4950

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1							0.370						0.0	7.0	
2							0.346						0.0	7.0	
3	266	761	235	672			0.343	4.9	98.2%	14.0	5.8	97.5%	16.6	7.1	
4					45.1	122.6	0.326						0.0	7.1	5
5	233	651	230	643			0.335	4.3	98.2%	12.0	5.2	97.7%	14.5	7.1	
6					58.2	149.0	0.307						0.0	7.0	5
7							0.330						0.0	7.0	
8							0.327						0.0	7.1	
9							0.324						0.0	7.1	
10	240	665	214	593			0.332	4.5	98.1%	12.5	5.8	97.3%	16.1	7.2	
11					47.0	120.3	0.307						0.0	7.0	1
12	258	652	289	730			0.303	3.9	98.5%	9.9	4.3	98.5%	10.9	7.1	
13					55.6	139.1	0.300						0.0	7.1	3
14							0.331						0.0	6.3	
15							0.330						0.0	7.1	
16							0.333						0.0	6.4	
17	195	655	195	655			0.403	5.7	97.1%	19.2	6.6	96.6%	22.2	7.1	
18					22.6	125.2	0.664						0.0	7.1	3
19	108	685	123	780			0.760	5.9	94.5%	37.4	7.7	93.7%	48.8	7.3	
20					24.8	133.8	0.647						0.0	7.0	8
21							0.555						0.0	6.9	
22							0.544						0.0	7.0	
23							0.485						0.0	7.1	
24	148	681	139	640			0.552	5.6	96.2%	25.8	6.3	95.5%	29.0	7.1	
25					29.7	118	0.476						0.0	7.0	2
26	203	692	195	665			0.409	5.8	97.1%	19.8	5.8	97.0%	19.8	7.1	
27					31.8	98.7	0.372						0.0	7.0	5
28							0.357						0.0	7.0	
29							0.388						0.0	7.1	
30							0.395						0.0	7.1	
31	235	702	227	678			0.358	6.1	97.4%	18.2	5	97.8%	14.9	7.0	
TOTAL	1886	6144	1847	6056	315	1007	12.609	47		169	53		193	218	32
	AVG 210	AVG 683	AVG 205	AVG 673	AVG 39.35	AVG 125.8	AVG 0.407	AVG 5.19	AVG 97.2	AVG 18.74	AVG 5.83	AVG 96.8	AVG 6.22	MIN 6.3	GEM 3
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 266	MAX 761	MAX 289	MAX 780	MAX 58.20	MAX 149.0	MAX 0.760	AVW 5.80		AVW 28.30	AVW 7.15		AVW 35.50	MAX 7.3	GM7 5
Limits								45		263	45		263	9.0	200

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GM7=highest 7-day Geometric Mean

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: January | Year: 2012

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water LAKE RIVER | Plant Operator : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4950

	PHASE 1 - EFFLUENT CONT															
Frequency	2/WEEK	2/WEEK	2/WEEK													
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TEMPERATURE DEGREES C									RAINFALL Inches			
1				13.2									0.00			
2				14.1									0.01			
3			98.9	14.3									0.00			
4	1.40	3.81		14.5									0.19			
5			99.6	14.5									0.00			
6	2.30	5.89		14.1									0.15			
7				13.8									0.02			
8				13.9									0.02			
9				14.1									0.22			
10			98.6	13.7									0.00			
11	3.30	8.45		13.5									0.00			
12			101.3	13.2									0.00			
13	2.80	7.01		13.2									0.00			
14				13.2									0.07			
15				12.9									0.00			
16				12.1									0.37			
17			99.0	12.0									1.00			
18	3.00	16.61		11.4									0.40			
19			80.8	11.4									1.00			
20	2.10	11.33		11.1									0.85			
21				11.5									0.10			
22				11.1									0.55			
23				11.8									0.30			
24			91.9	11.9									0.45			
25	4.40	17.50		12.0									0.10			
26			88.8	12.1									0.00			
27	4.00	12.40		12.1									0.00			
28				12.4									0.01			
29				12.8									0.37			
30				13.1									0.02			
31				12.9									0.03			
TOTAL	23.3	83	758.9	397.9									6.23			
	AVG 2.91	AVG 10.38	AVG 94.9	AVG 12.8												
Permit	1.4	8.2														
	MAX 4.40	MAX 17.50	MAX 101.3	MAX 14.5												
Limits	3.14															

Receiving Water is to be sampled May - October

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** February **Year:** 2012

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 4950

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT									
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1					38.3	109.6	0.343						0.0	7.0	10
2	239	652	231	630			0.327	5.4	97.7%	14.7	4.1	98.2%	11.2	6.9	
3					52.3	137.8	0.316						0.0	7.0	4
4							0.313						0.0	6.9	
5							0.320						0.0	7.0	
6							0.312						0.0	7.1	
7	281	722	333	855			0.308	6.1	97.8%	15.7	4.9	98.5%	12.6	7.1	
8					37.1	99.0	0.320						0.0	7.1	5
9	295	827	281	787			0.336	5.6	98.1%	15.7	4.9	98.3%	13.7	7.0	
10					50.3	134.2	0.320						0.0	7.2	3
11							0.320						0.0	7.0	
12							0.332						0.0	7.0	
13							0.326						0.0	7.1	
14	356	914	343	881			0.308	8.8	97.5%	22.6	6.3	98.2%	16.2	7.1	
15					48.8	124.9	0.307						0.0	7.1	11
16	279	742	254	676			0.319	5.9	97.9%	15.7	4.6	98.2%	12.2	7.0	
17					59.6	168.0	0.338						0.0	7.0	2[illegible]
18							0.384						0.0	6.9	
19							0.359						0.0	6.9	
20							0.377						0.0	6.9	
21	214	696	227	738			0.390	6.1	97.1%	19.8	5.9	97.4%	19.2	7.0	
22					32.9	125.4	0.457						0.0	6.9	9
23	310	1008	320	1041			0.390	5.3	98.3%	17.2	5.4	98.3%	17.6	7.0	
24					45.8	144.4	0.378						0.0	6.9	12
25							0.431						0.0	7.0	
26							0.420						0.0	6.9	
27							0.381						0.0	7.1	
28	254	828	215	701			0.391	5.7	97.8%	18.6	5.7	97.3%	18.6	6.9	
29					28.0	113.5	0.486						0.0	7.0	4
TOTAL	2228	6390	2204	6310	393	1157	10.309	48.9		140	41.8		121.3	203	79
	AVG 279	AVG 799	AVG 276	AVG 789	AVG 43.68	AVG 128.5	AVG 0.355	AVG 6.11	AVG 97.8	AVG 17.51	AVG 5.23	AVG 98.1	AVG 4.18	MIN 6.9	GEM 7
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 356	MAX 1008	MAX 343	MAX 1041	MAX 59.60	MAX 168.0	MAX 0.486	AVW 7.35		AVW 19.15	AVW 5.65		AVW 18.40	MAX 7.2	GM7 15
Limits								45		263	45		263	9.0	200

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 Month: February Year: 2012

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT County: CLARK

Receiving Water LAKE RIVER Plant Operator: : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION Population: 4950

	PHASE 1 - EFFLUENT CONT														
Frequency	2/WEEK	2/WEEK	2/WEEK	CONT											
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TEMPERATURE DEGREES C								RAIN FALL Inches			
1	3.80	11.80		13.0								0.02			
2			98.5	12.4								0.00			
3	3.10	8.20		12.6								0.00			
4				12.9								0.00			
5				13.1								0.00			
6				13.1								0.00			
7			99.0	13.0								0.04			
8	1.90	5.07		13.0								0.02			
9			99.5	13.0								0.10			
10	1.60	4.27		13.2								0.10			
11				13.3								0.00			
12				13.2								0.15			
13				13.4								0.03			
14			94.9	13.3								0.05			
15	0.60	1.54		13.3								0.01			
16			97.6	13.3								0.20			
17	0.60	1.69		13.4								0.40			
18				13.0								0.15			
19				12.9								0.10			
20				13.2								0.18			
21			85.1	13.4								0.60			
22	0.30	1.14		13.2								0.05			
23			80.3	12.4								0.07			
24	0.30	0.95		13.0								0.37			
25				12.6								0.24			
26				12.6								0.02			
27				12.7								0.00			
28			93.3	12.5								0.58			
29	0.30	1.22		12.3								0.61			
TOTAL	12.50	35.88	748.2	376.3								4.09			
	AVG 1.39	AVG 3.99	AVG 93.5	AVG 13.0											
Permit	1.4	8.2													
	MAX 3.80	MAX 11.80	MAX 99.5	MAX 13.4											
Limits	3.14														

Receiving Water is to be sampled May - October

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' :highest 7-day Geometric Mean

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272

Month: March Year: 2012

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT

County: CLARK

Receiving Water LAKE RIVER

Plant Operator: : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION

Population: 4950

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT									
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1	156	631	162	655			0.485	4.0	97.4%	16.2	3.2	98.0%	12.9	7.0	
2					37.6	133.9	0.427						0.0	6.9	2
3							0.395						0.0	6.8	
4							0.387						0.0	6.8	
5							0.394						0.0	6.8	
6	219	661	233	703			0.362	6.2	97.2%	18.7	7.1	97.0%	21.4	7.1	
7					38.6	112.4	0.349						0.0	7.0	6
8	283	748	259	685			0.317	4.8	98.3%	12.7	4.9	98.1%	13.0	7.1	
9					58.3	154.6	0.318						0.0	7.1	3
10							0.330						0.0	6.9	
11							0.376						0.0	4.8	
12							0.423						0.0	7.1	
13	153	658	175	753			0.516	5.6	96.3%	24.1	6.9	96.1%	29.7	7.0	
14					34.5	167.7	0.583						0.0	7.0	6
15	105	659	130	816			0.753	5.8	94.5%	36.4	6.8	94.8%	42.7	6.9	
16					20.0	88.7	0.532						0.0	6.9	5
17							0.510						0.0	6.8	
18							0.482						0.0	6.8	
19							0.431						0.0	7.0	
20	175	652	236	880			0.447	5.6	96.8%	20.9	6.9	97.1%	25.7	6.9	
21					24.3	97.3	0.480						0.0	6.9	21
22	157	740	183	862			0.565	6.0	96.2%	28.3	7.5	95.9%	35.3	6.7	
23					33.1	132.2	0.479						0.0	6.9	1
24							0.426						0.0	6.8	
25							0.408						0.0	6.9	
26							0.369						0.0	7.0	
27	203	664	193	631			0.392	5.6	97.2%	18.3	5.7	97.0%	18.6	7.0	
28					40.1	125.1	0.374						0.0	7.1	1
29	136	747	173	951			0.659	4.6	96.6%	25.3	8.3	95.2%	45.6	7.0	
30					26.8	146.8	0.657						0.0	6.6	5
31							0.624						0.0	6.7	
TOTAL	1587	6162	1744	6937	313	1159	14.250	48		201	57		245.0	212	50
	AVG 176	AVG 685	AVG 194	AVG 771	AVG 34.8	AVG 128.8	AVG 0.460	AVG 5.36	AVG 96.7	AVG 22.32	AVG 6.37	AVG 96.6	AVG 7.90	MIN 4.8	GEM 4
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 283	MAX 748	MAX 259	MAX 951	MAX 58.3	MAX 167.7	MAX 0.753	AVW 5.80		AVW 30.25	AVW 7.20		AVW 36.20	MAX 7.1	GM7 5
Limits								45		263	45		263	9.0	200

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** March **Year:** 2012

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 4950

	PHASE 1 - EFFLUENT CONT														
Frequency	2/WEEK	2/WEEK	2/WEEK	CONT											
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TEMPERATURE DEGREES C								RAIN FALL Inches			
1			94.0	12.1								0.80			
2	0.30	1.07		12.7								0.05			
3				12.7								0.00			
4				13.1								0.00			
5				13.1								0.22			
6			90.6	12.7								0.23			
7	0.30	0.87		12.8								0.00			
8			93.3	13.1								0.00			
9	0.30	0.80		13.4								0.00			
10				13.5								0.37			
11				13.3								0.08			
12				13.0								0.90			
13			76.0	12.3								0.10			
14	0.30	1.46		12.7								1.68			
15			71.0	11.7								0.10			
16	0.30	1.33		12.0								0.25			
17				12.1								0.20			
18				12.3								0.10			
19				12.3								0.10			
20			85.4	12.4								0.30			
21	0.30	1.20		12.3								1.00			
22			75.9	11.7								0.00			
23	0.30	1.20		12.0								0.00			
24				12.6								0.00			
25				12.9								0.01			
26				13.4								0.12			
27			93.4	13.5								0.20			
28	0.30	0.94		13.2								0.28			
29			79.0	13.1								1.45			
30	0.30	1.64		13.1								0.35			
31				12.4								0.50			
TOTAL	2.7	10.51	758.6	393.5								9.39			
	AVG 0.30	AVG 1.17	AVG 84.3	AVG 12.7											
Permit	1.4	8.2													
	MAX 0.30	MAX 1.64	MAX 94.0	MAX 13.5											
Limits	3.14														

Receiving Water is to be sampled May - October

Please Circle ALL Permit Violations Mail to P.O. Box 47775, Olympia WA 98504-7775

AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum

=highest 7-day Geometric Mean

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: April | Year: 2012

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water: LAKE RIVER | Plant Operator: John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4950

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WE...
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1							0.535							6.7	
2							0.446							7.1	
3	147	549	189	706			0.448	6.1	95.9%	22.8	6.4	96.6%	23.9	7.0	
4					32.6	121.3	0.446							6.9	1
5	168	668	174	692			0.477	6.3	96.3%	25.1	8.3	95.2%	33.0	6.7	
6					32.0	108.6	0.407							7.0	8
7							0.383							7.0	
8							0.382							6.8	
9							0.378							7.0	
10	352	1066	268	811			0.363	3.1	99.1%	9.4	4.4	98.4%	13.3	7.1	
11					29.0	88.3	0.365							7.1	2
12	210	674	263	844			0.385	5.7	97.3%	18.3	6.8	97.4%	21.8	7.0	
13					27.6	85.9	0.373							7.0	21
14							0.343							6.7	
15							0.349							6.9	
16							0.382							6.9	
17	269	787	242	708			0.351	5.2	98.1%	15.2	5.8	97.6%	17.0	6.8	
18					28.5	86.3	0.363							6.9	105
19	222	728	225	737			0.393	4.4	98.0%	14.4	5.4	97.6%	17.7	7.0	
20					31.1	98.3	0.379							6.9	6
21							0.344							6.9	
22							0.333							6.9	
23							0.324							7.0	
24	316	838	298	790			0.318	4.9	98.4%	13.0	5.2	98.3%	13.8	7.0	
25					50.5	133.1	0.316							6.9	21
26	266	794	289	863			0.358	4.3	98.4%	12.8	5.0	98.3%	14.9	6.9	
27					58.8	157.4	0.321							7.0	96
28							0.315							6.9	
29							0.322							6.7	
30							0.349							7.1	
TOTAL	1950	6105	1948	6153	290	879	11.248	40		131	47		155	208	260
	AVG 244	AVG 763	AVG 244	AVG 769	AVG 36.26	AVG 109.9	AVG 0.375	AVG 5.00	97.7	AVG 16.38	AVG 5.91	97.4	AVG 19.44	MIN 6.7	GEM 12
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 352	MAX 1066	MAX 298	MAX 863	MAX 58.80	MAX 157.4	MAX 0.535	AVW 6.20		AVW 23.95	AVW 7.35		AVW 28.45	MAX 7.1	GM7 45
Limits								45		263	45		263	9.0	200

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: April | Year: 2012

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water LAKE RIVER | Plant Operator : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4950

PHASE 1 - EFFLUENT CONT

Frequency	2/WEEK	2/WEEK	2/WEEK	CONT											
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TEMPERATURE DEGREES C								RAINFALL Inches			
1				12.3								0.11			
2				13.0								0.05			
3			82.1	12.9								0.35			
4	0.30	1.12		12.8								0.53			
5			76.6	12.8								0.04			
6	0.30	1.02		13.0								0.00			
7				13.3								0.00			
8				14.0								0.00			
9				14.4								0.00			
10			96.0	14.6								0.03			
11	0.30	0.91		14.6								0.31			
12			92.1	14.5								0.35			
13	0.30	0.93		14.7								0.00			
14				14.7								0.00			
15				14.7								0.38			
16				15.1								0.05			
17			90.4	14.6								0.18			
18	0.30	0.91		14.4								0.05			
19			87.6	14.4								0.40			
20	0.30	0.95		14.6								0.03			
21				15.4								0.00			
22				16.2								0.00			
23				16.8								0.00			
24			91.8	16.1								0.00			
25	0.30	0.79		16.1								0.49			
26			93.4	16.1								0.05			
27	0.30	0.80		15.8								0.05			
28				16.3								0.00			
29				16.5								0.23			
30				16.4								0.08			
TOTAL	2.4	7.43	710	441.1								3.76			
	AVG 0.30	AVG 0.93	AVG 88.8	AVG 14.7											
Permit	1.4	8.2													
	MAX 0.30	MAX 1.12	MAX 96.0	MAX 16.8											
Limits	3.14														

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: May | Year: 2012

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water: LAKE RIVER | Plant Operator: : John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4950

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1	247	705	309	881			0.342	4.7	98.1%	13.4	4.8	98.4%	13.7	7.1	
2					47.1	133.2	0.339						0.0	7.0	3
3	159	660	181	752			0.498	5.2	96.7%	21.6	5.3	97.1%	22.0	7.1	
4					38.7	144.9	0.449						0.0	6.9	7
5							0.403						0.0	6.8	
6							0.380						0.0	6.8	
7							0.347						0.0	6.9	
8	205	562	266	730			0.329	4.0	98.0%	11.0	6.9	97.4%	18.9	6.8	
9					48.3	132.9	0.330						0.0	7.0	1
10	245	654	257	686			0.320	4.0	98.4%	10.7	4.5	98.2%	12.0	6.9	
11					48.7	119.8	0.295						0.0	6.9	3
12							0.266						0.0	7.2	
13							0.283						0.0	7.1	
14							0.296						0.0	7.0	
15	250	573	303	695			0.275	4.0	98.4%	9.2	5.1	98.3%	11.7	7.0	
16					52.1	128.6	0.296						0.0	7.0	1
17	277	635	267	612			0.275	3.7	98.7%	8.5	4.4	98.4%	10.1	7.1	
18					57.4	214.9	0.449						0.0	7.1	5
19							0.270						0.0	6.5	
20							0.299						0.0	6.9	
21							0.334						0.0	7.1	
22	252	687	293	799			0.327	5.0	98.0%	13.6	7.2	97.5%	19.6	7.0	
23					40.7	106.6	0.314						0.0	7.1	1
24	255	685	261	701			0.322	5.9	97.7%	15.8	6.4	97.5%	17.2	7.1	
25					52.4	128.9	0.295						0.0	7.1	1
26							0.269						0.0	6.9	
27							0.263						0.0	7.0	
28							0.287						0.0	7.0	
29	305	705	317	732			0.277	5.4	98.2%	12.5	5.2	98.4%	12.0	7.1	
30					43.5	94.3	0.260						0.0	7.0	12
31	257	549	309	660			0.256	5.5	97.9%	11.7	6.2	98.0%	13.2	7.0	
TOTAL	2452	6415	2763	7248	429	1204	9.945	47		128	56		150.5	217	34
	AVG 245	AVG 642	AVG 276	AVG 725	AVG 47.66	AVG 133.8	AVG 0.321	AVG 4.74	AVG 98.0	AVG 12.80	AVG 5.60	AVG 97.9	AVG 4.86	MIN 6.5	GEM 2
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 305	MAX 705	MAX 317	MAX 881	MAX 57.40	MAX 214.9	MAX 0.498	AVW 5.45		AVW 17.50	AVW 6.80		AVW 18.40	MAX 7.2	GM7 5
Limits								45		263	45		263	9.0	200

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** May **Year:** 2012

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 4950

	PHASE 1 - EFFLUENT CONT														
Frequency	2/WEEK	2/WEEK	2/WEEK	CONT											
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TEMPERATURE DEGREES C								RAIN FALL Inches			
1			91.3	16.1								0.30			
2	0.30	0.85		15.8								0.64			
3			84.5	15.6								0.50			
4	0.30	1.12		15.3								0.09			
5				15.3								0.00			
6				16.0								0.00			
7				16.8								0.00			
8			89.4	17.0								0.00			
9	0.30	0.83		16.9								0.00			
10			106.5	16.5								0.00			
11	0.30	0.74		16.8								0.00			
12				17.5								0.00			
13				18.0								0.00			
14				18.4								0.00			
15			96.1	18.0								0.00			
16	0.30	0.74		18.2								0.00			
17			97.0	18.2								0.00			
18	0.30	1.12		18.0								0.00			
19				17.8								0.01			
20				17.6								0.31			
21				17.9								0.38			
22			93.1	17.4								0.21			
23	0.30	0.78		17.5								0.18			
24			99.3	17.6								0.22			
25	0.3	0.74		18.0								0.05			
26				18.3								0.00			
27				18.2								0.00			
28				18.1								0.00			
29			102.3	18.7								0.00			
30	0.30	0.65		18.8								0.00			
31			95.1	18.8								0.00			
TOTAL	2.7	7.57	954.6	539.1								2.89			
	AVG 0.30	AVG 0.84	AVG 95.5	AVG 17.4											
Permit	1.4	8.2													
	MAX 0.30	MAX 1.12	MAX 106.5	MAX 18.8											
Limits	3.14														

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: June | Year: 2012

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water: LAKE RIVER | Plant Operator: : John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4950

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1					59.9	129.9	0.260						0.0	7.1	12
2							0.264						0.0	7.0	
3							0.282						0.0	7.0	
4							0.284						0.0	7.1	
5	229	688	242	727			0.360	5.3	97.7%	15.9	7.0	97.1%	21.0	7.0	
6					45.5	113.1	0.298						0.0	7.0	19
7	263	735	268	749			0.335	4.6	98.3%	12.9	4.9	98.2%	13.7	7.0	
8					68.3	177.2	0.311						0.0	7.1	48
9							0.301						0.0	6.9	
10							0.299						0.0	7.0	
11							0.272						0.0	7.0	
12	271	655	335	810			0.290	6.1	97.7%	14.8	7.4	97.8%	17.9	6.9	
13					29.6	73.3	0.297						0.0	6.9	1
14	275	635	378	873			0.277	5.3	98.1%	12.2	6.6	98.3%	15.2	7.1	
15					46.4	101.0	0.261						0.0	7.1	35
16							0.251						0.0	7.1	
17							0.265						0.0	7.0	
18							0.284						0.0	7.1	
19	430	968	292	658			0.270	4.2	99.0%	9.5	5.1	98.3%	11.5	7.0	
20					39.0	86.5	0.266						0.0	7.0	1
21	291	626	372	800			0.258	3.4	98.8%	7.3	4.2	98.9%	9.0	7.1	
22					62.6	130.5	0.250						0.0	7.0	1
23							0.304						0.0	7.0	
24							0.292						0.0	7.0	
25							0.316						0.0	7.0	
26	329	787	315	754			0.287	4.2	98.7%	10.1	5.3	98.3%	12.7	7.0	
27					32.3	67.3	0.250						0.0	6.9	1
28	272	576	302	640			0.254	4.5	98.3%	9.5	5.6	98.1%	11.9	7.0	
29					64.1	133.6	0.250						0.0	6.9	3
30							0.277						0.0	6.9	
TOTAL	2360	5671	2504	6011	448	1012	8.465	38		92	46		113	210	121
	AVG 295	AVG 709	AVG 313	AVG 751	AVG 49.74	AVG 112.5	AVG 0.282	AVG 4.70	AVG 98.3	AVG 11.52	AVG 5.76	AVG 98.1	AVG 3.76	MIN 6.9	GEM 5
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 430	MAX 968	MAX 378	MAX 873	MAX 68.30	MAX 177.2	MAX 0.360	AVW 5.70		AVW 14.40	AVW 7.00		AVW 17.35	MAX 7.1	GM7 30
Limits								45		263	45		263	9.0	200

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: June | Year: 2012

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water: LAKE RIVER | Plant Operator: John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 4950

	PHASE 1 - EFFLUENT CONT				
Frequency	2/WEEK	2/WEEK	2/WEEK	CONT	CONT
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TEMPERATURE DEGREES C	RAINFALL Inches
1	0.30	0.65		18.9	0.02
2				18.8	0.00
3				18.7	0.03
4				18.4	0.94
5			91.5	18.4	0.00
6	0.30	0.75		18.3	0.37
7			88.6	18.3	0.07
8	0.30	0.78		17.8	0.50
9				17.7	0.06
10				18.2	0.00
11				19.3	0.10
12			89.8	18.8	0.08
13	0.30	0.7		18.8	0.00
14			98.0	19.0	0.00
15	0.30	0.65		19.6	0.00
16				20.1	0.00
17				20.0	0.02
18				19.7	0.08
19			95.4	19.7	0.08
20	0.30	0.67		20.0	0.00
21			90.0	20.4	0.00
22				18.8	0.25
23				19.5	0.53
24				19.7	0.01
25				19.5	0.01
26					0.05
27					0.00
28					0.00
29					0.00
30					0.55
TOTAL	1.8	4.24	553.3	476.4	3.75
	AVG 0.30	AVG 0.71	AVG 92.2	AVG 19.1	
Permit	1.4	8.2			
	MAX 0.30	MAX 0.78	MAX 98.0	MAX 20.4	
Limits	3.14				

Receiving Water is to be sampled May - October

Please Circle ALL Permit Violations   Mail to P.O. Box 47775, Olympia WA 98504-7775

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[illegible]=highest 7-day Geometric Mean

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John Duback   WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 | Month: July | Year: 2012

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water: LAKE RIVER | Plant Operator: : John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 5210

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1							0.293						0.0	6.9	
2							0.276						0.0	7.2	
3	298	681	325	743			0.274	7.4	97.5%	16.9	7.4	97.7%	16.9	7.0	
4					58.1	132.8	0.274						0.0	7.0	31
5	327	685	351	735			0.251	7.1	97.8%	14.9	7.6	97.8%	15.9	7.0	
6					51.7	88.4	0.205						0.0	7.1	1
7							0.238						0.0	7.4	
8							0.247						0.0	7.3	
9							0.262						0.0	7.2	
10	275	583	332	703			0.254	14.0	94.9%	29.7	34.0	89.8%	72.0	7.2	
11					62.3	135.1	0.260						0.0	7.2	5
12	297	646	324	705			0.261	6.0	98.0%	13.1	8.1	97.5%	17.6	7.0	
13					60.9	154.9	0.305						0.0	7.3	3
14							0.228						0.0	7.3	
15							0.258						0.0	7.0	
16							0.252						0.0	7.1	
17	291	597	312	640			0.246	5.2	98.2%	10.7	8.9	97.1%	18.3	7.0	
18					65.2	135.9	0.250						0.0	7.1	1
19	324	654	318	642			0.242	6.0	98.1%	12.1	8.1	97.5%	16.3	7.0	
20					54.2	111.7	0.247						0.0	7.2	5
21							0.233						0.0	7.1	
22							0.254						0.0	7.1	
23							0.249						0.0	7.2	
24	302	620	319	654			0.246	6.0	98.0%	12.3	5.8	98.2%	11.9	7.1	
25					46.7	94.6	0.243						0.0	7.2	22
26	312	617	317	627			0.237	6.7	97.9%	13.2	10.6	96.7%	21.0	7.2	
27					56.6	114.2	0.242						0.0	7.3	7
28							0.240						0.0	7.0	
29							0.258						0.0	7.1	
30							0.250						0.0	7.1	
31	279	554	322	639			0.238	8.7	96.9%	17.3	14.8	95.4%	29.4		
TOTAL	2705	5636	2920	6088	456	968	7.813	67		140	105		219.3	214	75
	AVG 301	AVG 626	AVG 324	AVG 676	AVG 56.96	AVG 121.0	AVG 0.252	AVG 7.46	AVG 97.5	AVG 15.57	AVG 11.70	AVG 96.4	AVG 7.07	MIN 6.9	GEM 5
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 327	MAX 685	MAX 351	MAX 743	MAX 65.20	MAX 154.9	MAX 0.305	AVW 10.00		AVW 21.40	AVW 21.05		AVW 44.80	MAX 7.4	GM7 12
Limits								45		263	45		263	9.0	200

Please Circle ALL Permit Violations **Mail to P.O. Box 47775, Olympia WA 98504-7775**

AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
GM7=highest 7-day Geometric Mean

I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 Month: July Year: 2012

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT County: CLARK

Receiving Water LAKE RIVER Plant Operator: : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION Population: 5210

	PHASE 1 - EFFLUENT CONT														
..equency	2/WEEK	2/WEEK	2/WEEK	CONT											
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TEMPERATURE DEGREES C								RAIN FALL Inches			
1				20.0								0.01			
2				20.1								0.04			
3			94.6	20.2								0.01			
4	0.30	0.69		20.2								0.00			
5			96.3	20.6								0.00			
6	0.30	0.51		20.9								0.00			
7				21.5								0.00			
8				21.9								0.00			
9				21.4								0.00			
10			101.8	21.7								0.00			
11	0.30	0.65		22.2								0.00			
12			89.8	22.0								0.00			
13	0.30	0.76		21.4								0.00			
14				22.2								0.00			
15				21.7								0.00			
16				22.0								0.00			
17			91.5	22.5								0.00			
18	0.30	0.63		21.5								0.00			
19			98.8	22.0								0.05			
20	0.30	0.62		21.6								0.02			
21				22.7								0.00			
22				21.6								0.01			
23				21.5								0.00			
24			102.8	22.2								0.00			
25	0.30	0.6		22.7								0.00			
26			108.8	22.4								0.00			
27	0.30	0.61		21.6								0.00			
28				22.0								0.00			
29				22.0								0.00			
30				21.7								0.00			
31			113.1	22.0								0.00			
TOTAL	2.40	5.08	897.5	670								0.14			
	AVG 0.30	AVG 0.64	AVG 99.7	AVG 21.6											
Permit	**1.4**	**8.2**													
	MAX 0.30	MAX 0.76	MAX 113.1	MAX 22.7											
Limits	**3.14**														

Receiving Water is to be sampled May - October

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** August **Year:** 2012

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 5210

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT									
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1					41.0	87.2	0.255						0.0	7.2	4
2	287	603	330	694			0.252	5.9	97.9%	12.4	11.3	96.6%	23.7	7.2	
3					58	113.2	0.234						0.0	7.2	36
4							0.232						0.0	7.2	
5							0.246						0.0	7.1	
6							0.250						0.0	7.1	
7	275	587	298	636			0.256	10.1	96.3%	21.6	17.6	94.1%	37.6	7.2	
8					48.8	102.2	0.251						0.0	7.2	5
9	293	638	294	640			0.261	9.0	96.9%	19.6	16.3	94.5%	35.5	7.3	
10					55.8	111.7	0.240						0.0	7.3	26
11							0.242						0.0	7.3	
12							0.245						0.0	7.2	
13							0.241						0.0	7.2	
14	281	509	291	527			0.217	3.9	98.6%	7.1	4.1	98.6%	7.4	7.3	
15					50.6	85.2	0.202						0.0	7.2	3
16	269	413	247	379			0.184	6.5	97.6%	10.0	10.6	95.7%	16.3	7.4	
17					50.2	83.3	0.199						0.0	7.2	1
18							0.199						0.0	7.1	
19							0.213						0.0	7.2	
20							0.218						0.0	7.2	
21	311	571	307	563			0.220	8.9	97.1%	16.3	15.4	95.0%	28.3	7.1	
22					54.3	98.3	0.217						0.0	7.2	13
23	321	560	337	587			0.209	7.6	97.6%	13.2	13.1	96.1%	22.8	7.1	
24					61.1	104.5	0.205						0.0	6.9	4
25							0.203						0.0	7.1	
26							0.219						0.0	7.1	
27							0.219						0.0	7.2	
28	284	521	285	523			0.220	6.1	97.9%	11.2	9.1	96.8%	16.7	7.2	
29					58.0	107.4	0.222						0.0	7.2	48
30	299	534	318	568			0.214	3.3	98.9%	5.9	2.8	99.1%	5.0	7.3	
31					52.1	94.3	0.217						0.0	7.2	5
TOTAL	2620	4934	2707	5117	530	987	7.002	61		117	100		193.3	223	145
	AVG 291	AVG 548	AVG 301	AVG 569	AVG 52.99	AVG 98.7	AVG 0.226	AVG 6.81	AVG 97.6	AVG 13.03	AVG 11.14	AVG 96.3	AVG 6.23	MIN 6.9	GEM 8
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 321	MAX 638	MAX 337	MAX 694	MAX 61.10	MAX 113.2	MAX 0.261	AVW 9.55		AVW 20.60	AVW 16.95		AVW 36.45	MAX 7.4	GM7 15
Limits								45		263	45		263	9.0	200

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** August **Year:** 2012

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 5210

PHASE 1 - EFFLUENT CONT

Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TEMPERATURE DEGREES C								RAIN FALL Inches			
Frequency	2/WEEK	2/WEEK	2/WEEK	CONT											
1	0.40	0.85		22.0								0.00			
2			113.4	21.8								0.00			
3	0.30	0.59		22.5								0.00			
4				23.1								0.00			
5				23.3								0.00			
6				23.5								0.00			
7			113.1	22.6								0.00			
8	0.30	0.63		22.3								0.00			
9			110.0	21.4								0.00			
10	0.30	0.60		22.3								0.00			
11				22.5								0.00			
12				23.0								0.00			
13				23.1								0.00			
14			114.9	23.8								0.00			
15	0.50	0.84		23.6								0.00			
16			113.8	23.8								0.00			
17	0.40	0.66		23.9								0.00			
18				23.7								0.00			
19				22.8								0.00			
20				22.8								0.00			
21			102.9	22.5								0.00			
22	0.30	0.54		22.3								0.00			
23			108.3	22.7								0.00			
24	0.30	0.51		22.0								0.00			
25				22.1								0.00			
26				22.1								0.00			
27				22.3								0.00			
28			115.5	22.3								0.00			
29	0.30	0.56		22.5								0.00			
30			126.1	22.4								0.00			
31	0.30	0.54		22.2								0.00			
TOTAL	3.4	6.32	1018	703.2											
	AVG 0.34	AVG 0.63	AVG 113.1	AVG 22.7											
Permit	1.4	8.2													
	MAX 0.50	MAX 0.85	MAX 126.1	MAX 23.9											
Limits	3.14														

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John Duback WWTP Operator

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Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** September **Year:** 2012

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 5210

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WE...
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1							0.202						0.0	7.2	
2							0.196						0.0	7.2	
3							0.235						0.0	7.2	
4	337	616	317	579			0.219	5.4	98.4%	9.9	7.5	97.6%	13.7	7.3	
5					51.6	92.1	0.214						0.0	7.3	7
6	274	480	270	473			0.210	5.1	98.1%	8.9	7.4	97.3%	13.0	7.2	
7					64.7	106.8	0.198						0.0	7.3	9
8							0.218						0.0	7.1	
9							0.237						0.0	7.0	
10							0.236						0.0	7.2	
11	328	618	315	594			0.226	7.4	97.7%	13.9	13.9	95.6%	26.2	7.0	
12					64.2	116.2	0.217						0.0	7.3	5
13	338	609	420	757			0.216	9.1	97.3%	16.4	12.7	97.0%	22.9	7.1	
14					66.1	107.5	0.195						0.0	7.3	2
15							0.223						0.0	7.2	
16							0.229						0.0	7.1	
17							0.228						0.0	7.2	
18	318	581	332	606			0.219	10.8	96.6%	19.7	13.9	95.8%	25.4	7.2	
19					44.4	81.5	0.220						0.0	7.2	5
20	340	632	359	668			0.223	4.9	98.6%	9.1	4.5	98.7%	8.4	7.1	
21					55.1	98.3	0.214						0.0	7.1	4
22							0.212						0.0	7.1	
23							0.231						0.0	7.1	
24							0.229						0.0	7.2	
25	294	539	340	624			0.220	8.9	97.0%	16.3	4.9	98.6%	9.0	7.1	
26					50.9	92.1	0.217						0.0	7.1	14
27	303	548	317	574			0.217	12.2	96.0%	22.1	12.0	96.2%	21.7	7.2	
28					37.7	63.5	0.202						0.0	7.2	14
29							0.218						0.0	7.0	
30							0.234						0.0	7.0	
TOTAL	2532	4623	2670	4874	435	758	6.555	64		116	77		140	215	60
	AVG 317	AVG 578	AVG 334	AVG 609	AVG 54.34	AVG 94.8	AVG 0.219	AVG 7.98	AVG 97.5	14.55	AVG 9.60	AVG 97.1	AVG 4.67	MIN 7.0	GEM 6
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 340	MAX 632	MAX 420	MAX 757	MAX 66.10	MAX 116.2	MAX 0.237	AVW 10.55		AVW 19.20	AVW 13.30		24.55	MAX 7.3	GM7 14
Limits								45		263	45		263	9.0	200

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John Duback WWTPO

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WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 — Month: September — Year: 2012

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT — County: CLARK

Receiving Water: LAKE RIVER — Plant Operator: John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION — Population: 5210

	PHASE 1 - EFFLUENT CONT														
..equency	2/WEEK	2/WEEK	2/WEEK												
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TEMPERATURE DEGREES C								RAINFALL Inches			
1				22.0								0.00			
2				21.9								0.00			
3				21.9								0.00			
4			115.8	22.2								0.00			
5	0.30	0.54		22.1								0.00			
6			127.9	22.8								0.00			
7	0.30	0.50		23.1								0.00			
8				22.8								0.00			
9				22.1								0.00			
10				22.1								0.00			
11			117.0	21.5								0.00			
12	0.30	0.54		21.6								0.00			
13			114.4	22.7								0.00			
14	0.30	0.49		22.4								0.00			
15				22.1								0.00			
16				21.9								0.00			
17				22.5								0.00			
18			119.1	22.7								0.00			
19	0.30	0.57		22.0								0.00			
20			118.4	22.3								0.00			
21	0.30	0.54		21.6								0.00			
22				21.7								0.00			
23				21.6								0.00			
24				21.9								0.00			
25			111.6	21.8								0.00			
26	0.30	0.54		21.6								0.00			
27			111.5	21.6								0.00			
28	0.60	1.01		22.1								0.00			
29				22.9								0.00			
30				21.3								0.00			
TOTAL	2.7	4.725	935.7	662.8											
	AVG 0.34	AVG 0.59	AVG 117.0	AVG 22.1								0.00			
Permit	1.4	8.2													
	MAX 0.60	MAX 1.01	MAX 127.9	MAX 23.1											
Limits	3.14														

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John Duback WWTPO

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 — **Month:** October **Year:** 2012

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT — **County:** CLARK

Receiving Water LAKE RIVER — **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION — **Population:** 5210

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1							0.222						0.0	7.2	
2	306	538	322	567			0.211	12.0	96.1%	21.1	14.7	95.4%	25.9	7.3	
3					58.4	102.8	0.211						0.0	7.1	125
4	286	513	310	556			0.215	5.1	98.2%	9.1	3.3	98.9%	5.9	7.4	
5					61.1	106.5	0.209						0.0	7.2	580
6							0.216						0.0	7.1	
7							0.220						0.0	7.1	
8							0.226						0.0	7.1	
9	298	512	324	557			0.206	10.8	96.4%	18.6	12.4	96.2%	21.3	7.0	
10					46.7	85.3	0.219						0.0	7.1	1
11	315	567	350	631			0.216	6.7	97.9%	12.1	6.0	98.3%	10.8	7.0	
12					51.7	109.1	0.253						0.0	7.1	5
13							0.244						0.0	7.0	
14							0.251						0.0	7.1	
15							0.268						0.0	7.0	
16	274	555	333	675			0.243	5.5	98.0%	11.1	8.7	97.4%	17.6	7.1	
17					45.2	87.8	0.233						0.0	7.3	5
18	328	648	390	771			0.237	7.2	97.8%	14.2	12.2	96.9%	24.1	7.2	
19					52.8	104.8	0.238						0.0	7.0	173
20							0.262						0.0	7.2	
21							0.283						0.0	7.2	
22							0.325						0.0	7.2	
23	238	574	251	605			0.289	9.4	96.1%	22.7	12.3	95.1%	29.6	7.2	
24					31.9	80.1	0.301						0.0	7.3	116
25	266	586	303	667			0.264	4.3	98.4%	9.5	5.8	98.1%	12.8	7.1	
26					46.2	99.0	0.257						0.0	7.1	8
27							0.302						0.0	7.0	
28							0.338						0.0	7.0	
29							0.365						0.0	7.2	
30	254	792	337	1051			0.374	7.3	97.1%	22.8	7.9	97.7%	24.6	7.0	
31					32.2	97.2	0.362						0.0	7.0	8
TOTAL	2565	5286	2920	6079	426	873	8.060	68		141	83		172.7	221	1021
	AVG 285	AVG 587	AVG 324	AVG 675	AVG 47.36	AVG 97.0	AVG 0.260	AVG 7.59	AVG 97.3	AVG 15.68	AVG 9.26	AVG 97.1	AVG 5.57	MIN 7.0	GEM 24
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 328	MAX 792	MAX 390	MAX 1051	MAX 61.10	MAX 109.1	MAX 0.374	AVW 8.75		AVW 16.10	AVW 10.45		AVW 21.20	MAX 7.4	GM7 269
Limits								45		263	45		263	9.0	200

Please Circle ALL Permit Violations **Mail to P.O. Box 47775, Olympia WA 98504-7775**

AVG=Average **AVW** =Highest Weekly Average **GEM**=Geometric Mean **MAX**=Maximum **MIN**=Minimum
GM7=highest 7-day Geometric Mean

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272 **Month:** October **Year:** 2012

Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator:** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 5210

PHASE 1 - EFFLUENT CONT

..equency	2/WEEK	2/WEEK	2/WEEK		
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TEMPERATURE DEGREES C	RAIN FALL Inches
1				21.3	0.00
2			111.6	21.2	0.00
3	0.50	0.88		20.7	0.00
4			107.3	20.4	0.00
5	0.50	0.87		20.3	0.00
6				20.3	0.00
7				20.6	0.00
8				20.6	0.00
9			113.4	20.6	0.00
10	0.30	0.55		20.9	0.00
11			116.8	20.4	0.00
12	0.30	0.63		20.1	1.10
13				20.2	0.01
14				20.4	0.45
15				20.5	0.27
16			99.3	20.4	0.00
17	0.30	0.58		20.1	0.00
18			97.5	19.9	0.10
19	0.30	0.60		19.9	0.40
20				19.6	0.30
21				19.3	0.12
22				19.1	0.80
23			93.3	18.5	0.50
24	0.30	0.75		18.5	0.09
25			76.6	18.5	0.01
26	0.30	0.64		18.5	0.01
27				18.6	0.75
28				18.9	1.10
29				18.4	0.38
30			74.1	18.3	0.90
31	0.30	0.91		18.3	0.38
TOTAL	3.1	6.41	889.9	613.3	7.67
	AVG 0.34	AVG 0.71	AVG 98.9	AVG 19.8	
Permit	1.4	8.2			
	MAX 0.50	MAX 0.91	MAX 116.8	MAX 21.3	
Limits	3.14				

Receiving Water is to be sampled May - October

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John Duback WWTP Operator

Name and Title

Signature

WASTEWATER TREATMENT PLANT MONITORING REPORT

Permit No. WA0023272

Month: November Year: 2012

Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT — County: CLARK

Receiving Water: LAKE RIVER — Plant Operator: John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION — Population: 5210

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT								
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WEEK
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1	246	689	266	745			0.336	5.7	97.7%	16.0	8.0	97.0%	22.4	7.0	
2					45.1	110.2	0.293						0.0	6.9	6
3							0.328						0.0	7.2	
4							0.288						0.0	7.2	
5							0.311						0.0	7.0	
6	282	604	311	667			0.257	5.0	98%	10.7	6.2	98.0%	13.3	7.2	
7					47.9	105.5	0.264						0.0	7.1	5
8	254	563	272	603			0.266	4.6	98.2%	10.2	7.7	97.2%	17.1	7.0	
9					52.1	110.4	0.254						0.0	7.2	9
10							0.250						0.0	6.8	
11							0.271						0.0	7.0	
12							0.317						0.0	7.0	
13	260	575	272	601			0.265	7.0	97%	15.5	11.2	96%	24.8	7.0	
14					32.1	71.5	0.267						0.0	7.0	1
15	297	671	280	633			0.271	6.6	97.8%	14.9	6.9	97.5%	15.6	7.0	
16					41.1	88.1	0.257						0.0	6.8	14
17							0.332						0.0	7.1	
18							0.375						0.0	7.1	
19	117	757	130	841			0.776	6.1	94.8%	39.5	4.4	96.6%	28.5	7.0	
20	151	706	141	660	16.9	79.1	0.561	3.6	97.6%	16.8	5.8	95.9%	27.1	6.9	1
21					17.6	68.4	0.466						0.0	6.9	2
22							0.402						0.0	7.0	
23							0.445						0.0	7.1	
24							0.473						0.0	7.0	
25							0.393						0.0	7.0	
26							0.349						0.0	6.9	
27	241	647	267	717			0.322	6.6	97.3%	17.7	12.4	95%	33.3	7.0	
28					38.8	102.9	0.318						0.0	7.1	1
29	230	604	279	733			0.315	7.5	96.7%	19.7	10.4	96.3%	27.3	6.9	
30					45.4	131.4	0.347						0.0	6.8	10
TOTAL	2078	5818	2218	6200	337	867	10.369	52.7		161	73.0		209.4	210	49
	AVG 231	AVG 646	AVG 246	AVG 689	AVG 37.44	AVG 96.37	AVG 0.346	AVG 5.86	AVG 97.3	AVG 17.89	AVG 8.11	AVG 96.6	AVG 6.98	MIN 6.8	GEM 3
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 297	MAX 757	MAX 311	MAX 841	MAX 52.10	MAX #####	MAX 0.776	AVW 7.05	.	AVW 28.15	AVW 11.40		AVW 30.30	MAX 7.2	GM7 7
Limits								45		263	45		263	9.0	200

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John Duback WWTP Operator

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Signature

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Facility Name: RIDGEFIELD WASTEWATER TREATMENT PLANT | County: CLARK

Receiving Water: LAKE RIVER | Plant Operator: : John Duback

Plant Type: ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION | Population: 5210

	PHASE 1 - EFFLUENT CONT															
equency	2/WEEK	2/WEEK	2/WEEK	CONT												
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TEMPERATURE DEGREES C									RAIN FALL Inches			
1			71.5	18.1									0.07			
2	0.30	0.73		18.1									0.51			
3				18.2									0.03			
4				18.2									0.01			
5				18.8									0.00			
6			78.4	18.3									0.01			
7	0.30	0.66		18.4									0.00			
8			82.8	17.8									0.00			
9	0.30	0.64		17.5									0.00			
10				17.3									0.00			
11				17.1									0.65			
12				17.4									0.05			
13			83.5	17.6									0.01			
14	0.30	0.67		17.5									0.00			
15			87.5	17.4									0.00			
16	0.30	0.64		17.2									0.40			
17				17.0									0.35			
18				16.5									1.78			
19			70.4	15.7									1.35			
20	0.30	1.40	67.4	15.4									0.36			
21	0.30	1.17		15.5									0.50			
22				16.0									0.05			
23				15.6									1.00			
24				15.5									0.05			
25				15.5									0.00			
26				15.6									0.00			
27			74.5	15.5									0.01			
28	0.30	0.80		15.5									0.05			
29			76.5	15.7									0.30			
30	0.30	0.87		15.8									0.90			
TOTAL	2.70	7.58	692.5	505.7									8.44			
	AVG 0.30	AVG 0.84	AVG 76.9	AVG 16.9												
Permit	1.4	8.2														
	MAX 0.30	MAX 1.40	MAX 87.5	MAX 18.8												
Limits	3.14															

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Name and Title

Signature

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Permit No. WA0023272

Month: December Year: 2012

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Receiving Water LAKE RIVER Plant Operator: : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION Population: 5210

	PHASE 1 - INFLUENT						PHASE 1 - EFFLUENT									
Frequency	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	2/WEEK	CONT	2/WEEK		2/WEEK	2/WEEK		2/WEEK	DAILY	3/WE...
Date	BOD 5-DAY MG/L	BOD 5-DAY LBS/DAY	TSS MG/L	TSS LBS/DAY	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	FLOW MGD	BOD 5-DAY MG/L	BOD 5-DAY % REMOVAL	BOD 5-DAY LBS/DAY	TSS MG/L	TSS % REMOVAL	TSS LBS/DAY	pH STANDARD UNITS	FECAL COLIFORM #/100 ML
1							0.460						0.0	6.9	
2							0.538						0.0	7.0	
3							0.468						0.0	7.0	
4	134	600	163	730			0.537	5.4	96.0%	24.2	7.3	95.5%	32.7	6.9	
5					17.8	66.2	0.446						0.0	6.8	1
6	174	560	207	666			0.386	3.0	98.3%	9.7	3.5	98.3%	11.3	6.9	
7					21.4	63.5	0.356						0.0	7.0	1
8							0.354						0.0	6.9	
9							0.370						0.0	7.0	
10							0.353						0.0	6.9	
11	236	683	210	608			0.347	5.0	97.9%	14.5	5.7	97.3%	16.5	7.0	
12					22.4	66.1	0.354						0.0	7.0	2
13	208	590	209	593			0.340	3.8	98.2%	10.8	4.3	97.9%	12.2	6.9	
14					29.2	84.3	0.346						0.0	6.9	5
15							0.420						0.0	6.9	
16							0.553						0.0	6.8	
17							0.563						0.0	6.8	
18	167	655	156	611			0.470	4.5	97.3%	17.6	3.4	97.8%	13.3	7.0	
19					27.8	114.8	0.495						0.0	6.9	4
20	150	913	140	852			0.730	7.5	95.0%	45.7	6.4	95.4%	39.0	7.0	
21					22.9	96.4	0.505						0.0	6.8	4
22							0.477						0.0	7.0	
23							0.496						0.0	6.9	
24							0.492						0.0	7.1	
25	182	894	181	889			0.589	7.3	96.0%	35.9	6.8	96.2%	33.4	7.0	
26					19.3	85.6	0.532						0.0	6.8	3
27	281	1010	297	1068			0.431	5.5	98.0%	19.8	4.8	98.4%	17.3	6.8	
28					32.2	102.6	0.382						0.0	6.9	3
29							0.354						0.0	7.0	
30							0.351						0.0	7.0	
31							0.328						0.0	7.0	
TOTAL	1532	5905	1563	6017	193	680	13.823	42		178	42		176	215	23
	AVG 192	AVG 738	AVG 195	AVG 752	AVG 24.13	AVG 84.9	AVG 0.446	AVG 5.25	AVG 97.1	AVG 22.25	AVG 5.28	AVG 97.1	AVG 5.66	MIN 6.8	GEM 2
Permit		1,240		1,240		160	0.7	30	85	175	30	85	175	6.0	100
	MAX 281	MAX 1010	MAX 297	MAX 1068	MAX 32.20	MAX 114.8	MAX 0.730	AVW 6.40		AVW 31.65	AVW 5.80		AVW 26.15	7.1	GM7 4
Limits								45		263	45		263	9.0	200

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John Duback WWTPO

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Facility Name RIDGEFIELD WASTEWATER TREATMENT PLANT **County:** CLARK

Receiving Water LAKE RIVER **Plant Operator** : John Duback

Plant Type ACTIVATED SLUDGE W/SECONDARY CLARIFIER & UV DISINFECTION **Population:** 5210

	PHASE 1 - EFFLUENT CONT														
equency	2/WEEK	2/WEEK	2/WEEK	CONT											
Date	AMMONIA AS N MG/L	AMMONIA AS N LBS/DAY	ALKALINITY MG/L AS CACO3	TEMPERATURE DEGREES C								RAINFALL Inches			
1				15.3								0.71			
2				14.8								0.52			
3				14.9								0.54			
4			74.1	15.0								0.40			
5	0.30	1.12		14.8								0.02			
6			71.5	14.8								0.15			
7	0.40	1.19		14.8								0.05			
8				14.7								0.10			
9				15.1								0.27			
10				15.2								0.30			
11			72.9	15.1								0.40			
12	0.30	0.89		14.9								0.18			
13			72.5	15.0								0.40			
14	0.30	0.87		14.8								0.02			
15				14.4								1.00			
16				13.3								1.25			
17				13.4								0.48			
18			70.5	13.4								0.20			
19	0.30	1.24		13.4								1.50			
20			69.1	12.7								0.40			
21	0.30	1.26		12.8								0.39			
22				13.4								0.10			
23				12.7								0.74			
24				12.9								0.52			
25			77.5	13.4								0.70			
26	1.00	4.44		12.9								0.10			
27			74.8	13.2								0.02			
28	0.60	1.91		12.9								0.00			
29				13.4								0.02			
30				13.5								0.00			
31				13.1								0.15			
TOTAL	3.5	12.92	582.9	434								11.63			
	AVG 0.44	AVG 1.62	AVG 72.9	AVG 14.0											
Permit	1.4	8.2													
	MAX 1.00	MAX 4.44	MAX 77.5	MAX 15.3											
Limits	3.14														

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APPENDIX F

2005 FLOW PROJECTIONS BY BASIN

FLOW PROJECTIONS FOR THE BOSCHA ANEXATION

FLOW PROJECTIONS FOR PROPOSED TRUNK SEWERS

Ridgefield UGA Flow Projections by Basin	Basin Identification		Land Use Subdivision (acres)	Land Use corrected to 42.5% for unbuildable	Peak Month Flow	EDUs	Population Equivilant	Peaking Factor	Average Annual Flow	Peak Flow gpd	Peak Flow GPM	Peak Flow CFS	Sum of Peak flows CFS
	1	MPBP	400.1		300,076	800	2,001	4	192,839	691,462	480	1.07	1.07
		MPBP	88.7		66,498	177	443	4	42,734	170,958	119	0.26	1.33
		INDUS PK	35.6		26,676	71	178	4	17,143	71,421	50	0.11	1.44
		PLANNED COMM	15.0		11,255	30	75	4	7,233	30,924	21	0.05	1.49
		INDUS PK	90.5		67,907	181	453	4	43,639	174,385	121	0.27	1.76
		LDR 7.5	43.5	18.5	40,279	107	269	4	25,884	106,090	74	0.16	1.93
		MPBP	2.6		1,939	5	13	4	1,246	5,486	4	0.01	1.94
		Total Basin 1			514,629	1,372	3,431	3	330,718	1,121,873	779	1.74	

Ridgefield UGA Flow Projections by Basin	Basin Identification		Land Use Subdivision (acres)	Land Use corrected to 42.5% for unbuildable	Peak Month Flow	EDUs	Population Equivilant	Peaking Factor	Average Annual Flow	Peak Flow gpd	Peak Flow GPM	Peak Flow CFS	Sum of Peak flows CFS
	2	INDUS PK	311.3		233,486	623	1,557	3.67	150,046	550,348	382.19	0.85	0.85
		MPBP	85.3		63,950	171	426	4.01	41,097	164,750	114.41	0.25	1.11
		PLANNED	99.4		74,561	199	497	3.98	47,916	190,490	132.28	0.29	1.40
		INDUS PK	50.4		37,826	101	252	4.11	24,308	99,896	69.37	0.15	1.56
		INDUS PK	36.0		26,975	72	180	4.16	17,335	72,191	50.13	0.11	1.67
		MPBP	23.9		17,947	48	120	4.22	11,533	48,686	33.81	0.08	1.74
		Total Basin 2			454,744	1,213	3,032	3.44	292,233	1,004,854	697.82	1.55	

Ridgefield UGA Flow Projections by Basin	Basin Identification		Land Use Subdivision (acres)	Land Use corrected to 42.5% for unbuildable	Peak Month Flow	EDUs	Population Equivilant	Peaking Factor	Average Annual Flow	Peak Flow gpd	Peak Flow GPM	Peak Flow CFS	Sum of Peak flows CFS
	2A	MDR 16	28.3	12.0	144,330.00	385	962	3.81	92,751	353,450	245.45	0.55	0.55
		LDR 7.5	145.53	61.9	134,709.84	359	898	3.83	86,569	331,526	230.23	0.51	1.06
		Total Basin 2A			279039.845	744.1063	1860.2656	3.610034	179320.28	647352.229	449.5502	1.001671	

Ridgefield UGA Flow Projections by Basin	Basin Identification		Land Use Subdivision (acres)	Land Use corrected to 42.5% for unbuildable	Peak Month Flow	EDUs	Population Equivilant	Peaking Factor	Average Annual Flow	Peak Flow gpd	Peak Flow GPM	Peak Flow CFS	Sum of Peak flows CFS
	3	INDUS PK	7.206		5,404.50	14.41	36.03	4.34	3,473.11	15,078.29	10.47	0.02	0.02
		INDUS PK	156.522		117,391.50	313.04	782.61	3.87	75,439.68	291,658.85	202.54	0.45	0.47
		INDUS PK	70.071		52,553.25	140.14	350.36	4.05	33,772.46	136,739.36	94.96	0.21	0.69
		INDUS PK	6.005		4,503.75	12.01	30.03	4.35	2,894.26	12,603.57	8.75	0.02	0.71
		Total Basin 3			179,853.00	479.61	1,199.02	3.75	115,579.51	433,168.12	300.81	0.67	

Ridgefield UGA Flow Projections by Basin	Basin Identification		Land Use Subdivision (acres)	Land Use corrected to 42.5% for unbuildable	Peak Month Flow	EDUs	Population Equivilant	Peaking Factor	Average Annual Flow	Peak Flow gpd	Peak Flow GPM	Peak Flow CFS	Sum of Peak flows CFS
	4	MPBP	238.294		178,721	477	1,191	3.75	114,852	430,655	299.1	0.67	0.67
		INDUS PK	51.347		38,510	103	257	4.11	24,748	101,627	70.6	0.16	0.82
		MPBP	13.69		10,268	27	68	4.29	6,598	28,274	19.6	0.04	0.87
		INDUS PK	33.162		24,872	66	166	4.18	15,983	66,756	46.4	0.10	0.97
		Total Basin 4			252,370	673	1,682	3.64	162,181	590,819	410.3	0.91	

Ridgefield UGA Flow Projections by Basin	Basin Identification		Land Use Subdivision (acres)	Land Use corrected to 42.5% for unbuildable	Peak Month Flow	EDUs	Population Equivilant	Peaking Factor	Average Annual Flow	Peak Flow gpd	Peak Flow GPM	Peak Flow CFS	Sum of Peak flows CFS
	5	MDR 16	39.333	16.716525	200,598	535	1,337.32	3.72	128,911	478,912	332.58	0.74	0.74
		LDR 6	39.882	16.94985	46,146	123	307.64	4.07	29,655	120,808	83.89	0.19	0.93
		MDR 16	21.698	9.22165	110,660	295	737.73	3.88	71,114	276,014	191.68	0.43	1.36
		MDR 16	6.054	2.57295	30,875	82	205.84	4.14	19,842	82,213	57.09	0.13	1.48
		MDR 16	4.696	1.9958	23,950	64	159.66	4.18	15,391	64,366	44.70	0.10	1.58
		N COMM	8.189		6,142	16	40.95	4.33	3,947	17,096	11.87	0.03	1.61
		LDR 8.5	79.108	33.6209	64,611	172	430.74	4.01	41,521	166,363	115.53	0.26	1.87
		Total Basin 5			482,982	1,288	3,219.88	3.42	310,380	1,060,298	736.32	1.64	

Ridgefield UGA Flow Projections by Basin	Basin Identification		Land Use Subdivision (acres)	Land Use corrected to 42.5% for unbuildable	Peak Month Flow	EDUs	Population Equivilant	Peaking Factor	Average Annual Flow	Peak Flow gpd	Peak Flow GPM	Peak Flow CFS	Sum of Peak flows CFS
	6	LDR 8.5	73.367	31.2	59,922.50	160	399	4.02	38,508	154,896	107.6	0.24	0.24
		Total Basin 6			59,922.50	160	399	4.02	38,508	154,896	107.6	0.24	

Ridgefield UGA Flow Projections by Basin	Basin Identification		Land Use Subdivision (acres)	Land Use corrected to 42.5% for unbuildable	Peak Month Flow	EDUs	Population Equivilant	Peaking Factor	Average Annual Flow	Peak Flow gpd	Peak Flow GPM	Peak Flow CFS	Sum of Peak flows CFS
	6A	LDR 8.5	105.1	44.7	85,860.03	229	572	3.94	55,177	217,577	151.1	0.34	0.34
		Total Basin 6 A			85,860.03	229	572	3.94	55,177	217,577	151.1	0.34	

Ridgefield UGA Flow Projections by Basin	Basin Identification		Land Use Subdivision (acres)	Land Use corrected to 42.5% for unbuildable	Peak Month Flow	EDUs	Population Equivilant	Peaking Factor	Average Annual Flow	Peak Flow gpd	Peak Flow GPM	Peak Flow CFS	Sum of Peak flows CFS
	7	LDR 8.5	177	75.2	144,565	386	964	3.81	92,902	353,983	245.82	0.55	0.55
		LDR 8.5	5.029	2.1	4,107	11	27	4.36	2,640	11,511	7.99	0.02	0.02
		MDR 16	3.721	1.6	18,977	51	127	4.21	12,195	51,393	35.69	0.08	0.63
		LDR 7.5	81.671	34.7	75,599	202	504	3.97	48,582	192,991	134.02	0.30	0.93
		MDR 16	4.899	2.1	58,788	157	392	4.03	37,779	152,112	105.63	0.24	1.16
		Pub Fac.	62.04		46,530	124	310	4.07	29,902	121,767	84.56	0.19	
		Total Basin 7			348,566	930	2,324	3.53	224,000	791,665	549.77	1.22	

Ridgefield UGA Flow Projections by Basin	Basin Identification		Land Use Subdivision (acres)	Land Use corrected to 42.5% for unbuildable	Peak Month Flow	EDUs	Population Equivilant	Peaking Factor	Average Annual Flow	Peak Flow gpd	Peak Flow GPM	Peak Flow CFS	Sum of Peak flows CFS
	8	LDR 8.5	258.42	109.83	211,060	563	1,407	3.70	135,634	501,776	348.46	0.78	0.78
		LDR 10	47.63	20.24	33,067	88	220	4.13	21,250	87,812	60.98	0.14	0.14
		Nhood Com	3.60		2,700	7	18	4.39	1,735	7,611	5.29	0.01	0.15
		MDR 16	15.51	6.59	79,116	211	527	3.96	50,843	201,448	139.89	0.31	0.45
		Total Basin 6			325,944	869	2,173	3.56	209,462	745,163	517.47	1.15	

Ridgefield UGA Flow Projections by Basin	Basin Identification		Land Use Subdivision (acres)	Land Use corrected to 42.5% for unbuildable	Peak Month Flow	EDUs	Population Equivilant	Peaking Factor	Average Annual Flow	Peak Flow gpd	Peak Flow GPM	Peak Flow CFS	Sum of Peak flows CFS
	9	LDR 8.5	69.4	29.5	56,703	151	378	4.03	36,439	146,984	102.07	0.23	0.23
		Total Basin 9			56,703	151	378	4.03	36,439	146,984	102:07	0.23	

Ridgefield UGA Flow Projections by Basin	Basin Identification		Land Use Subdivision (acres)	Land Use corrected to 42.5% for unbuildable	Peak Month Flow	EDUs	Population Equivilant	Peaking Factor	Average Annual Flow	Peak Flow gpd	Peak Flow GPM	Peak Flow CFS	Sum of Peak flows CFS
	10	LDR 8.5	129.2	54.9	105,514	281	703	3.89	67,807	263,995	183.33	0.41	0.41
		Total Basin 10			105,514	281	703	3.89	67,807	263,995	183.33	0.41	

Ridgefield UGA Flow Projections by Basin	Basin Identification		Land Use Subdivision (acres)	Land Use corrected to 42.5% for unbuildable	Peak Month Flow	EDUs	Population Equivilant	Peaking Factor	Average Annual Flow	Peak Flow gpd	Peak Flow GPM	Peak Flow CFS
	11	LDR 5	90.38	38.411	73,816.23	196.84	492.11	3.98	47,436.76	188,692.55	131.04	0.29
		LDR 8.5	8.40	3.570	6,860.70	18.30	45.74	4.32	4,408.91	19,056.94	13.23	0.03
		DT Mix Use	22.80		17,103.00	45.61	114.02	4.23	10,990.96	46,464.71	32.27	0.07
		WF Mix Use	50.21		37,658.25	100.42	251.06	4.11	24,200.44	99,473.08	69.08	0.15
		LDR 7.5	43.42	18.453	40,189.87	107.17	267.93	4.10	25,827.35	105,865.66	73.52	0.16
		LDR 7.5	83.40	35.445	77,199.21	205.86	514.66	3.97	49,610.78	196,842.52	136.70	0.30
		MDR 16	7.70	3.271	92,364.00	246.30	615.76	3.93	59,356.18	233,031.81	161.83	0.36
		MDR 16	2.02	0.860	24,288.00	64.77	161.92	4.18	15,608.28	65,243.98	45.31	0.10
		MDR 16	1.34	0.570	16,080.00	42.88	107.20	4.24	10,333.54	43,764.50	30.39	0.07
		MDR 16	2.90	1.233	34,800.00	92.80	232.00	4.12	22,363.64	92,224.06	64.04	0.14
		MDR 16	0.73	0.309	8,736.00	23.30	58.24	4.30	5,614.04	24,145.17	16.77	0.04
		MDR 16	1.30	0.553	15,600.00	41.60	104.00	4.24	10,025.08	42,495.04	29.51	0.07
	Cemetary	Pub Fac.	9.75			-	-		-	-	-	-
		Pub Fac.	15.30		11,471.25	30.59	76.48	4.27	7,371.81	31,504.69	21.88	0.05
		Pub Fac.	4.73		3,545.25	9.45	23.64	4.37	2,278.30	9,957.20	6.91	0.02
		Total Basin 11			459,711.76	1,225.90	3,064.75	3.43	295,426.05	1,014,644.06	704.61	1.57

Ridgefield UGA Flow Projections by Basin	Basin Identification		Land Use Subdivision (acres)	Land Use corrected to 42.5% for unbuildable	Peak Month Flow	EDUs	Population Equivilant	Peaking Factor	Average Annual Flow	Peak Flow gpd	Peak Flow GPM	Peak Flow CFS	Sum of Peak flows CFS
	12	LDR 8.5	88.3	37.5	72159.0	192	481	3.98	46,372	184,689	128.26	0.29	0.29
		LDR 8.5	19.8	8.4	16207.6	43	108	4.23	10,416	44,102	30.63	0.07	0.07
		MDR 16	15.1	6.4	76826.4	205	512	3.97	49,371	195,946	136.07	0.30	0.59
		LDR 7.5	142.3	60.5	131719.1	351	878	3.84	84,647	324,679	225.47	0.50	1.09
		Pub Park	0		-	-	-	-	-	-	-	-	
		Total Basin 12			296,912	792	1,979	3.59	190,806	684,854	476	1.06	

Ridgefield UGA Flow Projections by Basin	Basin Identification		Land Use Subdivision (acres)	Land Use corrected to 42.5% for unbuildable	Peak Month Flow	EDUs	Population Equivilant	Peaking Factor	Average Annual Flow	Peak Flow gpd	Peak Flow GPM	Peak Flow CFS	Sum of Peak flows CFS
	13	MDR 16	45.45	19.32	231,810	618	1,545	3.67	148,969	546,739	379.68	0.85	0.85
		LDR 7.5	79.31	33.71	73,414	196	489	3.98	47,178	187,722	130.36	0.29	1.14
		Total Basin 13			305,225	814	2,035	3.58	196,147	702,197	487.64	1.09	

Ridgefield UGA Flow Projections by Basin	Basin Identification		Land Use Subdivision (acres)	Land Use corrected to 42.5% for unbuildable	Peak Month Flow	EDUs	Population Equivilant	Peaking Factor	Average Annual Flow	Peak Flow gpd	Peak Flow GPM	Peak Flow CFS
	1	MPBP	400.1		300,076	800	2,001	3.59	192,839	691,462	480.18	1.07
		MPBP	88.7		66,498	177	443	4.00	42,734	170,958	118.72	0.26
		INDUS PK	35.6		26,676	71	178	4.17	17,143	71,421	49.60	0.11
		INDUS PK	90.5		67,907	181	453	4.00	43,639	174,385	121.10	0.27
		LDR 7.5	43.5	18.5	40,279	107	269	4.10	25,884	106,090	73.67	0.16
		PLANNED	15.0		11,255	30	75	4.28	7,233	30,924	21.47	0.05
		MPBP	2.6		1,939	5	13	4.40	1,246	5,486	3.81	0.01
		Total Basin 1			514,629	1,372	3,431	3.39	330,718	1,121,873	779.08	1.74
	2	INDUS PK	311.3		233,486	623	1,557	3.67	150,046	550,348	382.19	0.85
		MPBP	85.3		63,950	171	426	4.01	41,097	164,750	114.41	0.25
		PLANNED	99.4		74,561	199	497	3.98	47,916	190,490	132.28	0.29
		INDUS PK	50.4		37,826	101	252	4.11	24,308	99,896	69.37	0.15
		INDUS PK	36.0		26,975	72	180	4.16	17,335	72,191	50.13	0.11
		MPBP	23.9		17,947	48	120	4.22	11,533	48,686	33.81	0.08
		LDR 7.5	145.5	61.9	134,710	359	898	3.83	86,569	331,526	230.23	0.51
		MDR 16	28.3	12.0	144,325	385	962	3.81	92,748	353,438	245.44	0.55
		Total Basin 2			733,778	1,957	4,892	3.25	471,550	1,534,327	1,065.50	2.37
	3	INDUS PK	7.2		5,405	14	36	4.34	3,473	15,078	10.47	0.02
		INDUS PK	156.5		117,392	313	783	3.87	75,440	291,659	202.54	0.45
		INDUS PK	70.1		52,553	140	350	4.05	33,772	136,739	94.96	0.21
		INDUS PK	6.0		4,504	12	30	4.35	2,894	12,604	8.75	0.02
		Total Basin 3			179,853	480	1,199	3.75	115,580	433,168	300.81	0.67
	4	MPBP	238.3		178,721	477	1,191	3.75	114,852	430,655	299.07	0.67
		INDUS PK	51.3		38,510	103	257	4.11	24,748	101,627	70.57	0.16
		MPBP	13.7		10,268	27	68	4.29	6,598	28,274	19.63	0.04
		INDUS PK	33.2		24,872	66	166	4.18	15,983	66,756	46.36	0.10
		Total Basin 4			252,370	673	1,682	3.64	162,181	590,819	410.29	0.91
	13	MDR 16	45.5	19.3	231,810	618	1,545	3.67	148,969	546,739	379.68	0.85
		LDR 7.5	79.3	33.7	73,414	196	489	3.98	47,178	187,722	130.36	0.29
		Total Basin 12			305,225	814	2,035	3.58	196,147	702,197	487.64	1.09
		All of drainage			1,985,855		13,239	2.8	1,276,176	3,615,164	2510.53	5.593873
For 45th Ave Pump Station and force main												
Force main length	3,450 feet											
Change in ground level elevation 40 feet												

	Land Use Subdivision (acres)	Land Use corrected to 42.5% for unbuildable	Peak Month Flow	EDUs	Population Equivilant	Peaking Factor	Average Annual Flow	Peak Flow gpd	Peak Flow GPM	Peak Flow CFS
MPBP	400.101		300,076	800	2,001	4	192,839	691,462	480.18	1.07
Total Basin for 279th PS			300,076	800	2,001	4	192,839	691,462	480.18	1.07
For 279th Pump Station and force main										
Force main length	2,600 feet									
Change in ground level elevation 10 feet										

	Land Use Subdivision (acres)	Land Use corrected to 42.5% for unbuildable	Peak Month Flow	EDUs	Population Equivilant	Peaking Factor	Average Annual Flow	Peak Flow gpd	Peak Flow GPM	Peak Flow CFS
MPBP	400.10		300,076	800.20	2,001	3.59	192,839	691,462	480.18	1.07
MPBP	88.66		66,498	177.33	443	4.00	42,734	170,958	118.72	0.26
INDUS PK	35.57		26,676	71.14	178	4.17	17,143	71,421	49.60	0.11
PLANNED COMM	15.01		11,255	30.01	75	4.28	7,233	30,924	21.47	0.05
INDUS PK	90.54		67,907	181.09	453	4.00	43,639	174,385	121.10	0.27
LDR 7.5	43.51	18.49	40,279	107.41	269	4.10	25,884	106,090	73.67	0.16
MPBP	2.59		1,939	5.17	13	4.40	1,246	5,486	3.81	0.01
Total Basin 1			514,629	1,372.34	3,431	3.39	330,718	1,121,873	779.08	1.74
For Basin 1 Pump Station and force main										
Force main length	2,900 feet									
Change in ground level elevation 40 feet										

CITY OF RIDGEFIELD
BOSCHMA/TRI-MOUNTAIN/UNION RIDGE/JUNCTION AREA
SEWER COLLECTION SYSTEM CAPACITY ANALYSIS

Basin: Boschma Addition and Tri Mountain

Manhole		Diameter	Length	Slope	Pipe	Manning	Capacity		2012 Estimate		Capacity Greater than	Required Pipe
Upstream	Downstream	(in)	(ft)	(ft/ft)	Type	Coefficient	(cfs)	(MGD)	(cfs)	(MGD)	or Equal to 1.25*Flow	Size for Upgrade
J11-14	J-11-13	8	241	0.004	PVC	0.012	0.83	0.54	0.06	0.04	yes	Adequate
J-11-13	J-11-12	8	281	0.0048	PVC	0.012	0.91	0.59	0.06	0.04	yes	Adequate
J-11-12	J-11-11	8	282	0.0053	PVC	0.012	0.96	0.62	0.06	0.04	yes	Adequate
J-11-11	J-11-10	8	65	0.0043	PVC	0.012	0.86	0.56	0.06	0.04	yes	Adequate
J-11-10	J-11-9	8	211	0.005	PVC	0.012	0.93	0.60	0.06	0.04	yes	Adequate
J-11-9	J-11-8	8	211	0.0055	PVC	0.012	0.97	0.63	0.06	0.04	yes	Adequate
J-11-8	J-11-7	8	24	0.0042	PVC	0.012	0.85	0.55	0.06	0.04	yes	Adequate
J-11-7	J-11-6	8	110	0.005	PVC	0.012	0.93	0.60	0.06	0.04	yes	Adequate
J-11-6	J-11-5	8	259	0.0046	PVC	0.012	0.89	0.58	0.06	0.04	yes	Adequate
J-11-5	J-11-4	8	260	0.0045	PVC	0.012	0.88	0.57	0.06	0.04	yes	Adequate
J-11-4	J-11-3	8	236	0.0052	PVC	0.012	0.95	0.61	0.06	0.04	yes	Adequate
J-11-3	J-11-2	8	91	0.0057	PVC	0.012	0.99	0.64	0.06	0.04	yes	Adequate
J-11-2	J-11-1	8	205	0.0066	PVC	0.012	1.07	0.69	0.06	0.04	yes	Adequate
J-11-1	MHJ-11	8	269	0.0222	PVC	0.012	1.96	1.26	0.06	0.04	yes	Adequate

Basin: Union Ridge

Manhole		Diameter	Length	Slope [1]	Pipe	Manning	Capacity		2012 Estimate		Capacity Greater than	Required Pipe
Upstream	Downstream	(in)	(ft)	(ft/ft)	Type	Coefficient	(cfs)	(MGD)	(cfs)	(MGD)	or Equal to 1.25*Flow	Size for Upgrade
UR-8-1	J-24	8	327	0.0048	PVC	0.012	0.91	0.59	0.64	0.41	yes	Adequate
J-24	J-23	10	75	0.0035	PVC	0.012	1.41	0.91	0.64	0.41	yes	Adequate
J-23	J22A	10	401	0.0028	PVC	0.012	1.26	0.81	0.64	0.41	yes	Adequate
J22A	J-22	10	402	0.0027	PVC	0.012	1.24	0.80	0.64	0.41	yes	Adequate
J-22	J-21	10	199	0.0027	PVC	0.012	1.24	0.80	0.64	0.41	yes	Adequate
J-21	J-20A	10	103	0.0057	PVC	0.012	1.80	1.16	0.64	0.41	yes	Adequate
J-20A	J-20	10	89	0.0034	PVC	0.012	1.39	0.90	0.64	0.41	yes	Adequate
J-20	J-19	12	340	0.0022	PVC	0.012	1.82	1.17	0.64	0.41	yes	Adequate
J-19	J-18	12	195	0.0022	PVC	0.012	1.82	1.17	0.64	0.41	yes	Adequate
J-18	J-17	12	196	0.0022	PVC	0.012	1.82	1.17	0.64	0.41	yes	Adequate
J-17	J-16	12	197	0.0022	PVC	0.012	1.82	1.17	0.64	0.41	yes	Adequate
J-16	J-15	12	175	0.0022	PVC	0.012	1.82	1.17	0.64	0.41	yes	Adequate
J-15	J-14	12	172	0.0022	PVC	0.012	1.82	1.17	0.64	0.41	yes	Adequate
J-14	J-13	12	220	0.0022	PVC	0.012	1.82	1.17	0.64	0.41	yes	Adequate
J-13	J-12	12	220	0.0022	PVC	0.012	1.82	1.17	0.64	0.41	yes	Adequate
J-12	MHJ-11	12	162	0.0022	PVC	0.012	1.82	1.17	0.64	0.41	yes	Adequate

[1] Slope is assumed at minimum since as-built drawings are not available between J-20 and MHJ-11

Basin: I-5 Crossing

Manhole		Diameter	Length	Slope	Pipe	Manning	Capacity		2012 Estimate		Capacity Greater than	Required Pipe
Upstream	Downstream	(in)	(ft)	(ft/ft)	Type	Coefficient	(cfs)	(MGD)	(cfs)	(MGD)	or Equal to 1.25*Flow	Size for Upgrade
MHJ-11	J-10	12	157	0.0041	PVC	0.012	2.48	1.60	0.67	0.44	yes	Adequate
J-10	J-9	12	301	0.0028	PVC	0.012	2.05	1.32	0.67	0.44	yes	Adequate

Basin: West of I-5

Manhole		Diameter	Length	Slope	Pipe	Manning	Capacity		2012 Estimate		Capacity Greater than	Required Pipe
Upstream	Downstream	(in)	(ft)	(ft/ft)	Type	Coefficient	(cfs)	(MGD)	(cfs)	(MGD)	or Equal to 1.25*Flow	Size for Upgrade
J-9	J-9-3	8	122	0.019	PVC	0.012	1.81	1.17	0.67	0.44	yes	Adequate
J-9-3	J-8	8	170	0.004	PVC	0.012	0.83	0.54	0.73	0.47	no	9
J-8	J-7	8	350	0.004	PVC	0.012	0.83	0.54	0.73	0.47	no	9
J-7	J-6	8	350	0.004	PVC	0.012	0.83	0.54	0.73	0.47	no	9
J-6	J-5	8	200	0.004	PVC	0.012	0.83	0.54	0.73	0.47	no	9
J-5	J-4	8	350	0.0072	PVC	0.012	1.11	0.72	0.73	0.47	yes	Adequate
J-4	J-3	8	400	0.0072	PVC	0.012	1.11	0.72	0.73	0.47	yes	Adequate
J-3	J-2	8	350	0.0072	PVC	0.012	1.11	0.72	0.73	0.47	yes	Adequate
J-2	J-1	8	247	0.004	PVC	0.012	0.83	0.54	0.73	0.47	no	9
J-1	Junction Lift Station	8	365	0.004	PVC	0.012	0.83	0.54	0.73	0.47	no	9

Buildout Scenario Sewer Flow Projections

Tri Mountain Flow Contribution	Acres[3]	Flow/Acre	Maximum Month Flow (gpd)	Maximum Month Flow (MGD)	Maximum Month Flow (cfs)	Equivalent Population	Peaking Factor[2]	Average Day Flow (cfs)[1]	Peak Hour Flow (cfs)
RV Park [4]	-	-	8,880	0.009	0.014	63	4.29	0.009	0.040
Commercial	2.25	2,000	4,500	0.005	0.007	32	4.35	0.005	0.021
Total	2.25		13,380	0.013	0.021	95	4.25	0.014	**0.060**

[1] Average Day Flow is computed as 0.645*MMF from the General Sewer and Wastewater Facility Plan.

[2] The Peaking Factor is computed based on DOE "Orange Book" guidelines

[3] Acreage is based on area takeoff from Google Earth

[4] Estimated sewer flow is based on 74 RV sites and DOH LOSS recommended design flow of 120 gpd/site

Boschma Flow Contribution[4]	Acres[3]	Flow/Acre	Maximum Month Flow (gpd)	Maximum Month Flow (MGD)	Maximum Month Flow (cfs)	Equivalent Population	Peaking Factor[2]	Average Day Flow (cfs)[1]	Peak Hour Flow (cfs)
Office									
Industrial									
Total	0		0	0.000	0.000	0	4.50	0.000	**0.000**

[1] Average Day Flow is computed as 0.645*MMF from the General Sewer and Wastewater Facility Plan.

[2] The Peaking Factor is computed based on DOE "Orange Book" guidelines

[3] Acreage is based on zoning maps for the Boscha Development

[4] Only the flow contribution from the portion of the Boschma development within the same sewer basin as the UnionRidge development is

Union Ridge Flow Contribution	Acres[3]	Flow/Acre	Maximum Month Flow (gpd)	Maximum Month Flow (MGD)	Maximum Month Flow (cfs)	Equivalent Population	Peaking Factor[2]	Average Day Flow (cfs)[1]	Peak Hour Flow (cfs)
Residential									
Commercial	53	2,000	106,000	0.106	0.164	755	3.88	0.112	0.435
Office									
Industrial	58	180	10,440	0.010	0.016	74	4.28	0.011	0.047
Union Ridge Lot 5	11.4	10,965	125,000	0.125	0.193	891		0.132	
Total	111		241,440	0.241	0.374	1721	2.50	0.256	**0.639**

[1] Average Day Flow is computed as 0.645*MMF from the General Sewer and Wastewater Facility Plan.

[2] The Peaking Factor is computed based on DOE "Orange Book" guidelines

[3] Acreage is based on zoning maps for the Union Ridge Development

Total Flows from Development East of I-5	Acres	Flow/Acre	Maximum Month Flow (gpd)	Maximum Month Flow (MGD)	Maximum Month Flow (cfs)	Equivalent Population	Peaking Factor[2]	Average Day Flow (cfs)[1]	Peak Hour Flow (cfs)
Residential	0	5,680	0	0.000	0.000	0	4.50	0.000	0.000
Commercial	55.25	2,000	110,500	0.111	0.171	788	3.86	0.117	0.452
Office	0	400	0	0.000	0.000	0	4.50	0.000	0.000
Industrial	58	180	10,440	0.010	0.016	74	4.28	0.011	0.047
Union Ridge Lot 5	11.4	10,965	125,000	0.125	0.193	891	0.00	0.132	0.000
RV Park	-	-	8,880	0.009	0.014	63	4.29	0.009	0.040
Total	124.65		254,820	0.255	0.394	1816	2.50	0.270	**0.674**

[1] Average Day Flow is computed as 0.645*MMF from the General Sewer and Wastewater Facility Plan.

[2] The Peaking Factor is computed based on DOE "Orange Book" guidelines

North Junction Area Flow Contribution	Acres[3]	Flow/Acre	Maximum Month Flow (gpd)	Maximum Month Flow (MGD)	Maximum Month Flow (cfs)	Equivalent Population	Peaking Factor[2]	Average Day Flow (cfs)[1]	Peak Hour Flow (cfs)
Industrial	71	180	12,780	0.013	0.020	91	4.25	0.014	0.058
Total	71		12,780	0.013	0.020	91	4.25	0.014	**0.058**

[1] Average Day Flow is computed as 0.645*MMF from the General Sewer and Wastewater Facility Plan.

[2] The Peaking Factor is computed based on DOE "Orange Book" guidelines

[3] Acreage is based on area takeoff from Google Earth

South Junction Area Flow Contribution	Acres[3]	Flow/Acre	Maximum Month Flow (gpd)	Maximum Month Flow (MGD)	Maximum Month Flow (cfs)	Equivalent Population	Peaking Factor[2]	Average Day Flow (cfs)[1]	Peak Hour Flow (cfs)
Industrial	78	180	14,040	0.014	0.022	100	4.24	0.015	0.063
Total	78		14,040	0.014	0.022	100	4.24	0.015	**0.063**

[1] Average Day Flow is computed as 0.645*MMF from the General Sewer and Wastewater Facility Plan.

[2] The Peaking Factor is computed based on DOE "Orange Book" guidelines

[3] Acreage is based on area takeoff from Google Earth

Total Flows from Development West of I-5	Acres	Flow/Acre	Maximum Month Flow (gpd)	Maximum Month Flow (MGD)	Maximum Month Flow (cfs)	Equivalent Population	Peaking Factor[2]	Average Day Flow (cfs)[1]	Peak Hour Flow (cfs)
Industrial	149	180	26,820	0.027	0.041	191	4.16	0.028	0.118
Total	149		26,820	0.027	0.041	191	4.16	0.028	**0.118**

[1] Average Day Flow is computed as 0.645*MMF from the General Sewer and Wastewater Facility Plan.

[2] The Peaking Factor is computed based on DOE "Orange Book" guidelines

EDUs and Employment by Transportation Analysis Zone

TAZ	2033 Residential EDUs[(1)]	2033 Retail Employees[(2)]	2033 Non-Retail Employees[(2)]	% of total EDUs in TAZ[(3)]
464	793	1	8	6.2%
465	2,036	31	579	15.9%
466	11	133	1,147	0.1%
467	350	29	77	2.7%
468	496	41	514	3.9%
469	472	0	2	3.7%
470	1,075	0	0	8.4%
471	224	139	928	1.8%
472	433	479	2,405	3.4%
473	777	0	1	6.1%
561	497	0	18	3.9%
563	152	27	452	1.2%
564	100	6	11	0.8%
565	121	9	65	0.9%
584	630	842	1,711	4.9%
586	250	0	201	2.0%
587	878	639	488	6.9%
636	779	63	505	6.1%
637	608	79	2,733	4.8%
638	7	56	1,713	0.1%
639	23	0	0	0.2%
640	49	6	2	0.4%
641	1	127	675	0.0%
642	370	72	86	2.9%
643	276	29	88	2.2%
644	89	0	10	0.7%
645	147	0	0	1.2%
646	53	0	0	0.4%
647	20	0	0	0.2%
648	15	159	2,573	0.1%
649	405	114	57	3.2%
650	633	0	0	5.0%
Totals	**12,768**	**3,079**	**17,050**	**100.0%**

Maximum Month Flow

Residential Flow (gpd)[(4)]	Commercial Flow (gpd)[(5)]	Total Flow (gpd)
219,130	274	219,404
562,400	14,669	577,069
2,948	36,193	39,141
96,627	4,387	101,014
136,915	14,395	151,310
130,364	46	130,410
297,086	0	297,086
61,907	32,491	94,398
119,555	95,966	215,521
214,544	23	214,567
137,243	366	137,608
41,926	11,790	53,716
27,514	800	28,314
33,410	2,216	35,626
173,928	118,426	292,354
69,113	4,021	73,134
242,713	73,619	316,332
215,199	16,383	231,582
168,032	62,538	230,570
1,965	39,849	41,814
6,223	0	6,223
13,429	617	14,046
328	26,185	26,512
102,195	8,911	111,106
76,319	4,615	80,934
24,566	206	24,772
40,616	0	40,616
14,740	0	14,740
5,568	0	5,568
4,258	67,336	71,594
112,021	12,567	124,588
174,911	0	174,911
3,527,693	**648,887**	**4,176,580**

1 2033 population is determined based on the 2024 comprehensive plan population projected forward at 4.15 percent annually in accordance with the extrapolated growth rate from the 2010 Capital Facilities Plan. 2033 Residential EDUs are computed by dividing the 2033 residential population by 2.79 persons per EDU (from the 2010 Comprehensive Plan). The residential EDUs for each TAZ are allocated by multiplying the total residential EDUs by the "% of total EDUs in TAZ" as detemrined from the apportionment in the previous General Sewer / Facility Plan.

2 The number of retail and non-retail employees are computed based on the number of retail and non-retail employees from the 2010 Capital Facilities Plan increased by 4.15 percent annually.

3 The "% of total EDUs in TAZ" represents the proportion of total EDUs allocated to a particular TAZ.

4 Residential flows are computed based upon 173 gpd/EDU for the first 2,556 EDUs and 292 gpd per EDU for each subsequent EDU. Flows are allocated to each TAZ by multiplying the total residential flow by the "% of total EDUs in TAZ."

5 Commercial flows are computed based upon 100 gpd/retail employee and 20 gpd/non-retail employee.

Gravity Sewer Sizing

Mannings Equation   Q=0.0472(D^(8/3))(SQRT(S))

Pipe size	Min. velocity, V (fps)	Minimum Pipe slope (ft./ft)	Flow, Q (cfs)	Flow, Q/2
8	2	0.004	0.76	0.38
10	2	0.0028	1.16	0.58
12	2	0.0022	1.67	0.84
14	2	0.0017	2.22	1.11
15	2	0.0015	2.50	1.25
16	2	0.0014	2.87	1.44
18	2	0.0012	3.64	1.82
21	2	0.001	5.01	2.51
24	2	0.0008	6.40	3.20
27	2	0.0007	8.19	4.10
30	2	0.0006	10.05	5.02
36	2	0.0005	14.91	7.46

Average Day to Maximum Month Factor   1.463

Pipe Label	Flows in, TAZ or pipe	% of TAZ or Pipe	Equivalent Residential Population [3]	Peaking Factor	Peak Flow (gpm)[4]	Flow (cfs)	Pipe Size (in)	Pipe Adequate [2]
T-9E	470	40%	1200	3.75	211	0.47	12	yes
T-9W	470	40%	1200	3.75	211	0.47	12	yes
T-9N	469	20%	263		46			
	645	40%	164		29			
	646	100%	149		26			
	470	20%	600		106			
	TOTAL		1176	3.75	207	0.46	12	yes
T-9S	FM-2	100%			431			
	473	20%	433	4.01	81			
	TOTAL		433	4.01	512	1.14	21	yes
T-10	472	50%	604		179			
	584	40%	703		194			
	471	30%	188		47			
	T-11	100%	1054		1050			
	TOTAL		2549	3.50	1,470	3.27	30	yes
T-11	FM-5	100%			735			
	584	60%	1054		315			
	TOTAL		1054	3.79	1,050	2.34	27	yes
T-12E	638	20%	4		16			
	637	10%	170		44			
	471	40%	250		72			
	TOTAL		424	4.01	131	0.29	10	yes
T-12W	T-15	100%	767		186			
	T-12WB	100%	603		185			
	637	15%	255		59			
	471	15%	94		25			
	638	15%	3		11			
	TOTAL		1722	3.64	466	1.04	18	yes
T-12WB	637	35%	594		150			
	638	45%	9		35			
	TOTAL		603	3.93	185	0.41	12	yes
T-15	637	40%	679		170			
	650	5%	88		16			
	TOTAL		767	3.87	186	0.41	12	yes

Pipe Label	Flows in, TAZ or pipe	% of TAZ or Pipe	Equivalent Residential Population (3)	Peaking Factor	Peak Flow (gpm)(4)	Flow (cfs)	Pipe Size (in)	Pipe Adequate (2)
T-16E	649	50%	566		114			
	650	15%	265		48			
	TOTAL		831	3.85	162	0.36	10	yes
T-16W	473	10%	217	4.13	42	0.09	8	yes
T-17	473	20%	433	4.01	81	0.18	8	yes
T-18	473	25%	542	3.96	100	0.22	8	yes
T-19	650	80%	1413		239			
	473	25%	542		92			
	TOTAL		1955	3.59	330	0.74	15	
T-21S	636	40%	869	3.84	169	0.38	12	yes
T-22	587	30%	735					
	648	45%	19		59			
	472	10%	121		39			
	TOTAL		875	3.84	98	0.22	8	yes
T-23N	FM-12	100%			332			
	587	10%	245		59			
	648	55%	24		73			
	641	20%	1		10			
	472	30%	362		120			
	TOTAL		632	3.92	594	1.32	21	yes
T-23S	587	60%	1471	3.69	332	0.74	15	yes
T-24N	465	25%	1420	3.70	253	0.56	15	yes
T-24S	563	60%	254	4.11	63	0.14	8	yes
T-25E	465	40%	2272	3.54	388	0.86	16	yes
T-25S	465	15%	852	3.84	158	0.35	10	yes
T-25W	465	10%	568		100			
	FM-6	100%			803			
	FM-10	100%			109			
	636	40%	869		161			
	650	5%	88		15			
	TOTAL		1525	3.67	1,189	2.65	30	yes
T-26E	563	40%	169		38			
	561	20%	277		48			
	TOTAL		446	4.00	85	0.19	8	yes
T-26W	465	10%	568		108			
	T-26E	100%			85			
	FM-9	100%			411			
	TOTAL		568	3.95	604	1.35	21	yes

Pipe Label	Flows in, TAZ or pipe	% of TAZ or Pipe	Equivalent Residential Population (3)	Peaking Factor	Peak Flow (gpm)(4)	Flow (cfs)	Pipe Size (in)	Pipe Adequate (2)
T-27	T-27W	100%	693		125			
	561	30%	416		74			
	TOTAL		1109	3.77	199	0.44	12	yes
T-27W	561	50%	693	3.90	125	0.28	10	yes
FM-1 (1)	560	15%	325		59			
	464	25%	553		100			
	TOTAL		878	3.84	159	0.35		
FM-2 (1)	T-19	100%			330			
	FM-3				100			
					431	0.96		
FM-3 (1)	T-18	100%			100	0.22		
FM-4 (1)	T-10	100%			1,470			
	471	15%	94		29			
	TOTAL		94	4.25	1,499	3.34		
FM-5 (1)	T-23N	100%			594			
	T-22	100%			98			
	472	10%	121		43			
	TOTAL		121	4.22	735	1.64		
FM-6 (1)	T-26W	100%			604			
	T-27	100%			199			
	TOTAL				803	1.79		
FM-7 (1)	T-25W	100%			1,189			
	T-25S	100%			158			
	T-25E	100%			388			
	TOTAL				1,735	3.86		
FM-9 (1)	T-24N	100%			253			
	T-24S	100%			158			
	TOTAL				411	0.91		
FM-10 (1)	636	25%	543	3.96	109	0.24		
FM-12 (1)	T-23S	100%			332	0.74		
FM-14 (1)	464	20%	443	4.00	83	0.19		

(1) Force main pipe sizing is shown on the attached sheet.

(2) Pipe adequacy is demonstrated by having sufficient hydraulic capacity for 150% of 2033 projected flow.

(3) Basin residential population was determined by multiplying the number of EDUs in the basin by 2.79 residents per EDU (from the 2010 Comprehensive Plan)

(4) Peak flow for each TAZ is determined by dividing the maximum month flow for each basin by the Average Day to Maximum Month Factor and multiplying by the appropriate peaking factor.

Force Main Sewer Sizing

	Flow (cfs)	Max V (fps)	A Req'd (in2)	D Req'd (in)	Min D (in)			Act A (ft2)	Max V. (fps)
FM-1	0.353	6	8.48	3.29	4	Use	6 =	0.196	1.800
FM-2	0.959	6	23.02	5.41	4	Use	8 =	0.349	2.749
FM-3	0.224	6	5.37	2.62	4	Use	4 =	0.087	2.566
FM-4	3.338	6	80.12	10.10	4	Use	14 =	1.068	3.125
FM-5	1.637	6	39.28	7.07	4	Use	10 =	0.545	3.002
FM-6	1.789	6	42.93	7.40	4	Use	10 =	0.545	3.281
FM-7	3.864	6	92.73	10.87	4	Use	15 =	1.227	3.150
FM-9	0.915	6	21.96	5.29	4	Use	8 =	0.349	2.622
FM-10	0.242	6	5.81	2.72	4	Use	4 =	0.087	2.775
FM-12	0.740	6	17.76	4.76	4	Use	8 =	0.349	2.121
FM-14	0.186	6	4.46	2.38	4	Use	4 =	0.087	2.129

APPENDIX G

PRELIMINARY COST ESTIMATES FOR PROPOSED TRUNK LINES, FORCE MAINS, AND PHASED WWTP EXPANSION PROJECTS

City of Ridgefield
General Sewer and Wastewater Facility Plan
Sewer Collection Capital Improvement Projects (Trunk Lines)

Project Number	Description	Size (in.)	Length (LF)	Total Project Cost	City Funded	Developer Funded	Year	Notes
T-9E	NW of N. 45th Avenue	10	2,100	$ 451,500	$ 135,450	$ 316,050	2018	
T-9W	East of Reiman Road	10	3,500	$ 753,000	$ 225,900	$ 527,100	2018	
T-9N	Reiman Road	10	2,900	$ 625,500	$ 187,650	$ 437,850	2018	
T-9S	Pioneer to S. 4th Way	15	2,000	$ 505,500	$ 151,650	$ 353,850	2018	
T-10	Discovery Point & Union Ridge West	27	5,000	$ 1,815,000	$ 544,500	$ 1,270,500	2023	
T-11	N. Discovery Point	21	3,200	$ 991,500	$ 297,450	$ 694,050	2023	
T-12E	North Ridgecrest	8	3,800	$ 784,500	$ 235,350	$ 549,150	2018	
T-12W	Ridgecrest	15	4,100	$ 1,026,000	$ 307,800	$ 718,200	2018	
T-12WB	Ridgecrest	10	5,400	$ 1,156,500	$ 346,950	$ 809,550	2018	
T-15	Ridgecrest	10	4,000	$ 864,000	$ 259,200	$ 604,800	2018	
T-16E	S. 45th Ave. to Cedar Ridge	8	2,500	$ 519,000	$ 155,700	$ 363,300	2018	
T-16W	Doughnut Hole to Pioneer	8	2,200	$ 459,000	$ 137,700	$ 321,300	2023	
T-17	West Gee Creek	8	2,950	$ 609,000	$ 182,700	$ 426,300	2018	
T-18	Middle Gee Creek	8	2,750	$ 574,500	$ 172,350	$ 402,150	2023	
T-19	East Gee Creek	12	2,750	$ 622,500	$ 186,750	$ 435,750	2023	
T-21S	Adjacent to New High School Site	8	3,100	$ 642,000	$ 192,600	$ 449,400	2018	
T-22	Boschma North	8	5,800	$ 1,195,500	$ 358,650	$ 836,850	2023	
T-23N	Boschma	16	5,300	$ 1,372,500	$ 411,750	$ 960,750	2023	
T-23S	SE UGA to NE 259th	12	2,350	$ 528,000	$ 158,400	$ 369,600	2028	
T-24N	S. 20th Way to NE Carty Rd.	10	3,400	$ 735,000	$ 220,500	$ 514,500	2028	
T-24S	I-5 to Carty Rd	8	1,900	$ 396,000	$ 118,800	$ 277,200	2028	
T-25E	S. 20th Way to Gee Creek North Fork Confluence	15	6,350	$ 1,591,500	$ 477,450	$ 1,114,050	2023	
T-25S	Gee Creek South Fork Confluence to Royle Rd.	8	2,900	$ 598,500	$ 179,550	$ 418,950	2018	
T-25W	Royle Road to Gee Creek	24	2,650	$ 891,000	$ 267,300	$ 623,700	2018	
T-26E	Gee Creek to Carthy Rd.	8	1,600	$ 336,000	$ 100,800	$ 235,200	2023	
T-26W	Carthy Rd. to Carthy Pump Station (PS#6)	16	3,150	$ 820,500	$ 246,150	$ 574,350	2023	
T-27	Gee Creek South Fork to Carthy Rd.	10	2,350	$ 507,000	$ 152,100	$ 354,900	2023	
T-27W	Southern UGA Limit to Gee Creek	8	2,400	$ 495,000	$ 148,500	$ 346,500	2023	
T-28W	Junction Lift Station Inlet Sewer Upgrade	10	620	$ 142,500	$ 42,750	$ 99,750	2023	
T-28E	S. 6th Way Sewer	10	1,100	$ 240,000	$ 72,000	$ 168,000	2023	
	Total			**$ 22,248,000**	**$ 6,674,400**	**$ 15,573,600**		

Note: Sizes assumes pipes are laid at minimum slope. Projects T-28W and T-28E are laid at equal slope to the segments that they are replacing.

ASSUMPTIONS FOR GRAVITY SEWER COST ESTIMATES

Tax rate	8.2 %				
Contingency	20 %				
Engineering and Administrative Costs	25 %				
Mobilization, Cleanup and Demobilization	8%				
8-inch PVC Sewer Pipe, Including Fittings	$ 50	=UNIT PRICE			
10-inch PVC Sewer Pipe, Including Fittings	$ 55	=UNIT PRICE			
12-inch PVC Sewer Pipe, Including Fittings	$ 60	=UNIT PRICE			
15-inch PVC Sewer Pipe, Including Fittings	$ 75	=UNIT PRICE			
16-inch PVC Sewer Pipe, Including Fittings	$ 80	=UNIT PRICE			
18-inch PVC Sewer Pipe, Including Fittings	$ 90	=UNIT PRICE			
21-inch PVC Sewer Pipe, Including Fittings	$ 105	=UNIT PRICE			
24-inch PVC Sewer Pipe, Including Fittings	$ 120	=UNIT PRICE			
27-inch PVC Sewer Pipe, Including Fittings	$ 135	=UNIT PRICE			
30-inch PVC Sewer Pipe, Including Fittings	$ 150	=UNIT PRICE			
36-inch PVC Sewer Pipe, Including Fittings	$ 180	=UNIT PRICE			
Locate Existing Utilities	0.75%				
Erosion Control	1%				
Trench Safety Systems	$ 4.00	/ Lineal Foot			
Manholes					
48-inch Precast Manhole (Basic to 8')	$ 4,000	EA	1	Every	300 feet
54-inch Precast Manhole (Basic to 8')	$ 4,500	EA	1	Every	300 feet
60-inch Precast Manhole (Basic to 8')	$ 5,000	EA	1	Every	300 feet
48-inch Precast Manhole (Height over 8')	$ 300.00	EA		2 LF	per Manhole
54-inch Precast Manhole (Height over 8')	$ 350.00	EA		3 LF	per Manhole
60-inch Precast Manhole (Height over 8')	$ 400.00	EA		4 LF	per Manhole

TRENCH WIDTH	PIPE SIZE	Bottom Width (ft)	Top Width (ft)	Assumed Depth (ft)	Avg. W (ft)	Depth Minus Bedding Zone (ft)
	8	4.0	6.0	7.7	5	6
	10	4.0	6.0	7.8	5	6
	12	4.0	6.0	8.0	5	6
	15	4.0	6.0	8.3	5	6
	16	4.0	6.0	8.3	5	6
	18	4.0	6.0	8.5	5	6
	21	4.0	6.0	8.8	5	6
	24	4.0	6.0	9.0	5	6
	27	4.0	6.0	9.3	5	6
	30	4.0	6.0	9.5	5	6
	36	4.5	6.5	10.0	5.5	6
LANE WIDTH	WIDTH (ft)	12.0				

Pavement Sections	MATL DEPTH (feet)	UNT WEIGHT (TN/CY)	EXTRA MATL FACTOR	FRACTION OF LENGTH	PRODUCT
Gravel Backfill	4.92	1.0	1.1	0.25	0.050 * Trench Width = CY/LF
Cost per CY	$ 20.00				
Asphalt Concrete Pavement	0.25	2.05	1.0	0.25	0.017 * Lane Width = TN/LF
Cost per TN	$ 120.00				
Crushed Surfacing, Top Course	0.833	1.8	1.1	0.25	0.015 * Lane Width = TN/LF
Cost per TN	$ 20.00				
Sawcutting	$ 2.00	= Cost per LF of sawcutting			
Non-Pavement Sections					
Gravel Backfill	5.00	1.0	1.1	0.75	0.153 * Trench Width = CY/LF
Cost per CY	$ 20.00				
Crushed Surfacing, Top Course	0.67	1.8	1.1	0.75	0.037 * Lane Width = TN/LF
Cost per TN	$ 20.00				
Top Soil	0.33	1	1.1	0.75	0.010 * Trench Width = CY/LF
Cost per CY	$ 25.00				
Connections to Existing System	$ 1,000	EA			
Traffic Control	$ 30	EA	8	HRS per	200 feet

Notes:
Pavement work assumed to be associated with 25% of the total Project Length.
All gravel Backfill will be imported.

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-9E
NW of N. 45th Avenue

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	18,500	$	18,500
2	Dewatering	LUMP SUM	$	10,500	$	10,500
3	Locate Existing Utilities	LUMP SUM	$	1,700	$	1,700
4	Erosion Control	LUMP SUM	$	1,900	$	1,900
5	Trench Safety Systems	LUMP SUM	$	8,400	$	8,400
6	Traffic Control	84 HRS	$	30	$	2,520
7	Clearing and Grubbing	1,050 SY	$	2	$	2,100
8	Trench Safety Systems	2,100 LF	$	4	$	8,400
9	10-inch PVC Sewer Pipe, Including Fittings	2,100 LF	$	55	$	115,500
10	48-inch Precast Manhole (Basic to 8')	7 EA	$	4,000	$	28,000
11	48-inch Precast Manhole (Height over 8')	14 LF	$	300	$	4,200
12	Special Excavation of Unsuitable Material	40 CY	$	35	$	1,400
13	Gravel Backfill	2,130 CY	$	20	$	42,600
14	Crushed Surfacing, Top Course	550 TN	$	20	$	11,000
15	Asphalt Concrete Pavement	100 TN	$	120	$	12,000
16	Sawcutting	1,050 LF	$	2	$	2,100
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	1,050 SY	$	5	$	5,250
	Subtotal				$	278,000
	Tax rate (8.2%)					23,000
	Subtotal:				$	301,000
	Contingency (20%)					60,200
	TOTAL ESTIMATED CONSTRUCTION COST:				$	361,200
	Engineering and AdministrativeCosts (25%):					90,300
	TOTAL ESTIMATED PROJECT COST:				**$**	**451,500**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-9W
East of Reiman Road

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	30,900	$	30,900
2	Dewatering	LUMP SUM	$	17,500	$	17,500
3	Locate Existing Utilities	LUMP SUM	$	2,900	$	2,900
4	Erosion Control	LUMP SUM	$	3,100	$	3,100
5	Trench Safety Systems	LUMP SUM	$	14,000	$	14,000
6	Traffic Control	140 HRS	$	30	$	4,200
7	Clearing and Grubbing	1,750 SY	$	2	$	3,500
8	Trench Safety Systems	3,500 LF	$	4	$	14,000
9	10-inch PVC Sewer Pipe, Including Fittings	3,500 LF	$	55	$	192,500
10	48-inch Precast Manhole (Basic to 8')	12 EA	$	4,000	$	48,000
11	48-inch Precast Manhole (Height over 8')	24 LF	$	300	$	7,200
12	Special Excavation of Unsuitable Material	70 CY	$	35	$	2,450
13	Gravel Backfill	3,550 CY	$	20	$	71,000
14	Crushed Surfacing, Top Course	910 TN	$	20	$	18,200
15	Asphalt Concrete Pavement	170 TN	$	120	$	20,400
16	Sawcutting	1,750 LF	$	2	$	3,500
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	1,750 SY	$	5	$	8,750
	Subtotal				$	464,000
	Tax rate (8.2%)					38,000
	Subtotal:				$	502,000
	Contingency (20%)					100,400
	TOTAL ESTIMATED CONSTRUCTION COST:				$	602,400
	Engineering and AdministrativeCosts (25%):					150,600
	TOTAL ESTIMATED PROJECT COST:				**$**	**753,000**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-9N
Reiman Road

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	25,600	$	25,600
2	Dewatering	LUMP SUM	$	14,500	$	14,500
3	Locate Existing Utilities	LUMP SUM	$	2,400	$	2,400
4	Erosion Control	LUMP SUM	$	2,600	$	2,600
5	Trench Safety Systems	LUMP SUM	$	11,600	$	11,600
6	Traffic Control	116 HRS	$	30	$	3,480
7	Clearing and Grubbing	1,450 SY	$	2	$	2,900
8	Trench Safety Systems	2,900 LF	$	4	$	11,600
9	10-inch PVC Sewer Pipe, Including Fittings	2,900 LF	$	55	$	159,500
10	48-inch Precast Manhole (Basic to 8')	10 EA	$	4,000	$	40,000
11	48-inch Precast Manhole (Height over 8')	20 LF	$	300	$	6,000
12	Special Excavation of Unsuitable Material	60 CY	$	35	$	2,100
13	Gravel Backfill	2,940 CY	$	20	$	58,800
14	Crushed Surfacing, Top Course	760 TN	$	20	$	15,200
15	Asphalt Concrete Pavement	140 TN	$	120	$	16,800
16	Sawcutting	1,450 LF	$	2	$	2,900
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	1,450 SY	$	5	$	7,250
	Subtotal				$	385,000
	Tax rate (8.2%)					32,000
	Subtotal:				$	417,000
	Contingency (20%)					83,400
	TOTAL ESTIMATED CONSTRUCTION COST:				$	500,400
	Engineering and AdministrativeCosts (25%):					125,100
	TOTAL ESTIMATED PROJECT COST:				**$**	**625,500**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-9S
Pioneer to S. 4th Way

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	21,000	$	21,000
2	Dewatering	LUMP SUM	$	10,000	$	10,000
3	Locate Existing Utilities	LUMP SUM	$	2,000	$	2,000
4	Erosion Control	LUMP SUM	$	2,100	$	2,100
5	Trench Safety Systems	LUMP SUM	$	8,000	$	8,000
6	Traffic Control	80 HRS	$	30	$	2,400
7	Clearing and Grubbing	1,000 SY	$	2	$	2,000
8	Trench Safety Systems	2,000 LF	$	4	$	8,000
9	15-inch PVC Sewer Pipe, Including Fittings	2,000 LF	$	75	$	150,000
10	48-inch Precast Manhole (Basic to 8')	7 EA	$	4,000	$	28,000
11	48-inch Precast Manhole (Height over 8')	14 LF	$	300	$	4,200
12	Special Excavation of Unsuitable Material	40 CY	$	35	$	1,400
13	Gravel Backfill	2,030 CY	$	20	$	40,600
14	Crushed Surfacing, Top Course	520 TN	$	20	$	10,400
15	Asphalt Concrete Pavement	100 TN	$	120	$	12,000
16	Sawcutting	1,000 LF	$	2	$	2,000
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	1,000 SY	$	5	$	5,000
	Subtotal				$	311,000
	Tax rate (8.2%)					26,000
	Subtotal:				$	337,000
	Contingency (20%)					67,400
	TOTAL ESTIMATED CONSTRUCTION COST:				$	404,400
	Engineering and AdministrativeCosts (25%):					101,100
	TOTAL ESTIMATED PROJECT COST:				**$**	**505,500**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-10
Discovery Point & Union Ridge West

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	77,400	$	77,400
2	Dewatering	LUMP SUM	$	25,000	$	25,000
3	Locate Existing Utilities	LUMP SUM	$	7,300	$	7,300
4	Erosion Control	LUMP SUM	$	7,800	$	7,800
5	Trench Safety Systems	LUMP SUM	$	20,000	$	20,000
6	Traffic Control	200 HRS	$	30	$	6,000
7	Clearing and Grubbing	2,500 SY	$	2	$	5,000
8	Trench Safety Systems	5,000 LF	$	4	$	20,000
9	27-inch PVC Sewer Pipe, Including Fittings	5,000 LF	$	135	$	675,000
10	54-inch Precast Manhole (Basic to 8')	17 EA	$	4,500	$	76,500
11	54-inch Precast Manhole (Height over 8')	51 LF	$	350	$	17,850
12	Special Excavation of Unsuitable Material	100 CY	$	35	$	3,500
13	Gravel Backfill	5,070 CY	$	20	$	101,400
14	Crushed Surfacing, Top Course	1,300 TN	$	20	$	26,000
15	Asphalt Concrete Pavement	250 TN	$	120	$	30,000
16	Sawcutting	2,500 LF	$	2	$	5,000
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	2,500 SY	$	5	$	12,500
	Subtotal				$	1,118,000
	Tax rate (8.2%)					92,000
	Subtotal:				$	1,210,000
	Contingency (20%)					242,000
	TOTAL ESTIMATED CONSTRUCTION COST:				$	1,452,000
	Engineering and AdministrativeCosts (25%):					363,000
	TOTAL ESTIMATED PROJECT COST:				**$**	**1,815,000**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-11
N. Discovery Point

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	41,900	$	41,900
2	Dewatering	LUMP SUM	$	16,000	$	16,000
3	Locate Existing Utilities	LUMP SUM	$	3,900	$	3,900
4	Erosion Control	LUMP SUM	$	4,200	$	4,200
5	Trench Safety Systems	LUMP SUM	$	12,800	$	12,800
6	Traffic Control	128 HRS	$	30	$	3,840
7	Clearing and Grubbing	1,600 SY	$	2	$	3,200
8	Trench Safety Systems	3,200 LF	$	4	$	12,800
9	21-inch PVC Sewer Pipe, Including Fittings	3,200 LF	$	105	$	336,000
10	54-inch Precast Manhole (Basic to 8')	11 EA	$	4,500	$	49,500
11	54-inch Precast Manhole (Height over 8')	33 LF	$	350	$	11,550
12	Special Excavation of Unsuitable Material	60 CY	$	35	$	2,100
13	Gravel Backfill	3,250 CY	$	20	$	65,000
14	Crushed Surfacing, Top Course	830 TN	$	20	$	16,600
15	Asphalt Concrete Pavement	160 TN	$	120	$	19,200
16	Sawcutting	1,600 LF	$	2	$	3,200
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	1,600 SY	$	5	$	8,000
	Subtotal				$	611,000
	Tax rate (8.2%)					50,000
	Subtotal:				$	661,000
	Contingency (20%)					132,200
	TOTAL ESTIMATED CONSTRUCTION COST:				$	793,200
	Engineering and AdministrativeCosts (25%):					198,300
	TOTAL ESTIMATED PROJECT COST:				**$**	**991,500**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-12E
North Ridgecrest

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM		$ 32,000		$ 32,000
2	Dewatering	LUMP SUM		$ 19,000		$ 19,000
3	Locate Existing Utilities	LUMP SUM		$ 3,000		$ 3,000
4	Erosion Control	LUMP SUM		$ 3,200		$ 3,200
5	Trench Safety Systems	LUMP SUM		$ 15,200		$ 15,200
6	Traffic Control	152	HRS	$ 30		$ 4,560
7	Clearing and Grubbing	1,900	SY	$ 2		$ 3,800
8	Trench Safety Systems	3,800	LF	$ 4		$ 15,200
9	8-inch PVC Sewer Pipe, Including Fittings	3,800	LF	$ 50		$ 190,000
10	48-inch Precast Manhole (Basic to 8')	13	EA	$ 4,000		$ 52,000
11	48-inch Precast Manhole (Height over 8')	26	LF	$ 300		$ 7,800
12	Special Excavation of Unsuitable Material	80	CY	$ 35		$ 2,800
13	Gravel Backfill	3,850	CY	$ 20		$ 77,000
14	Crushed Surfacing, Top Course	990	TN	$ 20		$ 19,800
15	Asphalt Concrete Pavement	190	TN	$ 120		$ 22,800
16	Sawcutting	1,900	LF	$ 2		$ 3,800
17	Connections to Existing Manhole	1	EA	$ 1,000		$ 1,000
18	Hydroseeding	1,900	SY	$ 5		$ 9,500

Subtotal	$ 483,000
Tax rate (8.2%)	40,000
Subtotal:	$ 523,000
Contingency (20%)	104,600
TOTAL ESTIMATED CONSTRUCTION COST:	$ 627,600
Engineering and AdministrativeCosts (25%):	156,900
TOTAL ESTIMATED PROJECT COST:	**$ 784,500**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-12W
Ridgecrest

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	42,700	$	42,700
2	Dewatering	LUMP SUM	$	20,500	$	20,500
3	Locate Existing Utilities	LUMP SUM	$	4,000	$	4,000
4	Erosion Control	LUMP SUM	$	4,300	$	4,300
5	Trench Safety Systems	LUMP SUM	$	16,400	$	16,400
6	Traffic Control	164 HRS	$	30	$	4,920
7	Clearing and Grubbing	2,050 SY	$	2	$	4,100
8	Trench Safety Systems	4,100 LF	$	4	$	16,400
9	15-inch PVC Sewer Pipe, Including Fittings	4,100 LF	$	75	$	307,500
10	48-inch Precast Manhole (Basic to 8')	14 EA	$	4,000	$	56,000
11	48-inch Precast Manhole (Height over 8')	28 LF	$	300	$	8,400
12	Special Excavation of Unsuitable Material	80 CY	$	35	$	2,800
13	Gravel Backfill	4,160 CY	$	20	$	83,200
14	Crushed Surfacing, Top Course	1,070 TN	$	20	$	21,400
15	Asphalt Concrete Pavement	200 TN	$	120	$	24,000
16	Sawcutting	2,050 LF	$	2	$	4,100
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	2,050 SY	$	5	$	10,250

Subtotal..	$	632,000
Tax rate (8.2%)..		52,000
Subtotal:..	$	684,000
Contingency (20%)...		136,800
TOTAL ESTIMATED CONSTRUCTION COST:..............................	$	820,800
Engineering and AdministrativeCosts (25%):..............................		205,200
TOTAL ESTIMATED PROJECT COST:..............................	**$**	**1,026,000**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-12WB
Ridgecrest

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	47,500	$	47,500
2	Dewatering	LUMP SUM	$	27,000	$	27,000
3	Locate Existing Utilities	LUMP SUM	$	4,500	$	4,500
4	Erosion Control	LUMP SUM	$	4,800	$	4,800
5	Trench Safety Systems	LUMP SUM	$	21,600	$	21,600
6	Traffic Control	216 HRS	$	30	$	6,480
7	Clearing and Grubbing	2,700 SY	$	2	$	5,400
8	Trench Safety Systems	5,400 LF	$	4	$	21,600
9	10-inch PVC Sewer Pipe, Including Fittings	5,400 LF	$	55	$	297,000
10	48-inch Precast Manhole (Basic to 8')	18 EA	$	4,000	$	72,000
11	48-inch Precast Manhole (Height over 8')	36 LF	$	300	$	10,800
12	Special Excavation of Unsuitable Material	100 CY	$	35	$	3,500
13	Gravel Backfill	5,480 CY	$	20	$	109,600
14	Crushed Surfacing, Top Course	1,410 TN	$	20	$	28,200
15	Asphalt Concrete Pavement	270 TN	$	120	$	32,400
16	Sawcutting	2,700 LF	$	2	$	5,400
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	2,700 SY	$	5	$	13,500

Subtotal..	$	713,000
Tax rate (8.2%)..		58,000
Subtotal:..	$	771,000
Contingency (20%)..		154,200
TOTAL ESTIMATED CONSTRUCTION COST:..	$	925,200
Engineering and AdministrativeCosts (25%):..		231,300
TOTAL ESTIMATED PROJECT COST:..	**$**	**1,156,500**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-15
Ridgecrest

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	35,400	$	35,400
2	Dewatering	LUMP SUM	$	20,000	$	20,000
3	Locate Existing Utilities	LUMP SUM	$	3,300	$	3,300
4	Erosion Control	LUMP SUM	$	3,600	$	3,600
5	Trench Safety Systems	LUMP SUM	$	16,000	$	16,000
6	Traffic Control	160 HRS	$	30	$	4,800
7	Clearing and Grubbing	2,000 SY	$	2	$	4,000
8	Trench Safety Systems	4,000 LF	$	4	$	16,000
9	10-inch PVC Sewer Pipe, Including Fittings	4,000 LF	$	55	$	220,000
10	48-inch Precast Manhole (Basic to 8')	14 EA	$	4,000	$	56,000
11	48-inch Precast Manhole (Height over 8')	28 LF	$	300	$	8,400
12	Special Excavation of Unsuitable Material	80 CY	$	35	$	2,800
13	Gravel Backfill	4,060 CY	$	20	$	81,200
14	Crushed Surfacing, Top Course	1,040 TN	$	20	$	20,800
15	Asphalt Concrete Pavement	200 TN	$	120	$	24,000
16	Sawcutting	2,000 LF	$	2	$	4,000
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	2,000 SY	$	5	$	10,000

Subtotal	$	532,000
Tax rate (8.2%)		44,000
Subtotal:	$	576,000
Contingency (20%)		115,200
TOTAL ESTIMATED CONSTRUCTION COST:	$	691,200
Engineering and AdministrativeCosts (25%):		172,800
TOTAL ESTIMATED PROJECT COST:	**$**	**864,000**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-16E
S. 45th Ave. to Cedar Ridge

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	21,200	$	21,200
2	Dewatering	LUMP SUM	$	12,500	$	12,500
3	Locate Existing Utilities	LUMP SUM	$	2,000	$	2,000
4	Erosion Control	LUMP SUM	$	2,100	$	2,100
5	Trench Safety Systems	LUMP SUM	$	10,000	$	10,000
6	Traffic Control	100 HRS	$	30	$	3,000
7	Clearing and Grubbing	1,250 SY	$	2	$	2,500
8	Trench Safety Systems	2,500 LF	$	4	$	10,000
9	8-inch PVC Sewer Pipe, Including Fittings	2,500 LF	$	50	$	125,000
10	48-inch Precast Manhole (Basic to 8')	9 EA	$	4,000	$	36,000
11	48-inch Precast Manhole (Height over 8')	18 LF	$	300	$	5,400
12	Special Excavation of Unsuitable Material	50 CY	$	35	$	1,750
13	Gravel Backfill	2,540 CY	$	20	$	50,800
14	Crushed Surfacing, Top Course	650 TN	$	20	$	13,000
15	Asphalt Concrete Pavement	120 TN	$	120	$	14,400
16	Sawcutting	1,250 LF	$	2	$	2,500
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	1,250 SY	$	5	$	6,250

Subtotal	$	320,000
Tax rate (8.2%)		26,000
Subtotal:	$	346,000
Contingency (20%)		69,200
TOTAL ESTIMATED CONSTRUCTION COST:	$	415,200
Engineering and AdministrativeCosts (25%):		103,800
TOTAL ESTIMATED PROJECT COST:	**$**	**519,000**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-16W
Doughnut Hole to Pioneer

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM		$ 18,800	$ 18,800
2	Dewatering	LUMP SUM		$ 11,000	$ 11,000
3	Locate Existing Utilities	LUMP SUM		$ 1,800	$ 1,800
4	Erosion Control	LUMP SUM		$ 1,900	$ 1,900
5	Trench Safety Systems	LUMP SUM		$ 8,800	$ 8,800
6	Traffic Control	88	HRS	$ 30	$ 2,640
7	Clearing and Grubbing	1,100	SY	$ 2	$ 2,200
8	Trench Safety Systems	2,200	LF	$ 4	$ 8,800
9	8-inch PVC Sewer Pipe, Including Fittings	2,200	LF	$ 50	$ 110,000
10	48-inch Precast Manhole (Basic to 8')	8	EA	$ 4,000	$ 32,000
11	48-inch Precast Manhole (Height over 8')	16	LF	$ 300	$ 4,800
12	Special Excavation of Unsuitable Material	50	CY	$ 35	$ 1,750
13	Gravel Backfill	2,230	CY	$ 20	$ 44,600
14	Crushed Surfacing, Top Course	570	TN	$ 20	$ 11,400
15	Asphalt Concrete Pavement	110	TN	$ 120	$ 13,200
16	Sawcutting	1,100	LF	$ 2	$ 2,200
17	Connections to Existing Manhole	1	EA	$ 1,000	$ 1,000
18	Hydroseeding	1,100	SY	$ 5	$ 5,500

Subtotal	$ 283,000
Tax rate (8.2%)	23,000
Subtotal:	$ 306,000
Contingency (20%)	61,200
TOTAL ESTIMATED CONSTRUCTION COST:	$ 367,200
Engineering and AdministrativeCosts (25%):	91,800
TOTAL ESTIMATED PROJECT COST:	**$ 459,000**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-17
West Gee Creek

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM		$ 24,900		$ 24,900
2	Dewatering	LUMP SUM		$ 14,750		$ 14,750
3	Locate Existing Utilities	LUMP SUM		$ 2,300		$ 2,300
4	Erosion Control	LUMP SUM		$ 2,500		$ 2,500
5	Trench Safety Systems	LUMP SUM		$ 11,800		$ 11,800
6	Traffic Control	120	HRS	$ 30		$ 3,600
7	Clearing and Grubbing	1,480	SY	$ 2		$ 2,960
8	Trench Safety Systems	2,950	LF	$ 4		$ 11,800
9	8-inch PVC Sewer Pipe, Including Fittings	2,950	LF	$ 50		$ 147,500
10	48-inch Precast Manhole (Basic to 8')	10	EA	$ 4,000		$ 40,000
11	48-inch Precast Manhole (Height over 8')	20	LF	$ 300		$ 6,000
12	Special Excavation of Unsuitable Material	60	CY	$ 35		$ 2,100
13	Gravel Backfill	2,990	CY	$ 20		$ 59,800
14	Crushed Surfacing, Top Course	770	TN	$ 20		$ 15,400
15	Asphalt Concrete Pavement	150	TN	$ 120		$ 18,000
16	Sawcutting	1,475	LF	$ 2		$ 2,950
17	Connections to Existing Manhole	1	EA	$ 1,000		$ 1,000
18	Hydroseeding	1,480	SY	$ 5		$ 7,400

Subtotal	$ 375,000
Tax rate (8.2%)	31,000
Subtotal:	$ 406,000
Contingency (20%)	81,200
TOTAL ESTIMATED CONSTRUCTION COST:	$ 487,200
Engineering and AdministrativeCosts (25%):	121,800
TOTAL ESTIMATED PROJECT COST:	**$ 609,000**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-18
Middle Gee Creek

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM		$ 23,500	$ 23,500
2	Dewatering	LUMP SUM		$ 13,750	$ 13,750
3	Locate Existing Utilities	LUMP SUM		$ 2,200	$ 2,200
4	Erosion Control	LUMP SUM		$ 2,400	$ 2,400
5	Trench Safety Systems	LUMP SUM		$ 11,000	$ 11,000
6	Traffic Control	112	HRS	$ 30	$ 3,360
7	Clearing and Grubbing	1,380	SY	$ 2	$ 2,760
8	Trench Safety Systems	2,750	LF	$ 4	$ 11,000
9	8-inch PVC Sewer Pipe, Including Fittings	2,750	LF	$ 50	$ 137,500
10	48-inch Precast Manhole (Basic to 8')	10	EA	$ 4,000	$ 40,000
11	48-inch Precast Manhole (Height over 8')	20	LF	$ 300	$ 6,000
12	Special Excavation of Unsuitable Material	60	CY	$ 35	$ 2,100
13	Gravel Backfill	2,790	CY	$ 20	$ 55,800
14	Crushed Surfacing, Top Course	720	TN	$ 20	$ 14,400
15	Asphalt Concrete Pavement	140	TN	$ 120	$ 16,800
16	Sawcutting	1,375	LF	$ 2	$ 2,750
17	Connections to Existing Manhole	1	EA	$ 1,000	$ 1,000
18	Hydroseeding	1,380	SY	$ 5	$ 6,900

Subtotal	$ 354,000
Tax rate (8.2%)	29,000
Subtotal:	$ 383,000
Contingency (20%)	76,600
TOTAL ESTIMATED CONSTRUCTION COST:	$ 459,600
Engineering and AdministrativeCosts (25%):	114,900
TOTAL ESTIMATED PROJECT COST:	**$ 574,500**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-19
East Gee Creek

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	25,700	$	25,700
2	Dewatering	LUMP SUM	$	13,750	$	13,750
3	Locate Existing Utilities	LUMP SUM	$	2,400	$	2,400
4	Erosion Control	LUMP SUM	$	2,600	$	2,600
5	Trench Safety Systems	LUMP SUM	$	11,000	$	11,000
6	Traffic Control	112 HRS	$	30	$	3,360
7	Clearing and Grubbing	1,380 SY	$	2	$	2,760
8	Trench Safety Systems	2,750 LF	$	4	$	11,000
9	12-inch PVC Sewer Pipe, Including Fittings	2,750 LF	$	60	$	165,000
10	48-inch Precast Manhole (Basic to 8')	10 EA	$	4,000	$	40,000
11	48-inch Precast Manhole (Height over 8')	20 LF	$	300	$	6,000
12	Special Excavation of Unsuitable Material	60 CY	$	35	$	2,100
13	Gravel Backfill	2,790 CY	$	20	$	55,800
14	Crushed Surfacing, Top Course	720 TN	$	20	$	14,400
15	Asphalt Concrete Pavement	140 TN	$	120	$	16,800
16	Sawcutting	1,375 LF	$	2	$	2,750
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	1,380 SY	$	5	$	6,900
	Subtotal				$	384,000
	Tax rate (8.2%)					31,000
	Subtotal:				$	415,000
	Contingency (20%)					83,000
	TOTAL ESTIMATED CONSTRUCTION COST:				$	498,000
	Engineering and AdministrativeCosts (25%):					124,500
	TOTAL ESTIMATED PROJECT COST:				**$**	**622,500**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-21S
Adjacent to New High School Site

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	26,200	$	26,200
2	Dewatering	LUMP SUM	$	15,500	$	15,500
3	Locate Existing Utilities	LUMP SUM	$	2,500	$	2,500
4	Erosion Control	LUMP SUM	$	2,700	$	2,700
5	Trench Safety Systems	LUMP SUM	$	12,400	$	12,400
6	Traffic Control	124 HRS	$	30	$	3,720
7	Clearing and Grubbing	1,550 SY	$	2	$	3,100
8	Trench Safety Systems	3,100 LF	$	4	$	12,400
9	8-inch PVC Sewer Pipe, Including Fittings	3,100 LF	$	50	$	155,000
10	48-inch Precast Manhole (Basic to 8')	11 EA	$	4,000	$	44,000
11	48-inch Precast Manhole (Height over 8')	22 LF	$	300	$	6,600
12	Special Excavation of Unsuitable Material	60 CY	$	35	$	2,100
13	Gravel Backfill	3,140 CY	$	20	$	62,800
14	Crushed Surfacing, Top Course	810 TN	$	20	$	16,200
15	Asphalt Concrete Pavement	150 TN	$	120	$	18,000
16	Sawcutting	1,550 LF	$	2	$	3,100
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	1,550 SY	$	5	$	7,750
	Subtotal				$	396,000
	Tax rate (8.2%)					32,000
	Subtotal:				$	428,000
	Contingency (20%)					85,600
	TOTAL ESTIMATED CONSTRUCTION COST:				$	513,600
	Engineering and AdministrativeCosts (25%):					128,400
	TOTAL ESTIMATED PROJECT COST:				**$**	**642,000**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-22
Boschma North

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	48,900	$	48,900
2	Dewatering	LUMP SUM	$	29,000	$	29,000
3	Locate Existing Utilities	LUMP SUM	$	4,600	$	4,600
4	Erosion Control	LUMP SUM	$	5,000	$	5,000
5	Trench Safety Systems	LUMP SUM	$	23,200	$	23,200
6	Traffic Control	232 HRS	$	30	$	6,960
7	Clearing and Grubbing	2,900 SY	$	2	$	5,800
8	Trench Safety Systems	5,800 LF	$	4	$	23,200
9	8-inch PVC Sewer Pipe, Including Fittings	5,800 LF	$	50	$	290,000
10	48-inch Precast Manhole (Basic to 8')	20 EA	$	4,000	$	80,000
11	48-inch Precast Manhole (Height over 8')	40 LF	$	300	$	12,000
12	Special Excavation of Unsuitable Material	110 CY	$	35	$	3,850
13	Gravel Backfill	5,880 CY	$	20	$	117,600
14	Crushed Surfacing, Top Course	1,510 TN	$	20	$	30,200
15	Asphalt Concrete Pavement	290 TN	$	120	$	34,800
16	Sawcutting	2,900 LF	$	2	$	5,800
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	2,900 SY	$	5	$	14,500
	Subtotal				$	737,000
	Tax rate (8.2%)					60,000
	Subtotal:				$	797,000
	Contingency (20%)					159,400
	TOTAL ESTIMATED CONSTRUCTION COST:				$	956,400
	Engineering and AdministrativeCosts (25%):					239,100
	TOTAL ESTIMATED PROJECT COST:				**$**	**1,195,500**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-23N
Boschma

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	57,300	$	57,300
2	Dewatering	LUMP SUM	$	26,500	$	26,500
3	Locate Existing Utilities	LUMP SUM	$	5,400	$	5,400
4	Erosion Control	LUMP SUM	$	5,800	$	5,800
5	Trench Safety Systems	LUMP SUM	$	21,200	$	21,200
6	Traffic Control	212 HRS	$	30	$	6,360
7	Clearing and Grubbing	2,650 SY	$	2	$	5,300
8	Trench Safety Systems	5,300 LF	$	4	$	21,200
9	16-inch PVC Sewer Pipe, Including Fittings	5,300 LF	$	80	$	424,000
10	48-inch Precast Manhole (Basic to 8')	18 EA	$	4,000	$	72,000
11	48-inch Precast Manhole (Height over 8')	36 LF	$	300	$	10,800
12	Special Excavation of Unsuitable Material	100 CY	$	35	$	3,500
13	Gravel Backfill	5,380 CY	$	20	$	107,600
14	Crushed Surfacing, Top Course	1,380 TN	$	20	$	27,600
15	Asphalt Concrete Pavement	260 TN	$	120	$	31,200
16	Sawcutting	2,650 LF	$	2	$	5,300
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	2,650 SY	$	5	$	13,250

Subtotal..	$	846,000
Tax rate (8.2%)..		69,000
Subtotal:..	$	915,000
Contingency (20%)..		183,000
TOTAL ESTIMATED CONSTRUCTION COST:........................	$	1,098,000
Engineering and AdministrativeCosts (25%):........................		274,500
TOTAL ESTIMATED PROJECT COST:........................	**$**	**1,372,500**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-23S
SE UGA to NE 259th

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	21,700	$	21,700
2	Dewatering	LUMP SUM	$	11,750	$	11,750
3	Locate Existing Utilities	LUMP SUM	$	2,000	$	2,000
4	Erosion Control	LUMP SUM	$	2,200	$	2,200
5	Trench Safety Systems	LUMP SUM	$	9,400	$	9,400
6	Traffic Control	96 HRS	$	30	$	2,880
7	Clearing and Grubbing	1,180 SY	$	2	$	2,360
8	Trench Safety Systems	2,350 LF	$	4	$	9,400
9	12-inch PVC Sewer Pipe, Including Fittings	2,350 LF	$	60	$	141,000
10	48-inch Precast Manhole (Basic to 8')	8 EA	$	4,000	$	32,000
11	48-inch Precast Manhole (Height over 8')	16 LF	$	300	$	4,800
12	Special Excavation of Unsuitable Material	50 CY	$	35	$	1,750
13	Gravel Backfill	2,380 CY	$	20	$	47,600
14	Crushed Surfacing, Top Course	610 TN	$	20	$	12,200
15	Asphalt Concrete Pavement	120 TN	$	120	$	14,400
16	Sawcutting	1,175 LF	$	2	$	2,350
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	1,180 SY	$	5	$	5,900
	Subtotal				$	325,000
	Tax rate (8.2%)					27,000
	Subtotal:				$	352,000
	Contingency (20%)					70,400
	TOTAL ESTIMATED CONSTRUCTION COST:				$	422,400
	Engineering and AdministrativeCosts (25%):					105,600
	TOTAL ESTIMATED PROJECT COST:				**$**	**528,000**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-24N
S. 20th Way to NE Carty Rd.

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT	
1	Mobilization, Cleanup, and Demobilization	LUMP SUM		$	30,200	$	30,200
2	Dewatering	LUMP SUM		$	17,000	$	17,000
3	Locate Existing Utilities	LUMP SUM		$	2,800	$	2,800
4	Erosion Control	LUMP SUM		$	3,100	$	3,100
5	Trench Safety Systems	LUMP SUM		$	13,600	$	13,600
6	Traffic Control	136	HRS	$	30	$	4,080
7	Clearing and Grubbing	1,700	SY	$	2	$	3,400
8	Trench Safety Systems	3,400	LF	$	4	$	13,600
9	10-inch PVC Sewer Pipe, Including Fittings	3,400	LF	$	55	$	187,000
10	48-inch Precast Manhole (Basic to 8')	12	EA	$	4,000	$	48,000
11	48-inch Precast Manhole (Height over 8')	24	LF	$	300	$	7,200
12	Special Excavation of Unsuitable Material	70	CY	$	35	$	2,450
13	Gravel Backfill	3,450	CY	$	20	$	69,000
14	Crushed Surfacing, Top Course	890	TN	$	20	$	17,800
15	Asphalt Concrete Pavement	170	TN	$	120	$	20,400
16	Sawcutting	1,700	LF	$	2	$	3,400
17	Connections to Existing Manhole	1	EA	$	1,000	$	1,000
18	Hydroseeding	1,700	SY	$	5	$	8,500

Subtotal..	$	453,000
Tax rate (8.2%)..		37,000
Subtotal:..	$	490,000
Contingency (20%)..		98,000
TOTAL ESTIMATED CONSTRUCTION COST:........................	$	588,000
Engineering and AdministrativeCosts (25%):................		147,000
TOTAL ESTIMATED PROJECT COST:.........................	**$**	**735,000**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-24S
I-5 to Carty Rd

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	16,200	$	16,200
2	Dewatering	LUMP SUM	$	9,500	$	9,500
3	Locate Existing Utilities	LUMP SUM	$	1,500	$	1,500
4	Erosion Control	LUMP SUM	$	1,600	$	1,600
5	Trench Safety Systems	LUMP SUM	$	7,600	$	7,600
6	Traffic Control	76 HRS	$	30	$	2,280
7	Clearing and Grubbing	950 SY	$	2	$	1,900
8	Trench Safety Systems	1,900 LF	$	4	$	7,600
9	8-inch PVC Sewer Pipe, Including Fittings	1,900 LF	$	50	$	95,000
10	48-inch Precast Manhole (Basic to 8')	7 EA	$	4,000	$	28,000
11	48-inch Precast Manhole (Height over 8')	14 LF	$	300	$	4,200
12	Special Excavation of Unsuitable Material	40 CY	$	35	$	1,400
13	Gravel Backfill	1,930 CY	$	20	$	38,600
14	Crushed Surfacing, Top Course	500 TN	$	20	$	10,000
15	Asphalt Concrete Pavement	90 TN	$	120	$	10,800
16	Sawcutting	950 LF	$	2	$	1,900
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	950 SY	$	5	$	4,750
	Subtotal				$	244,000
	Tax rate (8.2%)					20,000
	Subtotal:				$	264,000
	Contingency (20%)					52,800
	TOTAL ESTIMATED CONSTRUCTION COST:				$	316,800
	Engineering and AdministrativeCosts (25%):					79,200
	TOTAL ESTIMATED PROJECT COST:				**$**	**396,000**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-25E
S. 20th Way to Gee Creek North Fork Confluence

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	66,300	$	66,300
2	Dewatering	LUMP SUM	$	31,750	$	31,750
3	Locate Existing Utilities	LUMP SUM	$	6,200	$	6,200
4	Erosion Control	LUMP SUM	$	6,700	$	6,700
5	Trench Safety Systems	LUMP SUM	$	25,400	$	25,400
6	Traffic Control	256 HRS	$	30	$	7,680
7	Clearing and Grubbing	3,180 SY	$	2	$	6,360
8	Trench Safety Systems	6,350 LF	$	4	$	25,400
9	15-inch PVC Sewer Pipe, Including Fittings	6,350 LF	$	75	$	476,250
10	48-inch Precast Manhole (Basic to 8')	22 EA	$	4,000	$	88,000
11	48-inch Precast Manhole (Height over 8')	44 LF	$	300	$	13,200
12	Special Excavation of Unsuitable Material	120 CY	$	35	$	4,200
13	Gravel Backfill	6,440 CY	$	20	$	128,800
14	Crushed Surfacing, Top Course	1,650 TN	$	20	$	33,000
15	Asphalt Concrete Pavement	320 TN	$	120	$	38,400
16	Sawcutting	3,175 LF	$	2	$	6,350
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	3,180 SY	$	5	$	15,900

Subtotal..	$	981,000
Tax rate (8.2%)...		80,000
Subtotal:..	$	1,061,000
Contingency (20%)..		212,200
TOTAL ESTIMATED CONSTRUCTION COST:......................	$	1,273,200
Engineering and AdministrativeCosts (25%):..................		318,300
TOTAL ESTIMATED PROJECT COST:........................	**$**	**1,591,500**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-25S
Gee Creek South Fork Confluence to Royle Rd.

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	24,500	$	24,500
2	Dewatering	LUMP SUM	$	14,500	$	14,500
3	Locate Existing Utilities	LUMP SUM	$	2,300	$	2,300
4	Erosion Control	LUMP SUM	$	2,500	$	2,500
5	Trench Safety Systems	LUMP SUM	$	11,600	$	11,600
6	Traffic Control	116 HRS	$	30	$	3,480
7	Clearing and Grubbing	1,450 SY	$	2	$	2,900
8	Trench Safety Systems	2,900 LF	$	4	$	11,600
9	8-inch PVC Sewer Pipe, Including Fittings	2,900 LF	$	50	$	145,000
10	48-inch Precast Manhole (Basic to 8')	10 EA	$	4,000	$	40,000
11	48-inch Precast Manhole (Height over 8')	20 LF	$	300	$	6,000
12	Special Excavation of Unsuitable Material	60 CY	$	35	$	2,100
13	Gravel Backfill	2,940 CY	$	20	$	58,800
14	Crushed Surfacing, Top Course	760 TN	$	20	$	15,200
15	Asphalt Concrete Pavement	140 TN	$	120	$	16,800
16	Sawcutting	1,450 LF	$	2	$	2,900
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	1,450 SY	$	5	$	7,250
	Subtotal				$	369,000
	Tax rate (8.2%)					30,000
	Subtotal:				$	399,000
	Contingency (20%)					79,800
	TOTAL ESTIMATED CONSTRUCTION COST:				$	478,800
	Engineering and AdministrativeCosts (25%):					119,700
	TOTAL ESTIMATED PROJECT COST:				**$**	**598,500**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-25W
Royle Road to Gee Creek

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	37,800	$	37,800
2	Dewatering	LUMP SUM	$	13,250	$	13,250
3	Locate Existing Utilities	LUMP SUM	$	3,500	$	3,500
4	Erosion Control	LUMP SUM	$	3,800	$	3,800
5	Trench Safety Systems	LUMP SUM	$	10,600	$	10,600
6	Traffic Control	108 HRS	$	30	$	3,240
7	Clearing and Grubbing	1,330 SY	$	2	$	2,660
8	Trench Safety Systems	2,650 LF	$	4	$	10,600
9	24-inch PVC Sewer Pipe, Including Fittings	2,650 LF	$	120	$	318,000
10	54-inch Precast Manhole (Basic to 8')	9 EA	$	4,500	$	40,500
11	54-inch Precast Manhole (Height over 8')	27 LF	$	350	$	9,450
12	Special Excavation of Unsuitable Material	50 CY	$	35	$	1,750
13	Gravel Backfill	2,690 CY	$	20	$	53,800
14	Crushed Surfacing, Top Course	690 TN	$	20	$	13,800
15	Asphalt Concrete Pavement	130 TN	$	120	$	15,600
16	Sawcutting	1,325 LF	$	2	$	2,650
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	1,330 SY	$	5	$	6,650

Subtotal..	$	549,000
Tax rate (8.2%)..		45,000
Subtotal:..	$	594,000
Contingency (20%)..		118,800
TOTAL ESTIMATED CONSTRUCTION COST:..	$	712,800
Engineering and AdministrativeCosts (25%):..		178,200
TOTAL ESTIMATED PROJECT COST:..	**$**	**891,000**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-26E
Gee Creek to Carthy Rd.

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	13,700	$	13,700
2	Dewatering	LUMP SUM	$	8,000	$	8,000
3	Locate Existing Utilities	LUMP SUM	$	1,300	$	1,300
4	Erosion Control	LUMP SUM	$	1,400	$	1,400
5	Trench Safety Systems	LUMP SUM	$	6,400	$	6,400
6	Traffic Control	64 HRS	$	30	$	1,920
7	Clearing and Grubbing	800 SY	$	2	$	1,600
8	Trench Safety Systems	1,600 LF	$	4	$	6,400
9	8-inch PVC Sewer Pipe, Including Fittings	1,600 LF	$	50	$	80,000
10	48-inch Precast Manhole (Basic to 8')	6 EA	$	4,000	$	24,000
11	48-inch Precast Manhole (Height over 8')	12 LF	$	300	$	3,600
12	Special Excavation of Unsuitable Material	30 CY	$	35	$	1,050
13	Gravel Backfill	1,620 CY	$	20	$	32,400
14	Crushed Surfacing, Top Course	420 TN	$	20	$	8,400
15	Asphalt Concrete Pavement	80 TN	$	120	$	9,600
16	Sawcutting	800 LF	$	2	$	1,600
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	800 SY	$	5	$	4,000
	Subtotal..				$	207,000
	Tax rate (8.2%)..					17,000
	Subtotal:..				$	224,000
	Contingency (20%)..					44,800
	TOTAL ESTIMATED CONSTRUCTION COST:..				$	268,800
	Engineering and AdministrativeCosts (25%):..					67,200
	TOTAL ESTIMATED PROJECT COST:..				**$**	**336,000**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-26W
Carthy Rd. to Carthy Pump Station (PS#6)

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT	
1	Mobilization, Cleanup, and Demobilization	LUMP SUM		$	34,200	$	34,200
2	Dewatering	LUMP SUM		$	15,750	$	15,750
3	Locate Existing Utilities	LUMP SUM		$	3,200	$	3,200
4	Erosion Control	LUMP SUM		$	3,500	$	3,500
5	Trench Safety Systems	LUMP SUM		$	12,600	$	12,600
6	Traffic Control	128	HRS	$	30	$	3,840
7	Clearing and Grubbing	1,580	SY	$	2	$	3,160
8	Trench Safety Systems	3,150	LF	$	4	$	12,600
9	16-inch PVC Sewer Pipe, Including Fittings	3,150	LF	$	80	$	252,000
10	48-inch Precast Manhole (Basic to 8')	11	EA	$	4,000	$	44,000
11	48-inch Precast Manhole (Height over 8')	22	LF	$	300	$	6,600
12	Special Excavation of Unsuitable Material	60	CY	$	35	$	2,100
13	Gravel Backfill	3,200	CY	$	20	$	64,000
14	Crushed Surfacing, Top Course	820	TN	$	20	$	16,400
15	Asphalt Concrete Pavement	160	TN	$	120	$	19,200
16	Sawcutting	1,575	LF	$	2	$	3,150
17	Connections to Existing Manhole	1	EA	$	1,000	$	1,000
18	Hydroseeding	1,580	SY	$	5	$	7,900
	Subtotal..........					$	506,000
	Tax rate (8.2%)..........						41,000
	Subtotal:..........					$	547,000
	Contingency (20%)..........						109,400
	TOTAL ESTIMATED CONSTRUCTION COST:..........					$	656,400
	Engineering and AdministrativeCosts (25%):..........						164,100
	TOTAL ESTIMATED PROJECT COST:..........					**$**	**820,500**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-27
Gee Creek South Fork to Carthy Rd.

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	20,800	$	20,800
2	Dewatering	LUMP SUM	$	11,750	$	11,750
3	Locate Existing Utilities	LUMP SUM	$	1,900	$	1,900
4	Erosion Control	LUMP SUM	$	2,100	$	2,100
5	Trench Safety Systems	LUMP SUM	$	9,400	$	9,400
6	Traffic Control	96 HRS	$	30	$	2,880
7	Clearing and Grubbing	1,180 SY	$	2	$	2,360
8	Trench Safety Systems	2,350 LF	$	4	$	9,400
9	10-inch PVC Sewer Pipe, Including Fittings	2,350 LF	$	55	$	129,250
10	48-inch Precast Manhole (Basic to 8')	8 EA	$	4,000	$	32,000
11	48-inch Precast Manhole (Height over 8')	16 LF	$	300	$	4,800
12	Special Excavation of Unsuitable Material	50 CY	$	35	$	1,750
13	Gravel Backfill	2,380 CY	$	20	$	47,600
14	Crushed Surfacing, Top Course	610 TN	$	20	$	12,200
15	Asphalt Concrete Pavement	120 TN	$	120	$	14,400
16	Sawcutting	1,175 LF	$	2	$	2,350
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	1,180 SY	$	5	$	5,900

Subtotal..	$	312,000
Tax rate (8.2%)..		26,000
Subtotal:..	$	338,000
Contingency (20%)..		67,600
TOTAL ESTIMATED CONSTRUCTION COST:..	$	405,600
Engineering and AdministrativeCosts (25%):..		101,400
TOTAL ESTIMATED PROJECT COST:..	**$**	**507,000**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-27W
Southern UGA Limit to Gee Creek

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	20,200	$	20,200
2	Dewatering	LUMP SUM	$	12,000	$	12,000
3	Locate Existing Utilities	LUMP SUM	$	1,900	$	1,900
4	Erosion Control	LUMP SUM	$	2,000	$	2,000
5	Trench Safety Systems	LUMP SUM	$	9,600	$	9,600
6	Traffic Control	96 HRS	$	30	$	2,880
7	Clearing and Grubbing	1,200 SY	$	2	$	2,400
8	Trench Safety Systems	2,400 LF	$	4	$	9,600
9	8-inch PVC Sewer Pipe, Including Fittings	2,400 LF	$	50	$	120,000
10	48-inch Precast Manhole (Basic to 8')	8 EA	$	4,000	$	32,000
11	48-inch Precast Manhole (Height over 8')	16 LF	$	300	$	4,800
12	Special Excavation of Unsuitable Material	50 CY	$	35	$	1,750
13	Gravel Backfill	2,430 CY	$	20	$	48,600
14	Crushed Surfacing, Top Course	630 TN	$	20	$	12,600
15	Asphalt Concrete Pavement	120 TN	$	120	$	14,400
16	Sawcutting	1,200 LF	$	2	$	2,400
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	1,200 SY	$	5	$	6,000

Subtotal	$	305,000
Tax rate (8.2%)		25,000
Subtotal:	$	330,000
Contingency (20%)		66,000
TOTAL ESTIMATED CONSTRUCTION COST:	$	396,000
Engineering and AdministrativeCosts (25%):		99,000
TOTAL ESTIMATED PROJECT COST:	**$**	**495,000**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-28W
Junction Lift Station Inlet Sewer Upgrade

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	5,900	$	5,900
2	Dewatering	LUMP SUM	$	3,100	$	3,100
3	Locate Existing Utilities	LUMP SUM	$	600	$	600
4	Erosion Control	LUMP SUM	$	600	$	600
5	Trench Safety Systems	LUMP SUM	$	2,500	$	2,500
6	Traffic Control	24 HRS	$	30	$	720
7	Clearing and Grubbing	310 SY	$	2	$	620
8	Trench Safety Systems	620 LF	$	4	$	2,480
9	10-inch PVC Sewer Pipe, Including Fittings	620 LF	$	55	$	34,100
10	48-inch Precast Manhole (Basic to 8')	3 EA	$	4,000	$	12,000
11	48-inch Precast Manhole (Height over 8')	6 LF	$	300	$	1,800
12	Special Excavation of Unsuitable Material	20 CY	$	35	$	700
13	Gravel Backfill	630 CY	$	20	$	12,600
14	Crushed Surfacing, Top Course	160 TN	$	20	$	3,200
15	Asphalt Concrete Pavement	30 TN	$	120	$	3,600
16	Sawcutting	310 LF	$	2	$	620
17	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
18	Hydroseeding	310 SY	$	5	$	1,550
	Subtotal				$	88,000
	Tax rate (8.2%)					7,000
	Subtotal:				$	95,000
	Contingency (20%)					19,000
	TOTAL ESTIMATED CONSTRUCTION COST:				$	114,000
	Engineering and AdministrativeCosts (25%):					28,500
	TOTAL ESTIMATED PROJECT COST:				**$**	**142,500**

City of Ridgefield
Preliminary Project Cost Estimate
Collection System Improvement T-28E
S. 6th Way Sewer

NO.	ITEM	QUANTITY	UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$ 9,800	$ 9,800
2	Dewatering	LUMP SUM	$ 5,500	$ 5,500
3	Locate Existing Utilities	LUMP SUM	$ 900	$ 900
4	Erosion Control	LUMP SUM	$ 1,000	$ 1,000
5	Trench Safety Systems	LUMP SUM	$ 4,400	$ 4,400
6	Traffic Control	44 HRS	$ 30	$ 1,320
7	Clearing and Grubbing	550 SY	$ 2	$ 1,100
8	Trench Safety Systems	1,100 LF	$ 4	$ 4,400
9	10-inch PVC Sewer Pipe, Including Fittings	1,100 LF	$ 55	$ 60,500
10	48-inch Precast Manhole (Basic to 8')	4 EA	$ 4,000	$ 16,000
11	48-inch Precast Manhole (Height over 8')	8 LF	$ 300	$ 2,400
12	Special Excavation of Unsuitable Material	30 CY	$ 35	$ 1,050
13	Gravel Backfill	1,120 CY	$ 20	$ 22,400
14	Crushed Surfacing, Top Course	290 TN	$ 20	$ 5,800
15	Asphalt Concrete Pavement	50 TN	$ 120	$ 6,000
16	Sawcutting	550 LF	$ 2	$ 1,100
17	Connections to Existing Manhole	1 EA	$ 1,000	$ 1,000
18	Hydroseeding	550 SY	$ 5	$ 2,750

Subtotal	$ 148,000
Tax rate (8.2%)	12,000
Subtotal:	$ 160,000
Contingency (20%)	32,000
TOTAL ESTIMATED CONSTRUCTION COST:	$ 192,000
Engineering and AdministrativeCosts (25%):	48,000
TOTAL ESTIMATED PROJECT COST:	**$ 240,000**

City of Ridgefield

General Sewer and Wastewater Facility Plan

Sewer Collection Capital Improvement Projects (Force Mains)

Estimated Developer Percentage = 50%

Project Number	Description	Size (in.)	Length (LF)	Year	Total Project Cost	City Funded	Developer Funded	Notes
FM-1	PS # 1 to Royal Rd.	4	1,550	2018	$ 676,000	$ 338,000	$ 338,000	
FM-2	S. 15th to S. 4th Way and S. 25th	6	5,400	2023	$ 1,265,000	$ 632,500	$ 632,500	
FM-3	PS #2 to FM-2	4	1,100	2018	$ 648,000	$ 324,000	$ 324,000	
FM-4	N. 50th Pl. to N. 45th Ave.	12	2,900	2018	$ 2,376,000	$ 1,188,000	$ 1,188,000	
FM-5	PS # 5 to Future T-11	8	2,650	2023	$ 1,488,000	$ 744,000	$ 744,000	
FM-6	NW Carty Rd to S. Royle Rd.	8	4,700	2023	$ 1,698,000	$ 849,000	$ 849,000	
FM-7	Royle Rd. to N 32nd and Pioneer	12	9,350	2018	$ 3,150,000	$ 1,575,000	$ 1,575,000	
FM-9	NE Carty to NW 11th	6	600	2028	$ 871,000	$ 435,500	$ 435,500	
FM-10	NW 229th to NW Carty	4	3,400	2023	$ 790,000	$ 395,000	$ 395,000	
FM-12	NE 10th, S. 10th to S. 5th	6	1,400	2028	$ 1,035,000	$ 517,500	$ 517,500	
FM-14	Taverner Ridge	4	1,000	2018	$ 640,000	$ 320,000	$ 320,000	
			Total		**$ 14,637,000**	**$ 7,318,500**	**$ 7,318,500**	

ASSUMPTIONS FOR FORCE MAIN COST ESTIMATES

Tax rate	8.2 %					
Contingency	20 %					
Engineering and Administrative Costs	25 %					
Mobilization, Cleanup and Demobilization	8% of subtotal without tax and contingency (round to $1000)					
4-inch CL 150 PVC Force Main	$ 30 =UNIT PRICE					
6-inch CL 150 PVC Force Main	$ 40 =UNIT PRICE					
8-inch CL 150 PVC Force Main	$ 50 =UNIT PRICE					
10-inch CL 150 PVC Force Main	$ 55 =UNIT PRICE					
12-inch CL 150 PVC Force Main	$ 60 =UNIT PRICE					
14-inch CL 150 PVC Force Main	$ 65 =UNIT PRICE					
15-inch CL 150 PVC Force Main	$ 70 =UNIT PRICE					
Locate Existing Utilities	0.8% of subtotal without mobilization, tax and contingency (round to $1000)					
Erosion Control	1.0% of subtotal without tax and contingency (round to $1000)					
Trench Safety Systems	$ 2.00 per LF of Pipe Length					
Air Release Valves	$ 2,500 EA			1	Every	2500 feet
Drain Station	$ 2,500 EA			1	Every	2500 feet
	Trenching					
Pump Stations (Cost associated with Force Main Pipe Diameter)	PIPE SIZE	Bottom Width (ft)	Top Width (ft)	Total Assumed Depth (ft)	Depth Minus Bedding Zone (ft)	
$350,000	4	2.5	2.5	3.3	2	
$500,000	6	2.5	2.5	3.5	2	
$750,000	8	2.5	2.5	3.7	2	
$1,000,000	10	2.5	2.5	3.8	2	
$1,250,000	12	2.5	2.5	4.0	2	
$1,500,000	14	2.5	2.5	4.2	2	
$1,750,000	15	2.5	2.5	4.3	2	
LANE WIDTH	WIDTH (ft)	12.0				

	MATL DEPTH (feet)	UNT WEIGHT (TN/CY)	EXTRA MATL FACTOR	FRACTION OF LENGTH	PRODUCT
Gravel Backfill	0.42	1.0	1.1	1.00	0.017 * Trench Width = CY/LF
Cost per CY	$ 20.00				
CDF	4.00	1.0	1.1	1.00	0.163 * Trench Width = CY/LF
Cost per CY	$ 100.00				
Foundation Gravel	0.00	1.8	1.1	0.50	0.000 * Trench Width = TN/LF
Cost per TN	$ 35.00				
Asphalt Concrete Pavement Repair	0.42	2.05	1.0	1.00	0.032 * Lane Width = TN/LF
Cost per TN	$ 120.00				
Sawcutting	$ 2.00 = Cost per LF of sawcutting				
Crushed Surfacing, Top Course	1.166666667	1.8	1.1	1.00	0.086 * Lane Width = TN/LF
Cost per TN	$ 20.00				
Cold Mix Asphalt	0.25	1.800	1.1	0.50	0.009 * Lane Width = TN/LF
Cost per TN	$ 100.00				
Connections to Existing System	$ 1,000 EA				
Traffic Control	$ 30 EA		8	HRS per	200 feet

City of Ridgefield
Prelimiary Project Cost Estimate
Collection System Improvement FM-1
PS # 1 to Royal Rd.

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	4,600	$	4,600
2	Locate Existing Utilities	LUMP SUM	$	400	$	400
3	Erosion Control	LUMP SUM	$	600	$	600
4	Trench Safety Systems	LUMP SUM	$	3,100	$	3,100
5	Traffic Control	64 HRS	$	30	$	1,920
6	Clearing and Grubbing	440 SY	$	2	$	880
7	4-inch CL 150 PVC Force Main	1,550 LF	$	30	$	46,500
8	Air Release Valves	1 EA	$	2,500	$	2,500
9	Drain Station	1 EA	$	2,500	$	2,500
10	Special Excavation of Unsuitable Material	20 CY	$	35	$	700
11	Gravel Backfill	70 CY	$	20	$	1,400
12	Crushed Surfacing, Top Course	30 TN	$	20	$	600
13	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
14	Pump Station	LUMP SUM	$	350,000	$	350,000
	Subtotal				$	417,000
	Tax rate (8.2%)					34,000
	Subtotal:				$	451,000
	Contingency (20%)					90,000
	TOTAL ESTIMATED CONSTRUCTION COST:				$	541,000
	Engineering and AdministrativeCosts (25%):					135,000
	TOTAL ESTIMATED PROJECT COST:				**$**	**676,000**

City of Ridgefield
Prelimiary Project Cost Estimate
Collection System Improvement FM-2
S. 15th to S. 4th Way and S. 25th

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	19,600	$	19,600
2	Locate Existing Utilities	LUMP SUM	$	1,800	$	1,800
3	Erosion Control	LUMP SUM	$	2,400	$	2,400
4	Trench Safety Systems	LUMP SUM	$	10,800	$	10,800
5	Traffic Control	216 HRS	$	30	$	6,480
6	Clearing and Grubbing	1,500 SY	$	2	$	3,000
7	6-inch CL 150 PVC Force Main	5,400 LF	$	40	$	216,000
8	Air Release Valves	2 EA	$	2,500	$	5,000
9	Drain Station	2 EA	$	2,500	$	5,000
10	Special Excavation of Unsuitable Material	50 CY	$	35	$	1,750
11	Gravel Backfill	230 CY	$	20	$	4,600
12	Crushed Surfacing, Top Course	100 TN	$	20	$	2,000
13	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
14	Pump Station	LUMP SUM	$	500,000	$	500,000
	Subtotal				$	779,000
	Tax rate (8.2%)					64,000
	Subtotal:				$	843,000
	Contingency (20%)					169,000
	TOTAL ESTIMATED CONSTRUCTION COST:				$	1,012,000
	Engineering and AdministrativeCosts (25%):					253,000
	TOTAL ESTIMATED PROJECT COST:				**$**	**1,265,000**

City of Ridgefield
Prelimiary Project Cost Estimate
Collection System Improvement FM-3
PS #2 to FM-2

NO.	ITEM	QUANTITY	UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$ 3,400	$ 3,400
2	Locate Existing Utilities	LUMP SUM	$ 300	$ 300
3	Erosion Control	LUMP SUM	$ 400	$ 400
4	Trench Safety Systems	LUMP SUM	$ 2,200	$ 2,200
5	Traffic Control	44 HRS	$ 30	$ 1,320
6	Clearing and Grubbing	310 SY	$ 2	$ 620
7	4-inch CL 150 PVC Force Main	1,100 LF	$ 30	$ 33,000
8	Air Release Valves	1 EA	$ 2,500	$ 2,500
9	Drain Station	1 EA	$ 2,500	$ 2,500
10	Special Excavation of Unsuitable Material	10 CY	$ 35	$ 350
11	Gravel Backfill	50 CY	$ 20	$ 1,000
12	Crushed Surfacing, Top Course	20 TN	$ 20	$ 400
13	Connections to Existing Manhole	1 EA	$ 1,000	$ 1,000
14	Pump Station	LUMP SUM	$ 350,000	$ 350,000
	Subtotal			$ 399,000
	Tax rate (8.2%)			33,000
	Subtotal:			$ 432,000
	Contingency (20%)			86,000
	TOTAL ESTIMATED CONSTRUCTION COST:			$ 518,000
	Engineering and AdministrativeCosts (25%):			130,000
	TOTAL ESTIMATED PROJECT COST:			**$ 648,000**

City of Ridgefield
Prelimiary Project Cost Estimate
Collection System Improvement FM-4
N. 50th Pl. to N. 45th Ave.

NO.	ITEM	QUANTITY	UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$ 15,200	$ 15,200
2	Locate Existing Utilities	LUMP SUM	$ 1,400	$ 1,400
3	Erosion Control	LUMP SUM	$ 1,900	$ 1,900
4	Trench Safety Systems	LUMP SUM	$ 5,800	$ 5,800
5	Traffic Control	116 HRS	$ 30	$ 3,480
6	Clearing and Grubbing	810 SY	$ 2	$ 1,620
7	12-inch CL 150 PVC Force Main	2,900 LF	$ 60	$ 174,000
8	Air Release Valves	1 EA	$ 2,500	$ 2,500
9	Drain Station	1 EA	$ 2,500	$ 2,500
10	Special Excavation of Unsuitable Material	30 CY	$ 35	$ 1,050
11	Gravel Backfill	120 CY	$ 20	$ 2,400
12	Crushed Surfacing, Top Course	50 TN	$ 20	$ 1,000
13	Connections to Existing Manhole	1 EA	$ 1,000	$ 1,000
14	Pump Station	LUMP SUM	$ 1,250,000	$ 1,250,000
	Subtotal........			$ 1,464,000
	Tax rate (8.2%)........			120,000
	Subtotal:........			$ 1,584,000
	Contingency (20%)........			317,000
	TOTAL ESTIMATED CONSTRUCTION COST:........			$ 1,901,000
	Engineering and AdministrativeCosts (25%):........			475,000
	TOTAL ESTIMATED PROJECT COST:........			**$ 2,376,000**

City of Ridgefield
Prelimiary Project Cost Estimate
Collection System Improvement FM-5
PS # 5 to Future T-11

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	11,800	$	11,800
2	Locate Existing Utilities	LUMP SUM	$	1,100	$	1,100
3	Erosion Control	LUMP SUM	$	1,500	$	1,500
4	Trench Safety Systems	LUMP SUM	$	5,300	$	5,300
5	Traffic Control	108 HRS	$	30	$	3,240
6	Clearing and Grubbing	740 SY	$	2	$	1,480
7	8-inch CL 150 PVC Force Main	2,650 LF	$	50	$	132,500
8	Air Release Valves	1 EA	$	2,500	$	2,500
9	Drain Station	1 EA	$	2,500	$	2,500
10	Special Excavation of Unsuitable Material	30 CY	$	35	$	1,050
11	Gravel Backfill	110 CY	$	20	$	2,200
12	Crushed Surfacing, Top Course	50 TN	$	20	$	1,000
13	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
14	Pump Station	LUMP SUM	$	750,000	$	750,000
	Subtotal				$	917,000
	Tax rate (8.2%)					75,000
	Subtotal:				$	992,000
	Contingency (20%)					198,000
	TOTAL ESTIMATED CONSTRUCTION COST:				$	1,190,000
	Engineering and AdministrativeCosts (25%):					298,000
	TOTAL ESTIMATED PROJECT COST:				**$**	**1,488,000**

City of Ridgefield
Prelimiary Project Cost Estimate
Collection System Improvement FM-6
NW Carty Rd to S. Royle Rd.

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	20,900	$	20,900
2	Locate Existing Utilities	LUMP SUM	$	2,000	$	2,000
3	Erosion Control	LUMP SUM	$	2,600	$	2,600
4	Trench Safety Systems	LUMP SUM	$	9,400	$	9,400
5	Traffic Control	188 HRS	$	30	$	5,640
6	Clearing and Grubbing	1,310 SY	$	2	$	2,620
7	8-inch CL 150 PVC Force Main	4,700 LF	$	50	$	235,000
8	Air Release Valves	2 EA	$	2,500	$	5,000
9	Drain Station	2 EA	$	2,500	$	5,000
10	Special Excavation of Unsuitable Material	40 CY	$	35	$	1,400
11	Gravel Backfill	200 CY	$	20	$	4,000
12	Crushed Surfacing, Top Course	90 TN	$	20	$	1,800
13	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
14	Pump Station	LUMP SUM	$	750,000	$	750,000
	Subtotal				$	1,046,000
	Tax rate (8.2%)					86,000
	Subtotal:				$	1,132,000
	Contingency (20%)					226,000
	TOTAL ESTIMATED CONSTRUCTION COST:				$	1,358,000
	Engineering and AdministrativeCosts (25%):					340,000
	TOTAL ESTIMATED PROJECT COST:				**$**	**1,698,000**

City of Ridgefield
Prelimiary Project Cost Estimate
Collection System Improvement FM-7
Royle Rd. to N 32nd and Pioneer

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM		$ 49,000	$ 49,000
2	Locate Existing Utilities	LUMP SUM		$ 4,600	$ 4,600
3	Erosion Control	LUMP SUM		$ 6,100	$ 6,100
4	Trench Safety Systems	LUMP SUM		$ 18,700	$ 18,700
5	Traffic Control	376	HRS	$ 30	$ 11,280
6	Clearing and Grubbing	2,600	SY	$ 2	$ 5,200
7	12-inch CL 150 PVC Force Main	9,350	LF	$ 60	$ 561,000
8	Air Release Valves	4	EA	$ 2,500	$ 10,000
9	Drain Station	4	EA	$ 2,500	$ 10,000
10	Special Excavation of Unsuitable Material	80	CY	$ 35	$ 2,800
11	Gravel Backfill	400	CY	$ 20	$ 8,000
12	Crushed Surfacing, Top Course	180	TN	$ 20	$ 3,600
13	Connections to Existing Manhole	1	EA	$ 1,000	$ 1,000
14	Pump Station	LUMP SUM		$ 1,250,000	$ 1,250,000
	Subtotal..				$ 1,941,000
	Tax rate (8.2%)..				159,000
	Subtotal:..				$ 2,100,000
	Contingency (20%)..				420,000
	TOTAL ESTIMATED CONSTRUCTION COST:..				$ 2,520,000
	Engineering and AdministrativeCosts (25%):..				630,000
	TOTAL ESTIMATED PROJECT COST:..				**$ 3,150,000**

City of Ridgefield
Prelimiary Project Cost Estimate
Collection System Improvement FM-9
NE Carty to NW 11th

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	2,600	$	2,600
2	Locate Existing Utilities	LUMP SUM	$	200	$	200
3	Erosion Control	LUMP SUM	$	300	$	300
4	Trench Safety Systems	LUMP SUM	$	1,200	$	1,200
5	Traffic Control	24 HRS	$	30	$	720
6	Clearing and Grubbing	170 SY	$	2	$	340
7	6-inch CL 150 PVC Force Main	600 LF	$	40	$	24,000
8	Air Release Valves	1 EA	$	2,500	$	2,500
9	Drain Station	1 EA	$	2,500	$	2,500
10	Special Excavation of Unsuitable Material	10 CY	$	35	$	350
11	Gravel Backfill	30 CY	$	20	$	600
12	Crushed Surfacing, Top Course	10 TN	$	20	$	200
13	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
14	Pump Station	LUMP SUM	$	500,000	$	500,000
	Subtotal				$	537,000
	Tax rate (8.2%)					44,000
	Subtotal:				$	581,000
	Contingency (20%)					116,000
	TOTAL ESTIMATED CONSTRUCTION COST:				$	697,000
	Engineering and AdministrativeCosts (25%):					174,000
	TOTAL ESTIMATED PROJECT COST:				**$**	**871,000**

City of Ridgefield
Prelimiary Project Cost Estimate
Collection System Improvement FM-10
NW 229th to NW Carty

NO.	ITEM	QUANTITY	UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$ 9,500	$ 9,500
2	Locate Existing Utilities	LUMP SUM	$ 900	$ 900
3	Erosion Control	LUMP SUM	$ 1,200	$ 1,200
4	Trench Safety Systems	LUMP SUM	$ 6,800	$ 6,800
5	Traffic Control	136 HRS	$ 30	$ 4,080
6	Clearing and Grubbing	950 SY	$ 2	$ 1,900
7	4-inch CL 150 PVC Force Main	3,400 LF	$ 30	$ 102,000
8	Air Release Valves	1 EA	$ 2,500	$ 2,500
9	Drain Station	1 EA	$ 2,500	$ 2,500
10	Special Excavation of Unsuitable Material	30 CY	$ 35	$ 1,050
11	Gravel Backfill	140 CY	$ 20	$ 2,800
12	Crushed Surfacing, Top Course	60 TN	$ 20	$ 1,200
13	Connections to Existing Manhole	1 EA	$ 1,000	$ 1,000
14	Pump Station	LUMP SUM	$ 350,000	$ 350,000
	Subtotal			$ 487,000
	Tax rate (8.2%)			40,000
	Subtotal:			$ 527,000
	Contingency (20%)			105,000
	TOTAL ESTIMATED CONSTRUCTION COST:			$ 632,000
	Engineering and AdministrativeCosts (25%):			158,000
	TOTAL ESTIMATED PROJECT COST:			**$ 790,000**

City of Ridgefield
Prelimiary Project Cost Estimate
Collection System Improvement FM-12
NE 10th, S. 10th to S. 5th

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	10,100	$	10,100
2	Locate Existing Utilities	LUMP SUM	$	900	$	900
3	Erosion Control	LUMP SUM	$	1,300	$	1,300
4	Traffic Control	56 HRS	$	30	$	1,680
5	Clearing and Grubbing	390 SY	$	2	$	780
6	Trench Safety Systems	1,400 LF	$	2	$	2,800
7	6-inch CL 150 PVC Force Main	2,800 LF	$	40	$	112,000
8	Air Release Valves	1 EA	$	2,500	$	2,500
9	Drain Station	1 EA	$	2,500	$	2,500
10	Special Excavation of Unsuitable Material	20 CY	$	35	$	700
11	Gravel Backfill	60 CY	$	20	$	1,200
12	Crushed Surfacing, Top Course	30 TN	$	20	$	600
13	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
14	Pump Station	LUMP SUM	$	500,000	$	500,000
	Subtotal				$	638,000
	Tax rate (8.2%)					52,000
	Subtotal:				$	690,000
	Contingency (20%)					138,000
	TOTAL ESTIMATED CONSTRUCTION COST:				$	828,000
	Engineering and AdministrativeCosts (25%):					207,000
	TOTAL ESTIMATED PROJECT COST:				**$**	**1,035,000**

City of Ridgefield
Prelimiary Project Cost Estimate
Collection System Improvement FM-14
Taverner Ridge

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	LUMP SUM	$	3,100	$	3,100
2	Locate Existing Utilities	LUMP SUM	$	300	$	300
3	Erosion Control	LUMP SUM	$	400	$	400
4	Trench Safety Systems	LUMP SUM	$	2,000	$	2,000
5	Traffic Control	40 HRS	$	30	$	1,200
6	Clearing and Grubbing	280 SY	$	2	$	560
7	4-inch CL 150 PVC Force Main	1,000 LF	$	30	$	30,000
8	Air Release Valves	1 EA	$	2,500	$	2,500
9	Drain Station	1 EA	$	2,500	$	2,500
10	Special Excavation of Unsuitable Material	10 CY	$	35	$	350
11	Gravel Backfill	40 CY	$	20	$	800
12	Crushed Surfacing, Top Course	20 TN	$	20	$	400
13	Connections to Existing Manhole	1 EA	$	1,000	$	1,000
14	Pump Station	LUMP SUM	$	350,000	$	350,000
	Subtotal..				$	395,000
	Tax rate (8.2%)..					32,000
	Subtotal:..				$	427,000
	Contingency (20%)..					85,000
	TOTAL ESTIMATED CONSTRUCTION COST:..............................				$	512,000
	Engineering and AdministrativeCosts (25%):..............................					128,000
	TOTAL ESTIMATED PROJECT COST:..............................				**$**	**640,000**

City of Ridgefield
Prelimiary Project Cost Estimate
WWTF Improvements
Phase 1 (0.7 MGD to 1.0 MGD)

NO.	ITEM	QUANTITY	UNIT PRICE	AMOUNT
1	Mobilization/Demobilization	1 LS	$ 525,000	$ 525,000
2	Demolition	1 LS	$ 55,000	$ 55,000
3	Headworks Modifications	1 LS	$ 15,000	$ 15,000
4	Modify Anoxic Zone/New Splitter Box	1 LS	$ 65,000	$ 65,000
5	Aeration Basin (0.174 MG)	1 LS	$ 700,000	$ 700,000
6	Aerobic Digester No. 3 (0.064 MG)	1 LS	$ 350,000	$ 350,000
7	Digester Blowers	3 EA	$ 45,000	$ 135,000
8	Imhoff Tank odor and foam control	1 LS	$ 124,000	$ 124,000
9	New Operations Building	930 SF	$ 250	$ 230,000
10	Pipeburst effluent pipeline	1000 LF	$ 200	$ 200,000
11	Site Dewatering	1 LS	$ 75,000	$ 75,000
12	Earthwork	1 LS	$ 250,000	$ 250,000
13	Misc. Metals	1 LS	$ 90,000	$ 90,000
14	Painting	1 LS	$ 90,000	$ 90,000
15	Site Work	1 LS	$ 250,000	$ 250,000
16	Mechanical/Yard Piping	1 LS	$ 675,000	$ 675,000
17	Electrical	1 LS	$ 900,000	$ 900,000
18	Instrumentation	1 LS	$ 50,000	$ 50,000
19	I&C Programming	1 LS	$ 30,000	$ 30,000

Subtotal	$ 4,809,000
Construction Contingency (20%)	$ 961,800
Subtotal	$ 5,770,800
WSST (8.2%)	$ 473,000
Total Estimated Construction Cost	**$ 6,244,000**
Engineering, Administrative & Legal Services (25%)	$ 1,561,000
Total Estimated Project Cost	**$ 7,805,000**

City of Ridgefield
Prelimiary Project Cost Estimate
WWTF Improvements
Phase 2B (Outfall to Columbia River)

NO.	ITEM	QUANTITY		UNIT PRICE		AMOUNT
1	Mobilization, Cleanup, and Demobilization	1 LS	$	418,500	$	418,500
2	24-inch C905 Pipe, incl. fittings and beddir	27,200 LF	$	85	$	2,312,000
3	24-inch Steel Pipe incl. Weld, Casing, and	1,400 LF	$	350	$	490,000
4	Locate Existing Utilities	1 LS	$	20,000	$	20,000
5	Erosion Control	1 LS	$	50,000	$	50,000
6	Additional Pipe Fittings	20,000 LB	$	3	$	60,000
7	Trench Safety Systems	1 LS	$	54,400	$	54,400
8	Drain Stations	3 EA	$	25,000	$	75,000
9	Combo Air Valve Station	5 EA	$	30,000	$	150,000
10	Gravel Backfill	10,000 CY	$	20	$	200,000
11	Foundation Gravel	1,000 TN	$	25	$	25,000
12	Crushed Surfacing, Top Course	8,300 TN	$	30	$	249,000
13	Cold Mix Asphalt	660 TN	$	60	$	39,600
14	HMA Cl. 3/8" PG. 58-22 (3"lift)	3,300 TN	$	100	$	330,000
15	Sawcutting	35,000 LF	$	2	$	70,000
16	Top Soil	300 CY	$	35	$	10,500
17	Hydroseed	6,100 SY	$	3	$	18,300
18	Traffic Control	700 HRS	$	45	$	31,500

Subtotal	$	4,603,800
Construction Contingency (20%)	$	921,000
Subtotal	$	5,524,800
Washington State Sales Tax (8.2%)		$453,000.00
Total Estimated Construction Cost	**$**	**5,978,000**
Right of Way Cost	$	484,000
Engineering, Administrative & Legal Services (20%)	$	1,195,600
Total Estimated Project Cost	$	7,660,000

City of Ridgefield
Prelimiary Project Cost Estimate
WWTF Improvements
Phase 4 (2.7 MGD to 4.7 MGD)

NO.	ITEM	QUANTITY	UNIT PRICE	AMOUNT
1	Mobilization/Demobilization	1 LS	$ 1,000,000	$ 1,000,000
2	Demolition	1 LS	$ 70,000	$ 70,000
3	Construct Primary Clarifiers w Pumps	1 LS	$ 1,085,000	$ 1,085,000
4	Construct New AB's	1 LS	$ 1,085,000	$ 1,085,000
5	Construct Gravity Thickener	1 LS	$ 240,000	$ 240,000
6	Install New AB Blowers	1 LS	$ 150,000	$ 150,000
7	Construct New Sec Clar w/ pumps	1 LS	$ 600,000	$ 600,000
8	Install WAS Thickening System	1 LS	$ 425,000	$ 425,000
9	Add UV	1 LS	$ 180,000	$ 180,000
10	Construct Anaerobic Digesters w/ Building	1 LS	$ 3,010,000	$ 3,010,000
11	Add Screen to Headworks	1 LS	$ 150,000	$ 150,000
12	Construct Equipment Building	4000 Lf	$ 170	$ 680,000
13	Add Pumps to Effluent PS	1 LS	$ 90,000	$ 90,000
14	Install New Generator	1 LS	$ 74,000	$ 74,000
15	Dewatering	1 LS	$ 90,000	$ 90,000
16	Earthwork	1 LS	$ 240,000	$ 240,000
17	Site Work	1 LS	$ 460,000	$ 460,000
18	Misc. Metals	1 LS	$ 310,000	$ 310,000
19	Painting	1 LS	$ 455,000	$ 455,000
20	Mechanical/Yard Piping	1 LS	$ 2,315,000	$ 2,315,000
21	Electrical	1 LS	$ 2,315,000	$ 2,315,000

Subtotal	$ 15,024,000
Construction Contingency (25%)	$ 3,756,000
Subtotal	$ 18,780,000
Washington State Sales Tax (8.2%)	$1,540,000
Total Estimated Construction Cost	**$ 20,320,000**
Engineering, Administrative & Legal Services (25%)	$ 5,080,000
Total Estimated Project Cost	$ 25,400,000

APPENDIX H

SANITARY SEWER ENGINEERING AND PRETREATMENT STANDARDS

CHAPTER 4

WASTEWATER COLLECTION

CHAPTER 4 - WASTEWATER COLLECTION

4.00 General Approval Requirements

A. In the sewer service area, sewer main extensions are required to assure orderly and adequate extension of the sewer utility system. These extensions are to be in accordance with requirements of development and service availability as established by the City and the Washington State Department of Ecology.

B. Design and construction of sewer mains and facilities, including but not limited to: sewer lift stations, telemetering facilities and appurtenances shall be in compliance with the latest edition of the City's ordinances, latest revision to the City's General Sewer Plan, these Standards, the Standard Details and the latest issue or revision of "Criteria for Sewage Work Design" published by the Washington State Department of Ecology.

C. Sewer mains shall be extended through and to the extremes of the property being developed, to provide connection points for future development of unserved property as determined by the City.

D. Side sewer permits for commercial and multifamily projects will be issued to owners as an extension agreement pre-construction requirement and shall be installed by a bonded contractor. The owner is required to make application and pay all necessary fees to obtain a permit. The side sewer can be installed as part of the mainline extension and put in use only after acceptance of the mainline system by the City. Side sewer permits for plats will be issued for installation only after main line extensions are accepted by the City. The lot owner or his bonded contractor is required to make application and pay all necessary fees, obtain a side sewer permit and connect the side sewer from the mainline lateral to the house plumbing.

E. For multifamily residential developments, mobile home parks, RV parks, commercial facilities, and industrial facilities, public sewers shall be extended through easement to individual structures. For purpose of reducing infiltration, such extensions of public sewer shall be made to the limits of the roadway, parking access serving said buildings. Sewers shall be routed across pavement whenever possible. Each building shall be served by a lateral from the public sewer with a cleanout located in close proximity to the connection between the lateral and public sewer.

4.01 Planning Criteria

A. Ensure adjacent properties can be provided sewer service (extend to extreme of property and designed for the ultimate development of the tributary areas).

Sewer service shall be provided by a gravity system (unless approved by the City Engineer).

In areas of the City where it is determined by the City Engineer that conventional gravity sanitary sewer service is not available, lift stations and forcemains may be used upon approval of the City Engineer and Public Works Director. Grinder pumps may be used to serve individual lots that cannot flow by gravity into the sewer system upon approval of the City Engineer and Public Works Director.

B. Demand Projections
  1. *Unit Demands:*
     Residential - 100 gallons per capita per day (GPCD)
     Commercial - Based on criteria found in Table G2-1 of the Department of Ecology Criteria for Sewage Works Design.
  2. *Peaking Factors:*
     Peaking factors shall be assigned to average day demands based upon criteria found in Figure C1-1 of the Department of Ecology Criteria for Sewage Works Design.

C. Infiltration/Inflow (I/I) Allowances
  1. For new systems, I/I is accounted for in the projections and peaking factors developed using Department of Ecology criteria.
  2. On existing sewer systems, I/I allowance shall be determined through a review of flow data from the existing system.

D. System Parameters
  1. New sewer lines shall be designed so that under ultimate development peak flow, including I/I, shall not exceed 50% capacity of the line. Existing lines can have peak flows to 75% capacity of the line. Capacity analysis using an approved sewer model shall be conducted to verify sewer flows.
  2. No connections to storm drainage system shall be made to the sanitary sewer system, unless approved by the City Engineer and only under special circumstances. (e.g. covered parking, wash down areas around garbage collection dumpster with an area less than 200 sq. ft.)

4.02 General Design Standards

A. Check that base map conforms to all requirements listed in the water and sewer utilities standard plan format per Chapter 1.

B. Check with City to determine how surrounding development will affect design (e.g. serve to extreme of property if adjacent property has potential for future development).

C. Cap end of existing sewer lines to be abandoned as follows:
  1. Asbestos cement lines: use end cap coupling equal to ROMAC EC501.
  2. Cast or ductile iron lines: use M.J. cap or plug
  3. Clay or concrete lines: fill end of line with cement concrete minimum of 12 inches from end of line.

4. Plastic lines: use cap or plug fitting compatible with plastic pipe to be abandoned.

D. Access shall be provided to every manhole and shall be appropriately sized for maintenance vehicles as determined by the City Engineer. In necessary locations as determined by the City Engineer, access to every other manhole may be provided.

4.03 Main Lines

A. Minimum Pipe Size. Minimum sanitary sewer pipe size shall be 8 inches, unless meeting the criteria listed in the Department of Ecology Criteria for Sewage Works Design for using 6-inch pipe.

B. Pipe Slope

1. Minimum slope for sanitary sewer pipes shall be per Department of Ecology Criteria for Sewage Works Design Table C1-1, as required to obtain a 2 foot per second flushing velocity.
2. Maximum main line slope shall not induce velocities greater than 10 feet per second under daily peak flows.
3. Pipe anchor blocks shall be shown at 20 feet on center where pipe slope exceeds 20%.

C. Horizontal Locations of Utilities

1. Locate sewer mains in public right-of-way per City Standards.
2. Outside of right-of-way, locate utilities in easements through paved areas wherever practical. Particular attention should be given to avoiding landscaped areas where trees may be planted.

4.04 Side Sewers

A. For residential side sewers, 4-inch pipe shall be used for the side sewer from the main line to 8 feet past the edge of the property line. For commercial side sewers, 6-inch pipe shall be used for side sewer from main line to 8 feet past edge of property line (unless expected flows require larger size line).

B. 4-inch minimum pipe shall be used for residential side sewers from the property line to the building. Commercial side sewers shall be a minimum 6-inch pipe.

C. Side sewer shall have a minimum of 6 feet of cover at property line. Greater depths may be required where elevation of lowest floor to be served is lower than surface elevation at property line.

D. All lots must be provided with their own side sewer. Provide a single stub to "low" end of each lot.

E. Side sewers shall connect to main sewers with tee rather than a wye, unless otherwise approved by the City. On plan, indicate station of side sewer tee from nearest downstream manhole. Also indicate length of side sewer from main to plug at end of 6-inch line.

F. Minimum side sewer slope shall be two percent (2%) for 4-inch laterals and one percent (1%) for 6-inch laterals. Maximum slope shall be 100 percent.

4.05 Manholes

A. Maximum length of main line between manholes shall be 400 feet.

B. All manhole covers shall be set flush with ground surface, except where otherwise designated by the City Engineer. Manholes in easements shall have locking lids.

C. Concrete perimeter seals shall be provided around all manhole adjustment sections in easement areas:
   1. Paved areas- asphalt concrete per standard detail.
   2. Unpaved areas- cement concrete per standard detail.

D. Terminal manholes (at end of main)
   1. Side sewer stubs shall not connect to terminal manholes when there is a potential for future main line extension from manhole.
   2. Terminal manholes (without side sewer connection) shall not be channeled. Slope manhole base to provide positive drainage toward pipe, use 3,000 psi cement concrete.

E. Where a side sewer connects to manhole, invert of side sewer shall be equal to or above main sewer crown, but not to exceed 18 inches above the invert of the main sewer.

F. Drop in invert elevation across a manhole shall be from 0.1 ft to 0.2 ft. In areas with sewer main slopes less than 0.004 ft/ft, lesser drops are allowed, if approved by the City Engineer.

G. Manhole Sizing
   1. 48-inch diameter manhole
      - Up to 4 connecting pipes, 8-inch to 12-inch in diameter.
   2. 54-inch diameter manhole
      - 2 connecting pipes, 15-inch to 21-inch in diameter
      - 3 connecting pipes, 12-inch to 15-inch in diameter
      - 4 connecting pipes, 12-inch to 15-inch in diameter
   3. 72-inch diameter manhole
      - 2 connecting pipes, 21-inch to 24-inch in diameter
      - 3 connecting pipes, 15-inch in diameter
      - 4 connecting pipes, 15-inch in diameter

i. The minimum angle between the incoming and the outgoing pipe shall be 90° unless otherwise approved by the City Engineer. Pipe shall be radial with the center of manhole.

ii. The above configurations shall provide adequate shelves and room for maintenance and performing T.V. inspections.

4. For other pipe configurations, the size of the manhole will be determined on a case by case basis.

H. Any manhole less than 5 feet deep (rim to invert) shall be provided without a cone section. All other manholes shall be provided with an eccentric cone.

I. Minimum manhole depths (invert to top of rim) shall be as follows:

Manhole Size	Pipe Size	Min Manhole Depth	Comments
	6"	3.0'	
48"	8"	3.2'	Special manhole per Std. Detail
	10"-12"	3.5'	
	8"	3.7'	
54"	10"-12"	4.0'	Special manhole per Std. Detail
	15"-18"	4.5'	
	15"	8.0'	Flat top manhole, 2 Access lids
72"	18"-24"	8.5'	(one over each major pipe
	27"	9.0'	entrance/exit)

i. 72-inch manholes over 11.5 feet in depth shall include 48-inch reducing section per the standard detail.

4.06 Pipe Class / Protection / Cover

A. Polyvinyl chloride (PVC) pipe class designation:

1. All sewer pipe shall be SDR 35 PVC conforming to ASTM D3034, unless otherwise determined by the City Engineer.

2. Depth of cover over SDR 35 PVC pipe shall be 3 feet minimum and 20 feet maximum. Pipe depths outside this range will require use of pressure class PVC conforming to AWWA C900 (dimension ratio 18 or less).

3. PVC pipe shall be encased in steel casing when crossing under rockeries or retaining walls. Casing to extend beyond footings or rockery face a minimum of 5 feet or the height of the wall or rockery, whichever is greater.

B. Ductile iron pipe, class 52, shall be used where required by the City. Ductile iron sewer pipe shall be provided with a hydrogen sulfide resistant internal coating.

C. All buried metal pipe shall be encased in 8-mil polyethylene per AWWA C-105, where required by the City.

D. Building setback requirements:
   1. 5 feet minimum from covered parking.
   2. 10 feet minimum from buildings and retaining walls, or equal to depth of pipe, whichever is greater.
   3. 20 feet minimum easement shall be provided between buildings.
   4. When passing between any two buildings (residential or commercial, etc.) which are 25 feet apart or less: the sewer line shall be oversized two (2) nominal pipe sizes above the capacity requirements between nearest manholes beyond limits of buildings.

4.07 Clearances / Other Utilities

A. Water services and sewer stubs shall have at least 5 feet horizontal separation.

B. Check for crossing or parallel utilities. Maintain minimum vertical and horizontal clearances. Avoid crossing at highly acute angles (smallest angle measure between utilities should be between 45 and 90 degrees).

C. Horizontal clearances from sanitary sewer:

Cable TV	5 feet
Gas	5 feet
Power	5 feet
Storm	5 feet
Telephone	5 feet

Vertical clearances from sanitary sewer:

Cable TV	1 feet
Gas	1 feet
Power	1 feet
Storm	1 feet
Telephone	1 feet

D. Clearances between water and sanitary sewer mains shall be as follows:

<u>Horizontal and Vertical Separation (Parallel)</u>

A minimum horizontal separation of 10 feet between sanitary sewers and any existing potable water lines, and a minimum vertical separation of 18 inches between the bottom of the drinking water line and the crown of the sewer shall be maintained. The distance shall be measured edge to edge (i.e., from the outer diameter of the pipes.) as shown in Figure C1-2 in the Criteria for Sewage Works Design (rev. 10/2006).

<u>Vertical Separation (Perpendicular)</u>

Sewer lines crossing water lines at angles including perpendicular shall be laid below the water lines to provide a separation of at least 18 inches between the invert of the water line and the crown of the sewer. In the event 18-inches of vertical separation cannot be achieved or the sewer line is required to be installed above the water line, the following is required.

Gravity Sewers Passing Under Water Lines

- Sewer pipe shall be encased in controlled density fill (CDF) with a minimum compressive strength of 300 psi or in a one quarter-inch thick continuous steel, ductile iron, or pressure rated PVC pipe with a dimension ratio (DR) of 18 or less, with all voids pressure-grouted with sand-cement grout or bentonite. Commercially available pipe skids and end seals are acceptable. When using steel or ductile iron casing, design consideration for corrosion protection should be considered. Encasement shall extend a minimum of 10-feet on each side of the crossing.
- One full length of sewer pipe shall be centered at the point of crossing so that the joints will be equidistant and as far as possible from the water line. The sewer pipe shall be the longest standard length available from the manufacturer.

Gravity Sewers Passing Over Water Lines

Water lines shall be protected by providing:

- A vertical separation of at least 18 inches between the invert of the sewer and the crown of the water line.
- Adequate structural support for the sewers to prevent excessive deflection of joints and settling on and breaking of the water lines.

- The length of sewer pipe shall be centered at the point of crossing so that the joints will be equidistant and as far a possible from the water line. The sewer pipe shall be the longest standard length available from the manufacturer.
- A water line encased in controlled density fill (CDF) with a minimum compressive strength of 300 psi or in a one quarter-inch thick continuous steel, ductile iron, or pressure rated PVC pipe with a dimension ratio (DR) of 18 or less, with all voids pressure-grouted with sand-cement grout or bentonite. Commercially available pipe skids and end seals are acceptable. When using steel or ductile iron casing, design consideration for corrosion protection should be considered. Encasement shall extend a minimum of 10-feet on each side of the crossing.

Pressure Sewers under Water Lines

- Pressure sewers shall be constructed only under water lines with pressure rated pipe encased in controlled density fill (CDF) with a minimum compressive strength of 300 psi or in a one quarter-inch thick continuous steel, ductile iron, or pressure rated PVC pipe with a dimension ratio (DR) of 18 or less, with all voids pressure-grouted with sand-cement grout or bentonite. Commercially available pipe skids and end seals are acceptable. When using steel or ductile iron casing, design consideration for corrosion protection should be considered. Encasement shall extend a minimum of 10-feet on each side of the crossing.

E. The developer/contractor shall send a letter and preliminary plan to existing utilities to inform them of new construction and shall request as-built information for incorporation into plans. At a minimum the following utilities shall be contacted:
   1. Cable television
   2. Natural gas
   3. Power
   4. Telephone

4.08 Connections to Existing Systems

A. New sewer mains (8 inches and larger) shall connect to existing sewer main at existing manholes, or with new manhole on existing sewer per standard detail.

B. Where new main is larger in diameter than existing downstream main, check that capacity of existing main is not exceeded by flow from new main.

C. When connecting to existing manhole, check that requirements of Section 4.05K above are satisfied.

D. If connecting to existing manhole which has access less than 24 inches in diameter and/or concentric cone (manholes over 5 feet deep), manhole shall be upgraded to include new 24-inch frame and cover and/or eccentric cone.

E. Connections to end of existing pipe:
   1. If end of pipe is known to have a bell and the new pipe is same material as existing, plans can specify connection by inserting spigot of new pipe into the existing bell end.
   2. If existing line is plain end, or must be cut, plans shall specify use of a coupling to connect new and existing lines.

F. Approved couplings for use on sewer mains include:
   1. Ductile iron mechanical couplings (equal to ROMAC) on ductile iron, concrete, or pipes with differing materials or diameters.
   2. On PVC or PE mains, PVC or PE couplings with compatible dimension ratio and gaskets to connect new and existing pipes shall be used.

4.09 Fats, Oils, Grease Separation

A. Oil/water separator. Whenever an industrial or commercial business generates mineral/petroleum oils exceeding 100 milligrams per liter to be discharged to the sanitary sewer, pre-treatment is required. An oil/water separation device shall be installed by the property owner as specified on various standard details. Selection and sizing of an oil/water separator shall be subject to approval of the City Engineer. Water discharged from any oil/water separator to the sanitary sewer system shall not contain in excess of 100 milligrams per liter of petroleum oil, non- biodegradable cutting oil or mineral products to be in compliance with the City of Ridgefield Regulations for Discharge to the Sanitary Sewer.

1. The oil/water separator shall be owned and maintained by the property owner. The property owner shall make the oil/water separator available for inspection by City public works staff at any time. A proposed maintenance schedule for the oil/water separator shall be submitted with the design plans.
2. Sizing of a separator facility shall be based upon maximum available flow to the separator and provision of a forty-five minute retention time in the separator at that flow, with a minimum capacity of at least 450 gallons.
3. The oil/water separator shall be covered with removable sections and provided with access and inspection covers, weighing not more than 30 lbs. The oil/water separator will be provided with suitable hand holds, are to be provided directly above inspection "tee" and oil/grit collection compartments.
4. Only waste water from floor drains and covered parking garages shall drain to the separator. The location and design shall minimize or eliminate the possibility of storm water reaching the separator -- areas over two hundred square feet open to rainfall shall not drain to the separator. Sewage from restrooms and shower facilities shall not drain to the separator. See standard detail.
5. Allowable materials for construction are as follows:
   - Tank - concrete
   - Baffles - concrete, steel plate
6. The separator shall be located within 20 feet of drive for access by maintenance vehicle.
7. A sampling tee shall be located on the outlet with a minimum 18 inch drop below the invert. Access to the separator shall be maintained free for inspection and compliance determination sampling at all times.
8. The effluent discharged from any oil/water separator to the sanitary sewer shall not exceed 100 parts per million total oil.
9. When pre-treatment is no longer required, the inlet and outlet pipes shall be permanently plugged, the separation chambers pumped out, and the vault removed.

B. Grease interceptor. Whenever a commercial and/or retail food preparation operation, regardless of size, generates animal/vegetable fats, oils or grease (f.o.g.)

waste in excess of 100 milligrams per liter to be discharged to the sanitary sewer, pre-treatment is required. A grease interception device shall be installed by the owner as specified on various City of Ridgefield Standard Details. Effluent discharged from any grease interceptor shall contain no more than 100 milligrams per liter animal/vegetable f.o.g. and be in compliance with the City of Ridgefield regulations for discharge to the sanitary sewer.

1. The grease interceptor shall be owned and maintained by the property owner. The property owner shall make the grease interceptor available for inspection by City public works staff at any time. A proposed maintenance schedule for the grease interceptor shall be submitted with the design plans.
2. Size and design of the grease interceptor shall conform to the Uniform Plumbing Code, Appendix H Standards, and shall be subject to approval by the City. Minimum capacity shall be 1,500 gallons except as noted by the City of Ridgefield.
3. Fixtures in the kitchen area which discharge waste-water containing grease are to be connected to the grease interceptor. Such fixtures include dishwashers, pot sinks, range woks, janitor's sink, floor sinks, rotoclones, toilets, urinals, and wash basins shall not flow through the interceptor.
4. The interceptor shall be located exterior to the building within twenty (20) feet of drive for access by maintenance vehicles.
5. The interceptor shall be filled with clean water prior to start-up of system. Allowable materials for construction are as follows:
   - Tank - concrete
   - Baffles - concrete, plastic
6. Access to the interceptor shall be maintained free for inspection and compliance determination sampling at all times.
7. When pre-treatment is no longer required, the inlet and outlet pipes shall be permanently plugged, the separation chambers pumped out, and the vault removed.

4.10 Easements

A. Show easements off roadways and identify width.

B. Show easements on developer's property. If easement is defined as a constant width on each side of sewer main, then show a segment of the easement and label as typical (typ).

C. All easements shall be a minimum of 15 feet in width, unless otherwise approved or required by the City Engineer.

4.11 Pump Stations

A. Pump stations shall only serve those properties which cannot otherwise be served by conventional gravity sewers.

B. Pump stations shall be approved on an individual basis by the City. Prior to construction, the City must review and approve submittals for all materials and equipment.

C. Pump stations shall generally be designed in conformance with Chapter 9 of the June 2007 edition of the Clean Water Services "Design and Construction Standards for Sanitary Sewer Service and Surface Water Management" manual and the Washington State Department of Ecology Regulations and Requirements, except as herein modified.

D. Pump stations shall be furnished with provisions for emergency power with 48 hours fuel capacity. Emergency generators shall be powered by diesel engines, if possible and shall be provided with noise attenuating enclosures. The developer shall submit to the City Engineer evidence of permit application and fee payment to the Southwest Clean Air Agency, Vancouver office, for any emergency generator prior to final acceptance of construction.

E. Submersible pump stations shall be provided with Flygt pumps or equal and shall be 460 volt 3-phase. One pump shall be equipped with a Flygt pump flushing valve.

F. Electrical panels mounted in unprotected areas will not be allowed. As a minimum, panels shall be located under a shed roof extending three (3) feet in all directions from the edges of the panel. The electrical and/or signal cables entering the wet well shall have water tight connections capable of cable disconnect.

G. All pump station sites shall have a paved 15 feet wide service road and shall be security fenced with a lockable gate.

H. All pump stations shall be provided with a 1-inch potable water service including reduced pressure backflow preventor and frost free yard hydrant.

I. All pump stations shall be equipped with City approved telemetry. Control and telemetry systems shall use Allen Bradley PLCs. Controls shall include hardwired high level alarm floats and back-up pump down timers. Control panels shall be designed based upon the City of Ridgefield standard control schematic.

J. Radio telemetry shall be used if adequate signal is available. It is the responsibility of the developer to evaluate the adequacy of radio telemetry for each site. If radio telemetry is not available for the site, telephone telemetry may be used.

K. The developer shall pay all costs for the City's telemetry integrator to develop a new SCADA screen for the lift station at the City's master SCADA system. It shall be the developer's responsibility to ensure that the lift station telemetry system communicates with the City's master telemetry system.

L. Control of pump stations shall be by Multitrode Liquid Level Control Probes and backup floats or other means acceptable to the City Engineer. Each lift station shall be provided with a minimum of the following floats:
   - High level alarm
   - Lag pump on
   - Lead pump on
   - All pumps off
   - Low level alarm

M. Each pump station shall be provided with a means for hydrogen sulfide control using one of the following methods:
   - Calcium Nitrate Injection (Bioxide)
   - Liquid Oxygen Injection

   The developer shall evaluate the alternatives for the pump station based upon the hydraulics, forcemain profile, and flow conditions. The City Engineer shall approve the method used.

N. Each pump station must be provided with a means for cleaning the sewer forcemain including pig launching and pig retrieval stations. Contractor shall be required to provide one new plastic coated pig to the City.

O. Isolation valves in lift stations shall be full port eccentric plug valves with resilient seat and handwheel operators. Each pump shall be provided with a Red Valve Pressure Sensor, or equal on its discharge piping. Gauges on the pressure sensors must be visible and readable from the vault hatch.

P. All exposed pump station piping and valve in the wet well or valve vaults must be painted with an epoxy painting system (Tnemec Series 66/69 or equal).

Q. Each pump station shall be provided with lifting equipment including hoist and socket for removing pumps.

R. All forcemains shall be installed with a continuous insulated 12 gauge solid copper toning wire.

S. Access hatches shall be watertight aluminum hatches rated for H-20 loading with spring assist and locking hasp, and safety grate, as manufactured by Halliday Products or equal.

T. Each pump station shall be provided with a magnetic flowmeter as manufacture by Siemens or approved equal. Indicator/transmitter shall be mounted at the control panel and the flowmeter shall be provided with a submergence kit.

U. All fasteners, bolts nuts, etc. located inside wet wells and vaults shall be stainless steel.

4.12 Grinder Pump System

A. Individual lots that cannot by served by gravity sewer service may be provided with Grinder Pump Systems, if approved by the City Engineer.

B. Grinder pump systems shall be engineered positive displacement systems, E/One or equal, with a minimum storage tank capacity of 225 gallons. Lots served by grinder pumps must include a statement on the face of the plat indicating that operation and maintenance of the grinder pumps is the responsibility of the home owner.

APPENDIX I

WASTEWATER TREATMENT PLANT CAPACITY ANALYSIS

CITY OF RIDGEFIELD

CLARK COUNTY WASHINGTON

WASTEWATER TREATMENT PLANT CAPACITY ANALYSIS

G&O #05616
DECEMBER 2007

Gray & Osborne, Inc.
CONSULTING ENGINEERS

CITY OF RIDGEFIELD

CLARK COUNTY **WASHINGTON**

WASTEWATER TREATMENT PLANT CAPACITY ANALYSIS

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EXPIRES: 1-15-2008

G&O #05616
DECEMBER 2007

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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CHAPTER 1

INTRODUCTION AND EXECUTIVE SUMMARY

INTRODUCTION

The City of Ridgefield owns and operates a sanitary sewer system and a secondary wastewater treatment plant (WWTP) with an outfall to Lake River. It serves residents, institutions and businesses within the city limits. Figure 1-1 is a map of the vicinity, showing the City of Ridgefield's sewer service area.

The original treatment facility was built in 1959. The most recent upgrades to the plant were completed in 2000 and 2007. The wastewater treatment facility (WWTF) provides secondary treatment using an activated sludge system and UV disinfection of the effluent. The facility has limited solids management capabilities and contracts with the Clark County Salmon Creek wastewater treatment plant for sludge hauling and treatment. Most of the lab analysis that is required for NPDES reporting is also performed at the Salmon Creek facility.

The City of Ridgefield is one of the most rapidly growing communities in southwest Washington. The City of Ridgefield *General Sewer and Wastewater Facility Plan* (2007) identified four phases of expansion at the existing plant location to address the WWTP's needs to accommodate the rapid rate of growth the City is experiencing without excessive rate impacts.

The WWTP is projected to reach capacity by the expiration of the current NPDES cycle in December 2009. The WWTP was designed to provide secondary treatment for 0.7 mgd maximum month flow. However, the plant is currently limited to 0.5 mgd and 1,083 lb/d BOD (and TSS) influent loading by the NPDES permit. The influent flow capacity limitation is primarily due to the lack of secondary clarifier redundancy and concerns about compliance with projected effluent ammonia limits for a discharge to Lake River. Chapter 2 provides a detailed description of the existing treatment plant with the design criteria.

The plant recently completed an upgrade to increase capacity. The City of Ridgefield *General Sewer and Wastewater Facility Plan* (2007) established the design criteria of the WWTP to provide treatment for at least 0.7 mgd maximum month flow. The projected maximum month flow rate of 0.7 mgd for 2009 equates to 1,832 equivalent dwelling units (EDUs) (*2004 Comprehensive Plan Update* and the *2007 General Sewer and Wastewater Facility Plan*). Based on the current loading rate of 0.5 lb BOD_5/EDU/d (and lb TSS/EDU/d) and a total of 1,832 EDUs, the projected 2009 influent BOD_5 (and TSS) load would be 957 lb/d. However, the rate of population growth and residential development in Ridgefield has increased more rapidly than expected in the past year, and projected loadings for 2009 may be greater than anticipated. Consequently, the City desires to increase the BOD_5 and TSS capacity of the WWTP, and it appears that the upgraded plant has sufficient capacity to handle greater BOD_5 (and TSS) loadings than currently permitted. As determined in this Capacity Analysis, the actual influent BOD_5 and TSS load capacities of the facility based on the secondary treatment capacity of existing facilities is 1,240 lb/d with a recommended alkalinity addition system installed.

Due to the rapid growth rate, the City desires that the NPDES permit rating for the facility reflect the actual capacity of the WWTP. This study demonstrates that the plant is able to handle BOD_5 and TSS loadings exceeding the rated capacities. It is proposed that the maximum month BOD_5 and TSS NPDES permitted influent loadings be increased to 1,240 lb/d.

PROJECTED POPULATION, FLOWS, AND LOADINGS

The number of current and expected development permit applications within the City's sewer service area has recently increased rapidly. The *General Sewer and Wastewater Facility Plan* assumed an annual average population growth rate of 8.9 percent between 2004 and 2024. Table 1-1 presents the population for the years 2002 through 2024 based on the City's *2004 Comprehensive Plan Update* and the *General Sewer and Wastewater Facility Plan*. Early indications are that the actual growth rate will exceed these expectations early in the planning period.

TABLE 1-1

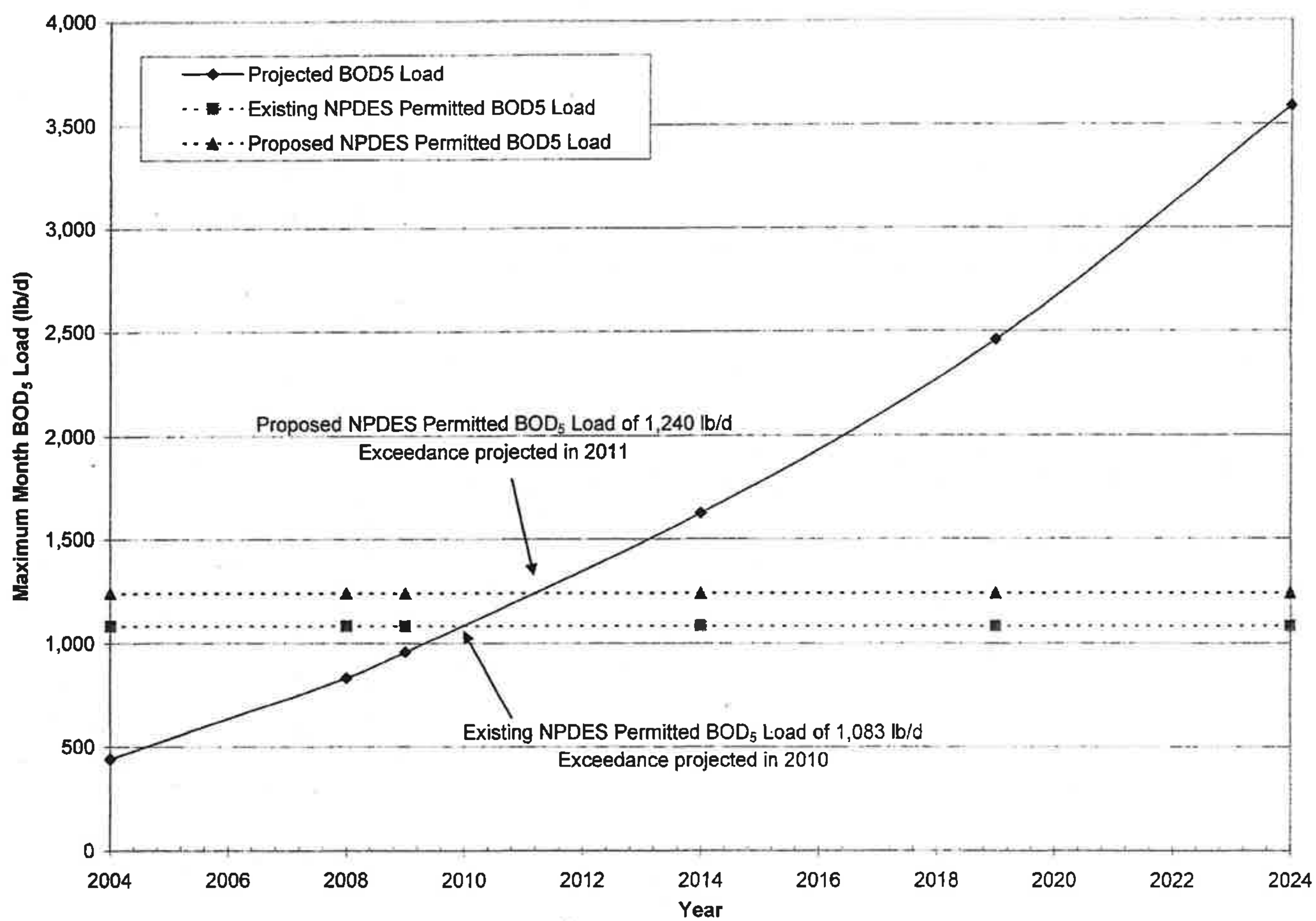
City of Ridgefield Population Projections

Year	Population
2002	2,145
2003	2,185
2004	2,195
2005	2,435
2006	2,675
2007	2,915
2008	3,395
2009	3,695
2010	3,995
2011	4,295
2012	4,595
2013	4,895
2014	5,195
2015	5,755
2016	6,315
2017	6,875
2018	7,435
2019	7,995
2020	8,796
2021	9,597
2022	10,398
2023	11,199
2024	12,000

Figure 1-2 provides a chart of the projected influent BOD_5 loading rates from the *General Sewer and Wastewater Facility Plan.* The chart includes the existing and proposed NPDES permitted design BOD_5 loadings of 1,083 lb/d and 1,240 lb/d respectively. The NPDES permitted BOD_5 loading is projected to be exceeded as early as 2010.

FIGURE 1-2

Projected Influent BOD_5 Load



PERFORMANCE EVALUATION OF EXISTING PLANT AT EXISTING NPDES PERMIT LIMITS

The performance of the existing wastewater treatment plant with respect to the existing NPDES permit limits is presented in Chapter 3. With only one of the two aeration basins in service, the facility has produced effluent with significantly better quality than required by the NPDES permit. The facility has treated approximately 77 percent of the permitted BOD loading capacity (average for November 2005 through February 2006), while using only 50 percent of the total aeration volume (one of two basins in service). During this period, the WWTP has also achieved nearly complete ammonia removal. Therefore, with both basins in service, the aeration basins will have sufficient capacity for the new projected design loading.

PERFORMANCE EVALUATION OF EXISTING PLANT AT PROPOSED NPDES PERMIT LIMITS

The performance of the upgraded WWTP at the new proposed flows and loadings is evaluated in Chapter 4 using activated sludge modeling, typical design criteria, and hand process calculations for both activated sludge and biosolids management. The WWTP has sufficient treatment capacity to meet the projected effluent BOD_5, TSS, and ammonia concentration limits. The proposed maximum month BOD_5 and TSS loading rates are used for the evaluation.

Based on the activated sludge model and the hand calculations, Table 1-2 provides design criteria for the aeration basins with the new proposed loadings. The solids retention time (SRT) corresponding to a design suspended solids (MLSS) concentration of 4,000 mg/L has been calculated. These criteria will result in effluent quality that meets the requirements of the NPDES permit.

TABLE 1-2

Aeration Basin Design Criteria with New Proposed Loadings

Parameter	Design Criteria
Number of Aeration Basins	2
Total Aerobic Volume	0.348 million gallons
Total Anoxic Selector Volume	0.048 million gallons
Hydraulic Detention Time	14 hrs
MLSS	4,000 mg/L
F/M	0.11 lb BOD_5/ lb MLSS/day
BOD_5 Loading Rate	27 lb BOD_5/1,000 ft^3 /day
SRT	9.1 days
NaOH Addition Rate, 25%	350 lbs/day

The existing aeration basin blowers that deliver air to the diffusers in the aeration basins provide the required oxygen supply for sufficient treatment of the new proposed design BOD_5 and TSS loadings.

At the conditions evaluated in this capacity study alkalinity addition will be needed to prevent a drop in the effluent pH, due to the low influent alkalinity concentration and limited alkalinity recovery from denitrification. A temporary alkalinity addition system should be installed, consisting of a 2,500-gallon tank for storage of 25 percent sodium hydroxide (NaOH), and two peristaltic chemical metering pumps.

With the current modification of the 50-foot-diameter aerobic digester to a secondary clarifier (WWTP Phase 1 upgrade), the secondary clarifiers provide adequate surface area and volume for settling of the activated sludge with the additional influent loading. A summary of the design criteria of the secondary clarifiers is presented in Table 1-3.

TABLE 1-3

Secondary Clarifiers Design Criteria with New Proposed Loadings

Parameter	Criteria	Reference(1)	Ridgefield WWTP(2)	Meets Criteria?
Surface Overflow Rate				
Max. Month	400-700 gpd/sf, max. mo. 400-700 gpd/sf, max. mo.	M&E, 2003 WEF, 1998	178	Yes
Peak Hour	<1,200 gpd/sf, max. mo. 1,000-1,600 gpd/sf, average 1,000-1,600 gpd/sf, average	Ecology, 1998 M&E, 2003 WEF, 1998	382	Yes
Solids Loading Rate				
Max. Month	24-34 lb/sq. ft. d. 20-30 lb/sq. ft. d.	M&E, 2003 WEF, 1998	9	Yes
Peak Hour	43 lb/sq. ft. d. 50 lb/sq. ft. d.	M&E, 2003 WEF, 1998	22	Yes

(1) M&E, 2003: Metcalf & Eddy Fourth Edition, 2003; WEF, 1998: Water Environment Federation Manual of Practice No. 8, 1998; Ecology, 1998: Washington State Department of Ecology Criteria for Sewage Works Design, 1998.

(2) Assumes two 50-foot clarifiers in service, MLSS = 4,000 mg/L, and RAS flow rate equals 53 percent of the WWTP influent flow, with a maximum flow of 1.08 mgd. Maximum month flow equals 0.7 mgd and peak hour flow equals 1.51 mgd.

The plant has sufficient capacity in the aerobic digesters to handle the load resulting from 1,240 lb/d of influent BOD_5 and TSS loads and would be able to produce Class "B" biosolids based on the digestion time and temperature or fecal coliform density. Solids generated in the treatment process will be hauled to the Clark County Salmon Creek wastewater treatment plant for further treatment. The aerobic digester and waste solids characteristics are summarized in Table 1-4.

TABLE 1-4

Aerobic Digesters Process Design Criteria with New Proposed Loadings[1]

Parameter	Value	Units
TSS	1,275	lb/d
WAS Concentration	10,000	mg/L
WAS Flow Rate	15,280	gpd
Percent VSS Destruction	40	%
SRT	48	days
Total Digester Volume	0.178	Mgal
Volatile Fraction of Digester	0.57	NA

(1) See Appendix D for more details.

CONCLUSION

A capacity analysis of the 0.7 mgd plant upgrade determines that the existing WWTP is capable of treating BOD_5 and TSS influent loadings of 1,240 lb/day, while remaining in compliance with projected effluent permit limits, with the recommended alkalinity addition system installed. The aeration basins, secondary clarifiers, and aerobic digesters have sufficient capacity for the increased mass loading rates. Recent performance history, activated sludge modeling and hand calculations support this conclusion. Therefore, the City of Ridgefield will request that its NPDES permit be revised to increase the rated capacity of its WWTP to this greater loading.

CHAPTER 2

WASTEWATER TREATMENT PLANT DESCRIPTION

INTRODUCTION

The City of Ridgefield operates an activated sludge wastewater treatment plant to provide secondary treatment of municipal sewage from the City's sewer service area. After treatment, the effluent is discharged through an outfall to Lake River, located west of the treatment facility. The WWTP was recently upgraded to treat a design flow (maximum month) of 0.7 mgd. The overall site plan of the WWTP after the 2007 upgrade is provided in Figure 2-1 and the process flow schematic is provided in Figure 2-2. The hydraulic profile for the upgraded plant is presented in Figure 2-3.

NPDES PERMIT NO. WA0023272

The Washington State Department of Ecology issued an NPDES permit to the City for discharge of treated effluent to Lake River. The permit was effective December 12, 2003.

The WWTP expansion in June 2000 was designed to treat a maximum month flow of 0.7 mgd. The design loadings were established in the City of Ridgefield Wastewater Facility Plan (2000). Facility design loadings and effluent limits, as indicated in the existing NPDES permit (WA0023272) are shown below in Table 2-1. However, the current NPDES permit limits the plant flow to a maximum month value of 0.5 mgd due to regulatory concerns over the lack of clarifier redundancy and adequate nitrification capacity in the treatment process (addressed by the upgrade completed in 2007). The permit has identified the City of Ridgefield's WWTP a Reliability Class 2 facility and therefore, it must comply with the Reliability Class 2 requirements established in the Department of Ecology's *Criteria for Sewage Works Design.*

Ecology's concerns over adequate nitrification were based on a perception that a WWTP discharge to Lake River in excess of 0.5 mgd would not comply with water quality standards for ammonia due to inadequate dilution in the river. Recent mixing zone studies by Cosmopolitan Engineering Group have determined critical low flow rates in Lake River and have calculated effluent ammonia limits at various plant flows (see Appendix E). The estimated future ammonia limits for a maximum monthly average WWTP flow of 0.7 mgd are 1.50 mg/L average month and 3.38 mg/L maximum day.

TABLE 2-1

Existing WWTP Design Criteria and NPDES Permit Limits[1]

Influent Design Criteria	Values	
Maximum Month Flow Maximum Month Influent BOD5 Loading Maximum Month Influent TSS Loading	0.5 mgd 1,083 lbs/day 1,083 lbs/day	
	Effluent Limitations	
Parameter	**Average Monthly**	**Average Weekly**
Biochemical Oxygen Demand[2] (5 day)	30 mg/L (125 lb/day)	45 mg/L (188 lb/day)
Total Suspended Solids[3]	30 mg/L (125 lb/day)	45 mg/L (188 lb/day)
Fecal Coliform Bacteria	200 cfu/100 mL	400 cfu/100 mL
pH	Shall not be outside the range of 6.0 to 9.0	

(1) The average monthly and weekly effluent limitations are based on the arithmetic mean of the samples taken except fecal coliform, which is based on the geometric mean.

(2) The average monthly effluent concentration for BOD_5 shall not exceed 30 mg/L or 15 percent of the monthly average influent concentration, whichever is more stringent.

(3) The average monthly effluent concentration for Total Suspended Solids shall not exceed 30 mg/L or 15 percent of the monthly average influent concentration, whichever is more stringent.

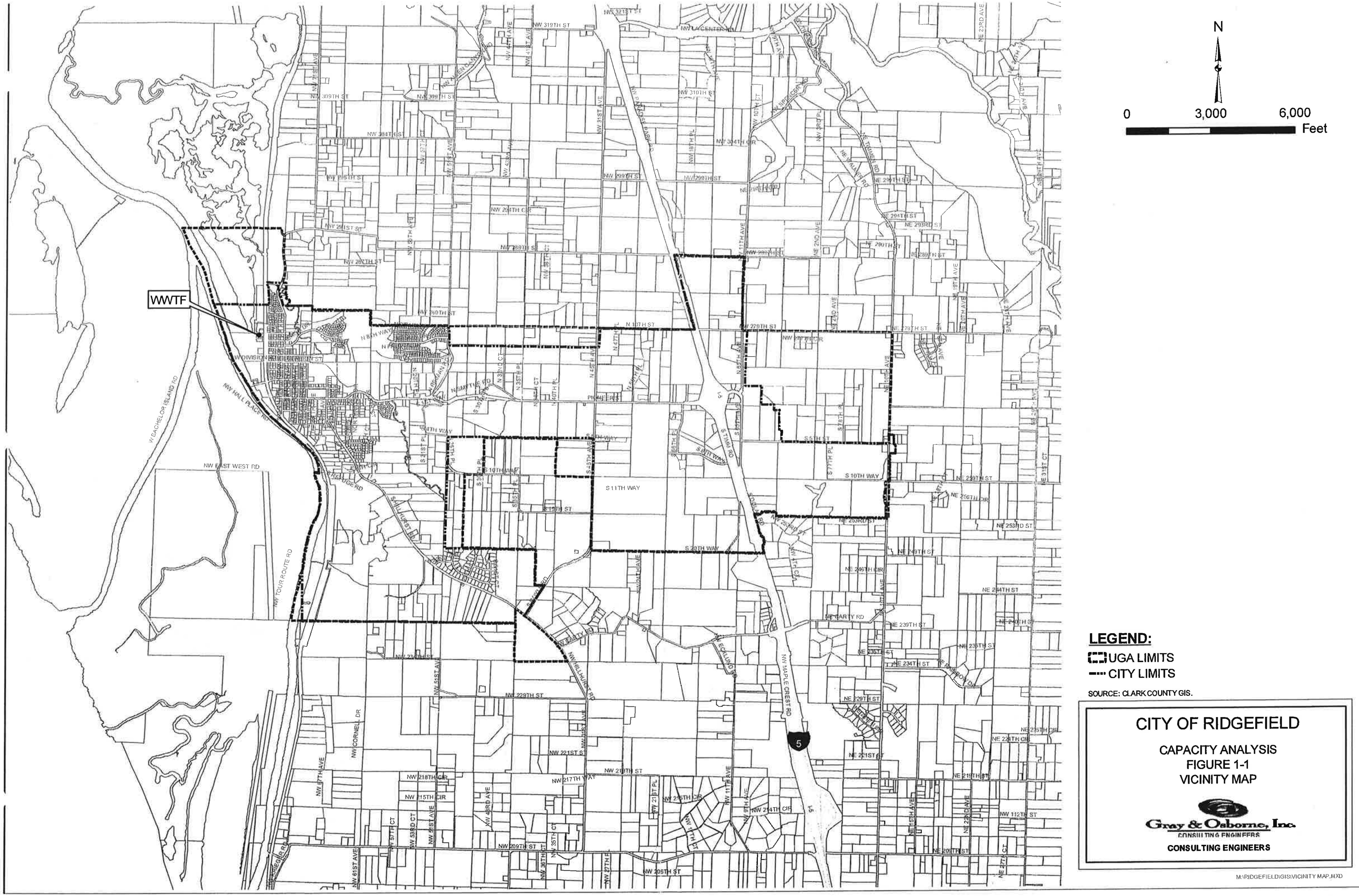
DESCRIPTION OF TREATMENT PLANT

The WWTP unit processes that exist after the 0.7 MGD upgrade (Phase 1) in 2007 are described below. Daily Monitoring Report (DMR) summaries for the years 2004 through 2006 are included in Appendix B.

PRELIMINARY TREATMENT

Influent Pump Station

Raw sewage flows by gravity from the 10-inch-diameter interceptor sewer, which crosses under the adjacent railroad tracks, to the influent pump station located at the southeast corner of the plant. The influent pump station wet well is 10'-0" inside diameter, 11'-0" deep and equipped with three submersible centrifugal pumps. All three of the influent pumps are equipped with a variable frequency drive (VFD), which varies the speed of each pump based on a signal from the ultrasonic level sensor located in the wet well. A high-level float generates an alarm via the plant programmable logic controller (PLC) and provides backup control of the pumps. All three pumps discharge to a common 8-inch force main. Each pump has an isolation plug valve and check valve on the 6-inch discharge line, all of which are located in a below-grade valve vault adjacent to the wet



CITY OF RIDGEFIELD

CAPACITY ANALYSIS
FIGURE 1-1
VICINITY MAP

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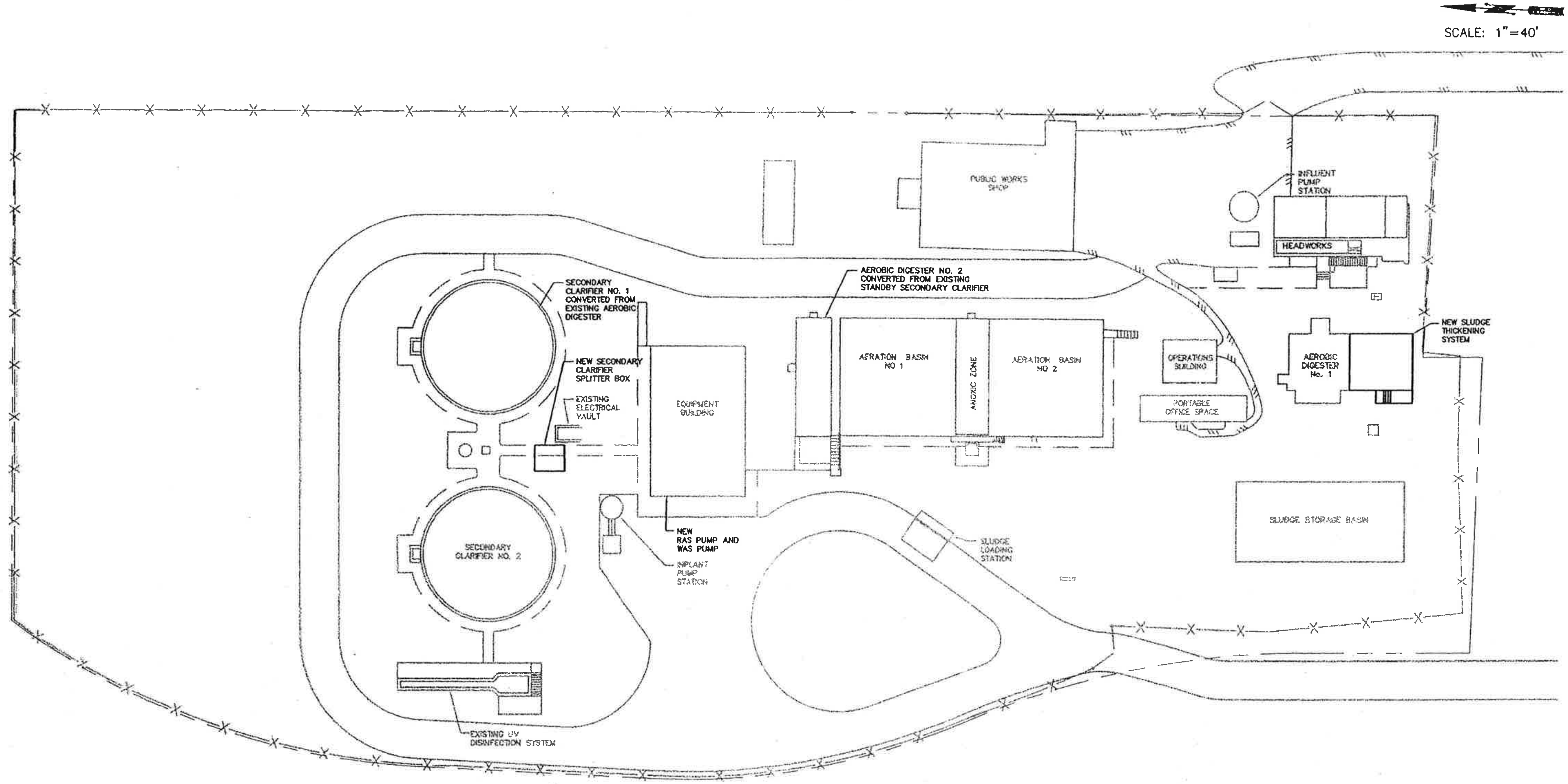

M:\RIDGEFIELD\05616 WWTP UPGRADE\CAPACITY ANALYSIS\FIGURES\FIG. 2-1.DWG, 2-1, 12/18/2006 10:34:50 AM, 1:1, BY: M NAGEL

LEGEND:

—X———X— FENCE

———— PROPERTY LINE

CITY OF RIDGEFIELD
CAPACITY ANALYSIS
FIGURE 2-1
WWTF SITE PLAN (2009, 0.7 MGD)

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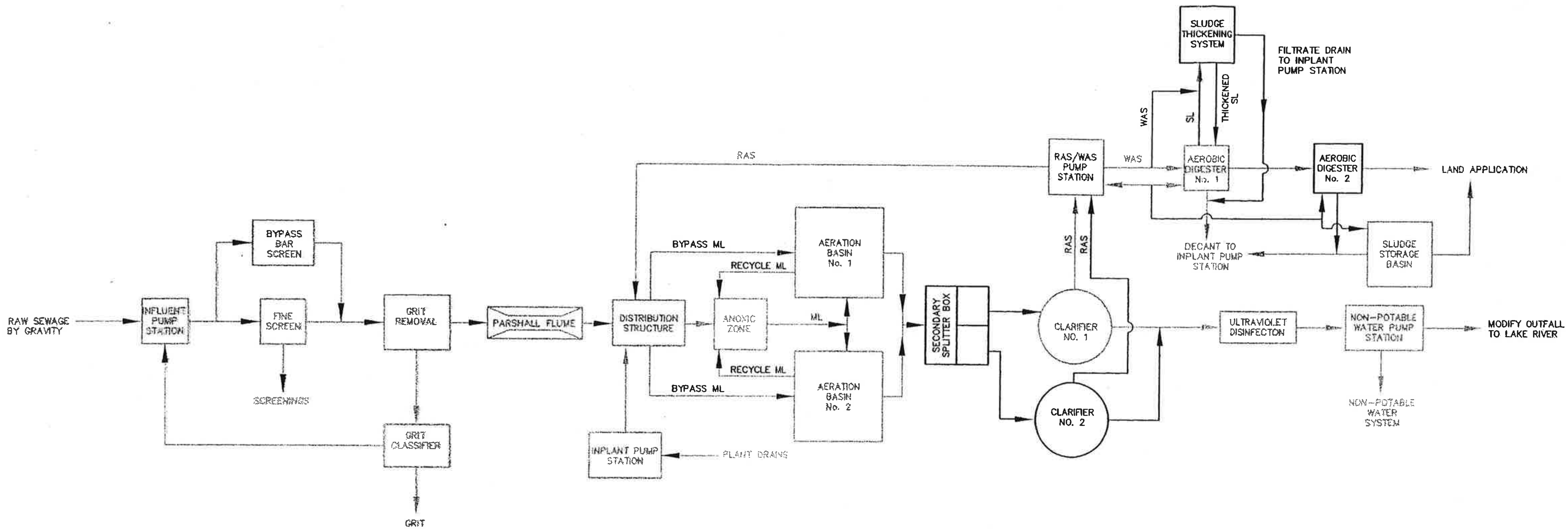
M:\RIDGE. .05616 WWTP UPGRADE\CAPACITY ANALYSIS\FIGURES\FIG.2-2.DWG, 2-2, 12/18/2 .0:44:57 AM, 1:1, BY: M NAGEL



NOTE: DARK LINES REFLECT RECENT CHANGES.

CITY OF RIDGEFIELD

CAPACITY ANALYSIS

FIGURE 2-2

WWTF PROCESS FLOW DIAGRAM

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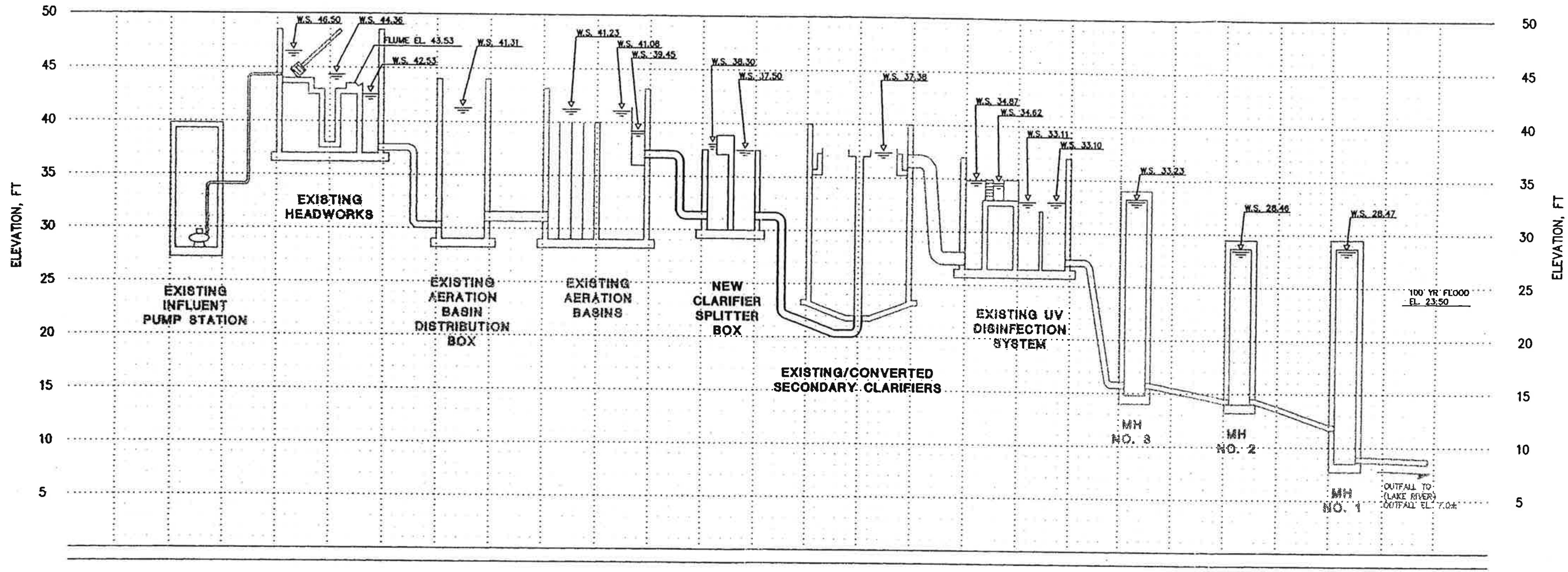

HYDRAULIC PROFILE
(PEAK HOUR FLOW 1.51 MGD)
SCALE: 1"=10', VERTICAL
NOT TO SCALE, HORIZONTAL
DATUM = NGVD 29 (47)

CITY OF RIDGEFIELD
CAPACITY ANALYSIS
FIGURE 2-3
HYDRAULIC PROFILE

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M:\RIDGEFIELD\05616 WWTP UPGRADE\CAPACITY ANALYSIS\FIGURES\FIG. 2-3.DWG, 2-3, 12/20/2006 12:05:20 PM, 1:1, BY: M NAGEL well. The influent pumps each have 7.5 hp, 460 V motors and a design operating condition of 520 gpm at 29.8 feet of head. The capacity of the existing influent pump station with one pump out of service per DOE criteria is 950 gpm (1.4 MGD). The station was constructed in 2000.

Headworks

Raw sewage is pumped from the Influent Pump Station to the headworks. The headworks is an above-grade concrete structure, which has a mechanical fine screen, manually-cleaned bypass bar screen, influent sampler, and influent flow meter. The mechanical fine screen and manually-cleaned bar screen are located in adjacent 1'-8"-wide concrete channels separated by isolation stop gates. Screenings from the mechanical fine screen drop into a dumpster for landfill disposal. The influent sampler is located upstream of the influent flow meter. The influent flow meter consists of a 9-inch Parshall flume equipped with an ultrasonic level sensor. The influent sampler is a refrigerated automatic unit, which collects flow-proportional samples.

Grit Removal System

A grit removal system was added to the headworks in 2003. The grit removal process begins with a Smith & Loveless Pista Grit circular settling tank system driven by 3/4–hp motor. Settled grit is removed with a Wemco recessed impeller pump and lifted into a classifier which both drains the grit and conveys the grit by a screw conveyor into the same dumpster that is used for the headworks screenings. A 7.5-hp motor powers the Wemco pump. The classifier is a Goodman Conveyor. Drainage from the classifier is returned to the headworks.

The design criteria for the treatment processes are provided in Table 2-2.

TABLE 2-2

Preliminary Treatment Process Design Criteria

Influent Pump Station	
Quantity of Pumps	3
Pump Type	Submersible Centrifugal
Motor Size	7.5 hp
Drive	Variable Speed
Capacity (each)	520 gpm @ 29.8 ft
Pump Station Capacity	950 gpm (1.4 mgd)
Influent Flow Measurement	
Type	Parshall Flume
Size	9 inch
Capacity	3.3 mgd
Influent Screens	
Mechanical Fine Screen	
Quantity	1
Type	Helical Auger
Screen Width	20 inches
Mesh Diameter	0.25 inch
Motor Size	1 hp
Capacity (each)	3.5 mgd
Bypass Bar Screen	
Quantity	1
Type	Manual Coarse Bar
Screen Width	24 inches
Bar Spacing	0.75-inch
Grit Removal	
Grit Removal System	
Quantity	1
Type	Vortex
Motor Size	0.75 hp
Grit Cyclone	
Quantity	1
Grit Classifier	
Quantity	1
Screw Diameter	9-inch
Motor Size	0.75 hp
Grit Pump	
Quantity	1
Motor Size	7.5 hp

SECONDARY TREATMENT

The Ridgefield WWTP operates as a conventional activated sludge system. The purpose of the activated sludge system is to remove suspended and colloidal solids and dissolved organic matter from wastewater. This removal is accomplished by introduction of the wastewater into a biological reactor (aeration basin) containing a high concentration of actively growing microorganisms in the presence of dissolved oxygen. The microorganisms utilize the waste material as a source of food to obtain the energy necessary for their own life processes and growth. The rapid growth of these organisms results in the creation of a flocculent biological mass, which can be removed from the liquid stream by sedimentation in the secondary clarifier, thus creating a clear effluent with a low organic content. In the activated sludge process, a high concentration of active biological mass is maintained by continuously recycling the organisms back into the aeration basin. Effective settling and separation of the biological mass from the liquid stream in the secondary clarifiers is essential for the proper operation of the activated sludge system. Some removal ("wasting") of the biological mass is also conducted to maintain a steady-state population in the system.

Aeration Basins

Wastewater flows by gravity from the headworks to a concrete distribution structure adjacent to the aeration basins. The distribution structure also receives discharge from the plant drain pump station and return activated sludge (RAS) flow, which is pumped from two (after the 2007 upgrade) secondary clarifiers. The combined wastewater and RAS, which is commonly called mixed liquor, flows by gravity from the distribution structure through an anoxic selector basin to the aeration basins. The aeration basins (the function of which are to biologically remove carbonaceous and nitrogenous material) are housed in a concrete structure consisting of a single 48,000-gallon anoxic basin and two equally sized 175,000-gallon aeration basins. The anoxic basin is located between the two aeration basins, sharing a common wall with each basin, and is equipped with four platform-mounted, vertical shaft mixers. Aeration and mixing of the aeration basins is provided by three aeration blowers, which are located in the equipment building, and a fine bubble air diffusion system. A submersible recycle pump is located in each basin to recirculate mixed liquor to the anoxic basin for nitrogen removal and alkalinity recovery.

Mixed liquor flows by gravity from the distribution structure through the anoxic basin and then to each aeration basin over isolation slide gates. Mixed liquor from the two aeration basins discharges over effluent weirs and combine in a secondary splitter box before flowing into the two secondary clarifiers.

The overall design criteria for the activated sludge basins are provided in Table 2-4.

TABLE 2-3

Aeration Basin Design Criteria

Anoxic Selector Basin	
Quantity	1
Side Water Depth	12 ft
Volume	48,000 gal
Mixing	
Type	Vertical Shaft
Quantity	4
Drive	2 Variable Speed, 2 Constant Speed
Motor Size	1 hp
Aeration:	
Type	Fine Membrane Bubble Diffusers
Aeration Basins	
Quantity	2
Side Water Depth	12 ft
Volume, Each	175,000 gal
Effluent Weir Length	7 ft
Aeration	
Type	Fine Membrane Bubble Diffusers
Mixed Liquor Recycle Pumps	
Quantity	2
Pump Type	Submersible Centrifugal
Motor Size	7.5 hp
Drive	Variable Speed
Capacity (each)	1,000 gpm @ 18.2 ft
F/M, assuming MLSS = 3,720 mg/L	
At Max Month BOD Load (1,083 lb/d)	0.10
Detention Time (2 basins in service)	
At AAF (0.45 mgd)	18.6 hours
At Design Flow Rate (0.7 mgd)	12.0 hours
At Peak Hourly Flow Rate (1.51 mgd)	5.6 hours
Aeration Basin Blowers	
Quantity	3
Type	Positive Displacement
Capacity, Each	800 scfm @ 9 psi
Motor Size	50 hp

Aeration System

There are five aeration blowers, located in the equipment building, which supply air to the various processes. The three aeration basin blowers are variable speed, 50-hp positive displacement blowers. The discharge piping of each of the blowers is connected to a common header. The aerobic digester blower (No. 1) is a variable speed, 100-hp positive displacement blower. The auxiliary digester blower (No. 2) is a dual-speed, 25-hp positive displacement blower.

Secondary Clarifiers

Mixed liquor flows from each aeration basin to the two 50-foot-diameter circular, concrete secondary clarifiers. The existing 50-foot-diameter aerobic digester is being converted to a secondary clarifier of equal size to the existing circular secondary clarifier. The current upgrade is installing a splitter box to divide the flow equally to the secondary clarifiers.

Each clarifier is equipped with a clarifier mechanism with a 1/2-hp drive motor, sludge scrapers, scum skimmer blade, scum collection box, energy dissipating inlet, and flocculating feedwell. The clarified effluent flows over a peripheral v-notch weir to the effluent trough where it flows by gravity to the UV disinfection system. For each clarifier, settled solids are collected in a sludge hopper, which has suction piping connection to three horizontal screw centrifugal RAS pumps and two horizontal screw centrifugal Waste Activated Sludge (WAS) pumps, located in the equipment building. A new return activated sludge (RAS) pump and a new waste activated sludge pump (WAS) are being installed to serve the new clarifier and backup the existing RAS pumps and WAS pump. The design criteria for the secondary clarifiers and RAS/WAS pump station are provided in Table 2-4.

Normal operation will be to pump WAS to the sludge (rotary drum) thickener, discharging the thickened sludge to Aerobic Digester No. 1, and then transferring the sludge from Digester No. 1 to Digester No. 2. However, the WAS discharge line will be configured to connect to Aerobic Digester No. 1 *and* the sludge thickener to allow WAS to be transferred by the WAS pumps directly to the aerobic digesters or the sludge thickening facilities, as desired.

TABLE 2-4

Secondary Clarifier and RAS/WAS Pump Station Design Criteria

Secondary Clarifiers	
Secondary Clarifiers *	
Quantity	2 (1 existing, 1 modified)
Diameter	50 ft
Effective Settling Area, Each	1,963 ft^2
Effective Side Water Depth, Each	14 ft
RAS Flow Rate at AAF (0.45 mgd)	0.24 mgd
RAS Flow Rate at MMF (0.7 mgd)	0.38 mgd
RAS Flow Rate at PHF (1.51 mgd)	1.08 mgd
Surface Loading Rate AAF	115 gpd/ ft^2
Surface Loading Rate at MMF	178 gpd/ ft^2
Surface Loading Rate at PHF	382 gpd/ ft^2
Solids Loading Rate AAF**	5.4 lb/d/ft^2
Solids Loading Rate at MMF**	8.5 lb/d/ft^2
Solids Loading Rate at PHF**	20 lb/d/ft^2
Detention Time at AAF	22 hrs
Detention Time at MMF	14 hrs
Detention Time at PHF	6.6 hrs
Drive Size	0.5 hp
*Loadings based on two clarifiers in operation **MLSS Concentration = 3,720 mg/L	
Return Activated Sludge Pumps	
Quantity of Pumps	3 (2 existing, 1 new)
Pump Type	Screw Centrifugal
Motor Size	3 hp
Drive	Variable Speed
Capacity (each)	375 gpm @ 13.5 ft
Waste Activated Sludge Pumps	
Quantity of Pumps	2 (1 existing, 1 new)
Pump Type	Screw Centrifugal
Motor Size	1 hp
Drive	Two Speed (existing) Variable Speed (new)
Capacity	100 gpm @ 5 ft
RAS Flow Meters	
Quantity	2 (1 existing, 1 new)
Type	Magnetic
Size	4-inch

TABLE 2-4 – (continued)

Secondary Clarifier and RAS/WAS Pump Station Design Criteria

WAS Flow Meter	
Quantity	1 (existing)
Type	Magnetic
Size	3-inch

EFFLUENT DISINFECTION AND DISPOSAL

Prior to discharge to the outfall line, the treated wastewater undergoes disinfection. Disinfection is the inactivation of potentially harmful (pathogenic) microorganisms in the WWTP effluent. At the City's WWTP, disinfection is accomplished using ultraviolet light radiation.

Ultraviolet Disinfection System

Secondary effluent flows by gravity from the secondary clarifier to the UV disinfection system structure. This structure consists of a concrete channel with three UV banks, a downstream finger weir for level control, a 3-foot-wide effluent trapezoidal weir with an ultrasonic level sensor, and an effluent sampler. The effluent sampler is a refrigerated automatic unit, which collects flow-proportional samples.

The design criteria for the UV system are provided in Table 2-5..

TABLE 2-5

UV Disinfection System Design Criteria

Effluent Disinfection	
Type	Ultra-Violet
UV Tube Type	Low Pressure, Low Output, Horizontal
Quantity of Channels	1
Channel Width	27 in
Channel Depth	4 ft
Channel Length	32 ft
Flow Control Weir Length	27 ft
Quantity of Banks	3
Quantity of Modules Per Bank	4
Quantity of Lamps Per Module	8
Total Quantity of Lamps	96
Design UV Transmittance (Min)	65%
Effluent Disinfection Standard	200 cfu/100 ml
Disinfection Dose Required	33,000 μW sec/cm^2
Peak Rated Flow To Meet Standard	1.93 mgd

Outfall

Treated effluent is discharged to Lake River via a 10-inch concrete outfall pipe, constructed in the 1950s, and a new 10-inch HDPE pipe extension to mid-channel in the river. The outfall extension was installed during the recent (2007) upgrade. A single 8-inch-diameter diffuser port are provided.

SOLIDS HANDLING SYSTEM

Table 2-6 summarizes the design criteria for the sludge stabilization and solids handling system. The component descriptions below reflect the recent (2007) upgrade of the WWTP.

Aerobic Digestion

The sludge stabilization process consists of an existing Imhoff Tank (Digester No. 1), the sludge storage basin, and a conversion of the backup rectangular secondary clarifier to an aerobic digester (Digester No. 2). Digester No. 1 is a converted concrete Imhoff tank with a volume of 54,000 gallons, and is equipped with coarse bubble diffusers, which receive low-pressure air from a dual-speed blower located in the equipment building. The sludge storage basin is a 60,000-gallon concrete tank and has a total volume of 54,000 gallons with a side water depth of 3.5 feet. The 25 hp dual-speed blower that supplies Aerobic Digester No. 1 also supplies air to the coarse bubble diffusers in the sludge storage basin. The existing standby secondary clarifier has been modified and converted to Aerobic Digester No. 2 in the 0.7 mgd WWTP upgrade. The walls of the existing secondary clarifier were raised 4 feet to provide a total Aerobic Digester No. 2 volume of 64,000 gallons. A new coarse bubble diffuser system was installed in Digester No. 2 for oxidation and mixing. Digester No. 2 was also equipped with two 2.6-hp submersible mixers. The existing 100-hp variable speed digester blower was retained to provide air to diffusers in Aerobic Digester No.2. The total aerobic digestion volume of all three tanks is 178,000 gallons.

Sludge Thickening System

A sludge thickening system has been installed to thicken the aerobic digester biosolids to 3 percent. Thickening the digester biosolids reduces the required treatment volume and dewatering the waste sludge reduces the sludge disposal costs. The sludge thickening system consists of a rotary drum thickener, polymer addition system, magnetic flow meter, and rotary lobe sludge thickener transfer pump. The rotary drum thickener, new sludge thickener pump and polymer addition system are located adjacent to the existing Imhoff Tank on a new concrete pad as shown on Figure 4-1. A new structural steel supported canopy has been constructed to protect the sludge thickening system from rain.

TABLE 2-6

Sludge Stabilization and Handling System Design Criteria

Aerobic Digesters and Sludge Storage Tanks	
Digester Nos. 1 (Existing Imhoff Tank)	
Length x Width	20 ft x 20 ft
Side Water Depth	18 ft
Volume (each)	54,000 gallons
Solids Retention Time*	56 d
Solids Concentration	3%
Aeration	
Type	Coarse Bubble Diffusers
Digester No. 1 Blower**	
Quantity	1 (existing)
Type	Positive Displacement
Capacity Required	345 scfm @ 10.0 psig
Motor Size	25 hp
Drive	Dual Speed
*Value applies to total volume of Aerobic Digester No. 1, Digester No. 2, and Sludge Storage Tank. **Also used for Sludge Storage Tank.	

TABLE 2-6 – (continued)

Sludge Stabilization and Handling System Design Criteria

Aerobic Digesters and Sludge Storage Tanks	
Digester No. 2 (Modified Rectangular Clarifier)	
Length x Width	44 ft x 12 ft
Side Water Depth	16.25 ft
Volume	64,000 gallons
Aeration	
Type	Coarse Bubble Diffusers
Digester No. 2 Blower	
Quantity	1 (existing)
Type	Positive Displacement
Capacity	1,477 scfm @ 7.5 psig
Motor Size	100 hp
Drive	Variable Speed
Mixer	
Type	Submersible
Quantity	2
Capacity	2,174 gpm
Motor Size	2.3 hp
Drive	Constant Speed
Storage Tank No. 2 (Existing)	
Length x Width	80 ft x 30 ft
Side Water Depth	3.5 ft
Volume	60,000 gallons
Aeration	
Type	Coarse Bubble Diffusers
Sludge Thickener	
Quantity	1
Type	Rotary Drum
Flow Rate	50 gpm
Feed Solids	1-1.5%
Thickened Solids	5-7%
Motor Size:	
Flocculator	1.0 hp
Drum Main Drive	1.5 hp
Booster Pump	2.0 hp

TABLE 2-6 – (continued)

Sludge Stabilization and Handling System Design Criteria

Aerobic Digesters and Sludge Storage Tanks	
Polymer Addition System	
Quantity	1
Type	Liquid Emulsion
Max Polymer Feed Rate	4.5 gph
Max Dilution Water Rate	600 gph
Power Required	120 V, 1-Phase, 60 Hz, 5 amp max
Sludge Thickener Pump	
Quantity	1
Type	Rotary Lobe
Capacity	100 gpm @ 25 psig
Motor Size	10 hp
Drive	Variable Speed
Sludge Thickener Flow Meter	
Quantity	1
Type	Magnetic
Size	4-inch

The new polymer addition system is located within a heated enclosure, which also contains a reduced pressure backflow preventer and an attachment to the potable water system for polymer dilution. The sludge thickener pump recirculates sludge from Aerobic Digester No. 1 to the rotary drum thickener at a rate of about 100 gpm. During normal operation, the WAS pumps transfer waste activated sludge directly to the rotary drum thickener at a rate of 60 gpm. A liquid polymer preparation system injects polymer solution downstream of a static mixer located on the influent sludge line to the rotary drum thickener. Thickened sludge discharges from the rotary drum thickener discharge chute and drops back into Aerobic Digester No. 1 at a concentration of about 6 percent.

When operated in a recycle fashion, approximately half of the contents of Aerobic Digester No. 1 are required to thicken a full tank to 3 percent. With a full volume of 54,000 gallons, about 27,000 would be required to be thickened to 6 percent in the thickener. At a flow rate of 100 gpm, thickening of a full tank would take approximately four and a half hours. Batch thickening can then be accomplished approximately once a week for 4.5 hours. Normal operation would require pumping WAS directly to the drum thickener via the WAS pumps every other day and pumping WAS directly to Aerobic Digester No. 1 on the other days, to provide a digester sludge concentration of 3 percent. Upon shutdown of the rotary drum thickener, hand washdown of the unit is required to prevent sludge from drying of the drum and clogging the drum screen. The rotary drum thickener will have a solenoid valve and connection to the non-potable water system for the thickener spray bar assembly and will have a drain connection to the existing drain line connected to the existing Aerobic Digester No. 1 decant line.

Though adequate sludge treatment can be provided to achieve Class B quality, all sludge is planned to be hauled off-site for further treatment and disposition at the Clark County Salmon Creek Wastewater Treatment Plant.

NON-POTABLE WATER SYSTEM

A non-potable water system supplies plant effluent for process and maintenance uses. Two end suction submersible pumps, located adjacent to the UV disinfection system channel, pump plant effluent to a strainer and hydropneumatic tank in the equipment building. A pressure transducer on the hydropneumatic tank piping controls the on/off status of the non-potable water pumps to maintain the desired water pressure. The non-potable water pumps transfer effluent from a section of the UV disinfection system channel located downstream of the finger weir and upstream of the trapezoidal weir. This section is 4'-0" long and 6'-8" wide, with a side water depth of 6'-6" and with a storage volume of 1,300 gallons.

STANDBY GENERATOR

The existing auxiliary/standby generator and automatic transfer switch are located in the equipment building. The generator is rated at 350 kW, three phase, 480 volts.

CHAPTER 3

EXISTING WASTEWATER TREATMENT PLANT PERFORMANCE

CURRENT WASTEWATER TREATMENT PLANT PERFORMANCE

Since the 2007 upgrade has been completed, the City of Ridgefield's wastewater treatment plant will be permitted to receive a maximum month flow of 0.7 mgd and maximum month loadings of 1,083 lb/day BOD_5 and 1,083 lb/day TSS as indicated in the NPDES Permit (Appendix A).

Discharge Monitoring Reports (DMRs) from May 2004 through October 2006 (Appendix B) were reviewed for the evaluation of the upgraded plant. Table 3-1 summarizes the current performance of the facility (September through October 2006). Table 3-1 compares the current average performance and operating conditions with the NPDES permit limitations after the 2007 upgrade.

PROJECTED WASTEWATER TREATMENT PLANT PERFORMANCE

Table 3-1 demonstrates that with only one aeration basin in service during the season with high influent BOD load, the facility has produced effluent with significantly better quality than the NPDES permit requires. On average, the monthly average effluent BOD concentration has been 8 percent of the permit limit (30 mg/L), and the effluent TSS concentration has been 11 percent of the limit. On average, during the months with the highest BOD loadings, the effluent quality did not deteriorate. Therefore, the facility has not exceeded its capacity for BOD treatment.

While using only 50 percent of the aeration volume and current secondary clarifier capacity, the facility provided treatment of 84 percent of the permitted BOD loading capacity during September and October 2006 (914 lb/d BOD_5 treated versus 1,083 lb/d permitted). Table 3-2 extrapolates the loading rates successfully treated using one aeration basin and one secondary clarifier in service to two aeration basins and secondary clarifiers in service. The extrapolated loading capacity exceeds the proposed BOD loading rate of 1,240 lb/d. Additional evaluation is provided in Chapter 4 to establish the actual loading capacity of the entire treatment facility.

The WWTP consistently removed almost all ammonia during the period of record, while operating with a single aeration basin. Therefore, it is expected that the plant will be capable of meeting a projected future effluent ammonia limit of 1.5 mg/L (maximum month) at the proposed new influent loadings.

TABLE 3-1

Current Treatment Performance and NPDES Permit Limits

Design Parameters	Current NPDES Permit Limits(1)	Proposed NPDES Permit Limits	January 2004 through October 2006 Average(4)	Summer 2006 Average(5)	September 2006 Through October 2006 Average(4)
Influent Flow(2)	0.7 mgd	0.7 mgd	0.25 mgd	0.25 mgd	0.28 mgd
BOD_5 Loading(2)	1,083 lb/d	1,240 lb/d	547 lb/d	740 lb/d	914 lb/d
TSS Loading(2)	1,083 lb/d	1,240 lb/d	733 lb/d	834 lb/d	965 lb/d
Effluent BOD_5 Concentration(3)	30 mg/L	30 mg/L	2.0 mg/L	2.5 mg/L	2.4 mg/L
Effluent TSS Concentration(3)	30 mg/L	30 mg/L	3.0 mg/L	3.3 mg/L	3.3 mg/L
Effluent BOD_5 Load(3)	125 lb/d	125 lb/d	4.2 lb/d	5.2 lb/d	5.6 lb/d
Effluent TSS Load(3)	125 lb/d	125 lb/d	7.1 lb/d	6.9 lb/d	7.5 lb/d
Effluent Ammonia Concentration(3)	None	1.50 mg/L	0.13 mg/L	0.06 mg/L	0.03 mg/L

(1) After the upgrade is complete, the existing maximum month influent flow permit limit is 0.5 mgd.
(2) Maximum month.
(3) Average monthly.
(4) One aeration basin in service; and one secondary clarifier in operation.
(5) Based on June through September 2006 average, one aeration basin in service, and one secondary clarifier in operation.

TABLE 3-2

2006 Demonstrated Aeration Basin Capacity Extrapolated to Two Aeration Basins and Two Secondary Clarifiers

Design Parameters	Current NPDES Permit Limits(1)	2006 Demonstrated Capacity (One AB, One SC)(2)	Extrapolated Capacity (Two AB and Two SC)(4)	Proposed NPDES Permit Limits
Influent Flow(3)	0.7 mgd	0.28 mgd	0.56 mgd	0.7 mgd
BOD_5 loading(3)	1,083 lb/d	914 lb/d	1,828 lb/d	1,240 lb/d
TSS loading(3)	1,083 lb/d	965 lb/d	1,828 lb/d	1,240 lb/d

(1) After the upgrade is complete, the maximum month influent flow permit limit is 0.7 mgd.
(2) September through October 2006, one aeration basin in service, and one secondary clarifier in operation.
(3) Maximum month.
(4) Two aeration basins and two secondary clarifiers in service.

CHAPTER 4

CAPACITY ANALYSIS OF 0.7 MGD WASTEWATER TREATMENT PLANT UPGRADE

EVALUATION OF CONDITIONS FOR CAPACITY ANALYSIS

Performance at the proposed influent BOD_5 and TSS design loadings of 1,240 lb/d each is established based on the hand process calculations for the activated sludge treatment process and the biosolids handling facilities (Appendix D). The performance of the WWTP at the new proposed loadings is also evaluated using activated sludge modeling (Appendix C). WWTP performance is evaluated at the loading conditions defined in Table 4-1. The maximum month influent design flow remains 0.7 mgd, which is the NPDES permitted design flow now that the 2007 upgrade is complete. The activated sludge modeling evaluation and hand process calculations both confirm the facility is capable of effectively treating an influent BOD_5 and TSS load of 1,240 lb/d each. The influent $CBOD_5$ load is an input for the activated sludge modeling evaluation and is assumed to equal the BOD_5 load to provide a conservative estimate. The influent TKN load is an input for the hand process calculations and the activated sludge modeling evaluation. The influent TKN load is estimated using typical wastewater characteristic ratios; the BOD_5 to NH_4-N ratio is 6:1 and the TKN to NH_4-N ratio is 1.5:1. The influent alkalinity concentration used for this analysis, shown on Table 4-1, is based on the laboratory testing results provided in Appendix F.

TABLE 4-1

Proposed Influent Loading

Parameter	Values	Units
Influent Flow	0.70	mgd
Influent BOD_5 Load	1,240	lb/d
Influent BOD_5 Concentration	212	mg/L
Influent $CBOD_5$ Concentration(1)	212	mg/L
Influent TSS Load	1,240	lb/d
Influent TSS Concentration	212	mg/L
Influent TKN Load	309	lb/d
Influent TKN Concentration(2)	53	mg/L
Influent Alkalinity Concentration	250	mg/L

(1) A conservative approach estimates CBOD equals BOD_5.
(2) Assumes BOD:NH_4-N equals 6:1 and TKN:NH_4-N equals 1.5:1.

EVALUATION OF TREATMENT WITH NEW PROPOSED LOADING

This section will evaluate the performance of the existing treatment processes at the evaluation conditions listed in Table 4-1, based on actual and typical design parameters. The new evaluation conditions do not include any increase in the existing design flow of 0.7 mgd (maximum monthly average following completion of the 2007 upgrade).

HEADWORKS CAPACITY

The preliminary treatment processes (fine screening, flow measurement, sampling, and grit removal) are designed and operated based on hydraulic loading rates. There is no need to modify the design flow rates for this equipment. Therefore, the headworks has capacity for the proposed BOD and TSS loading rates.

The increase in BOD and TSS capacity may result in a greater volume of screenings and grit entering the facility. The result will be more frequent removal of screening and grit from the collection dumpsters.

AERATION BASIN CAPACITY

The aeration basins have demonstrated the capacity to treat the new projected mass loadings. The capacity of the existing system to provide the required effluent quality and aeration capacity has been confirmed by activated sludge process modeling and hand calculations, presented below.

ACTIVATED SLUDGE PROCESS MODELING

The General Purpose Simulator (GPS-X) software was used to model and evaluate the capacity of the Ridgefield WWTP. The model was created using Hydromantis, Inc. GPS-X (Version 4.1.2) software and physical design data for the treatment facility. GPS-X uses computer-modeling technology to simulate the activated sludge and secondary clarification processes. By using the computer model it is possible to test the ability of the facility to meet its effluent limits at different influent loadings. Although a well-developed model can be a powerful tool, the results should be viewed with a certain amount of caution. Mathematical models are by nature only approximations of actual conditions and can provide erroneous output as a result of inaccurate input parameters.

The results of the model evaluation (Appendix C) indicate that two aeration basins and two secondary clarifiers have sufficient capacity to oxidize the organic load at the new proposed design loading rates. Hand calculations were performed to confirm the results of the activated sludge model. Detailed hand calculations using an Excel spreadsheet are provided in Appendix D.

First the software model was calibrated using actual facility performance data recorded in the DMRs for average conditions between May 2004 and October 2006. The average winter (November 2005 through February 2006) conditions were chosen for the calibration. Winter conditions were chosen for the calibration since the growth rate of the microorganisms responsible for treatment is limited by the temperature; hence, winter conditions will often limit the capacity of a biological treatment system. The existing conditions of the facility were entered into the model and the effluent quality was evaluated at steady state conditions. The default values for the aeration basin kinetics were adjusted within the suggested range of textbook values (Metcalf and Eddy, Fourth Edition, 2003). The values were adjusted so that the performance of the model matched the performance of the facility as reported in the DMRs. Table 4-2 provides a summary of significant input values evaluated in the calibration. The model performance and results from the calibration are included in Appendix C.

TABLE 4-2

Activated Sludge Model Calibration Values

Inputs	Units	Model Calibration	Reference
Maximum nitrification rate $\mu_{max,n}$(20°C)	1/d	0.8	M&E, 2003[1]
Nitrifier half-velocity constant K_N	mg N/L	0.74	M&E, 2003[1]
Oxygen half-velocity constant K_O	mg DO/L	0.5	M&E, 2003[1]
Maximum BOD_5 oxidation rate μ_{max} (20°C)	1/d	6	M&E, 2003[1]
Readily biodegradable substrate half-saturation constant K_s	mg COD/L	10	M&E, 2003[1]
Autotrophic Decay Rate (20°C)	1/d	0.08	M&E, 2003[1]
Influent Ammonia/TKN Ratio	None	0.5	M&E, 2003[1]
Influent VSS/TSS Ratio	None	0.85	M&E, 2003[1]
Heterotrophic Yield	mg COD/mg COD	0.67	M&E, 2003[1]
Settling Behavior (0-1; 1 is good)	None	0.20	Calibrated Value[2]

(1) Metcalf and Eddy Fourth Edition, 2003.
(2) Calibrated with summer 2005 average operating parameters and effluent quality.

The activated sludge model was then used to evaluate the performance for the proposed conditions established in Table 4-1. The performance of the facility operating with two aeration basins and two secondary clarifiers in service was evaluated. Table 4-3 provides the model inputs for the evaluation conditions, reported on the basis of two aeration basins and two secondary clarifiers in service. Table 4-4 summarizes the facility performance at the proposed loadings presented in Table 4-3. The results of the activated sludge model evaluation confirm the facility is capable of achieving a high quality effluent at the proposed influent BOD_5 and TSS loads. The BOD_5 and TSS effluent concentrations are well below the NPDES effluent concentrations limits of 30 mg/L, and the predicted effluent ammonia concentration is well below the projected future limit of 1.50 mg/L maximum month average. The activated sludge model that was used does not determine the effect of the influent alkalinity concentration on the process. Alkalinity consumption will be evaluated in a later section.

TABLE 4-3

Activated Sludge Model Inputs for Proposed Influent Loading Rates

Parameter	Units	Maximum Month Flow Condition
TKN concentration(1)	mg/L	53
$CBOD_5$ concentration(2)	mg/L	212
TSS concentration	mg/L	212
Non-biodegradable soluble COD (nbsCOD) concentration	mg/L	30
Influent flow	mgd	0.70
DO concentration set point	mg/L	2.0
RAS flow rate	NA	75% Q
Aeration basin temperature	^{0}C	12
SVI	mL/g	127
MLSS concentration set point	mg/L	4,000
No. of aeration basins	NA	2
Secondary clarifier area (2-50' diameter clarifiers)	ft^2	3,928

(1) Assumes BOD:NH_4-N is 6:1 and TKN:NH_4-N is 1.5:1.
(2) $BOD_5 = CBOD_5$ to provide the most conservative assumption.

TABLE 4-4

Activated Sludge Model Results for Proposed Loading Rates

Parameter	Units	Maximum Month Flow Condition
WAS rate	mgd	0.0175
MLSS concentration	mg/L	3,947
SRT	days	8.8
Effluent BOD_5 concentration	mg/L	5.2
Effluent ammonia concentration	mg-N/L	0.90
Effluent TSS concentration	mg/L	15.3
WAS solids concentration	mg/L	8,894
Net sludge yield	lb TSS/lb $BOD_{removed}$	0.93

RECOMMENDED PROCESS DESIGN CRITERIA

Table 4-5 provides the recommended design criteria for the aeration basins with the new proposed loadings.

TABLE 4-5

Aeration Basin Design Criteria with New Proposed Loadings

Parameter	Design Criteria
Number of Aeration Basins	2
Total Aerobic Volume	0.348 million gallons
Total Anoxic Selector Volume	0.048 million gallons
Hydraulic Detention Time	14 hrs
MLSS	4,000 mg/L
F/M	0.11 lb BOD_5/ lb MLSS/day
BOD_5 Loading Rate	27 lb BOD_5/1000 ft^3 /day
SRT	9.1 days
NaOH Addition Rate, 25%	350 lbs/day

It is recommended that the process should be operated with higher MLSS concentrations than the existing design criteria of 3,720 mg/L. A higher MLSS concentration will result in a more stable process with less sludge production. Increasing the MLSS concentrations from 3,720 mg/L to 4,000 mg/L will provide excellent treatment with the new projected BOD and TSS loadings as confirmed by the results of the activated sludge modeling evaluation. The higher MLSS concentration will also achieve near-complete nitrification.

AERATION SYSTEM CAPACITY

The two aeration basins are equipped with fine bubble diffusers and positive displacement blowers, which provide sufficient oxygen to meet the oxygen demand of the activated sludge treatment process. Air is supplied to the fine bubble diffusers by three 50-hp blowers that deliver oxygen at a rate of 800 scfm each at 9 psig.

The oxygen demand for the aeration basins with the new proposed loading rates has been calculated by hand; details are in Appendix D. The total oxygen demand is presented in Table 4-6. Two of the existing blowers, with one blower out of service, are capable of providing sufficient airflow to meet the oxygen demand (991 scfm) of the proposed BOD_5 and TSS loads to achieve the desired level of treatment. Therefore, the existing aeration blowers are sufficient for the required oxygen transfer with the new proposed loading rates.

TABLE 4-6

Aeration System Design Criteria with New Proposed Loadings[1]

Parameter	Unit	Value	Description
Carbonaceous O_2 demand ($O_{2\text{-}C}$)	lb/d	1,294	(1)
Nitrogenous O_2 demand ($O_{2\text{-}N}$)	lb/d	736	(1)
Total O_2 demand (Tot O_2)	lb/d	2,030	$O_{2\text{-}C} + O_{2\text{-}N}$
Diurnal peak factor (PF)	NA	1.3	Estimate
Design O_2 demand (AOR)	lb/d	2,639	Tot O_2 * PF
Standard oxygen requirement (SOR) [2]	lb/d	6,111	AOR / 0.39
Diffuser efficiency (DE)	%/ft	2.25	Recommended Value
Total efficiency (Tot DE) [3]	NA	0.25	DE * 11
Total required air flow	scfm	991	SOR / (1440*Tot DE * 0.0173)

(1) See Appendix D for details.
(2) AOR/SOR equals 0.39. See Appendix D for details.
(3) Assumes a diffuser submergence of 11 feet.

ALKALINITY ADDITION SYSTEM

The nitrification process in the aeration basins consumes alkalinity. If the influent wastewater does not contain sufficient alkalinity to act as a buffer, the alkalinity can be depleted to the point that the pH of the system begins to drop. Low pH could inhibit nitrification, resulting in elevated effluent ammonia concentrations, and result in violation of the NPDES permit (the effluent pH must be between 6 and 9 standard units).

Based on limited data (Appendix F) the alkalinity of the influent wastewater is estimated at 250 mg/L. The hand calculations in Appendix D include an assessment of alkalinity consumption and production in the treatment process. At the conditions evaluated in this capacity study, alkalinity addition will be needed to prevent a drop in the effluent pH, due to the low influent alkalinity concentration and limited alkalinity recovery from denitrification. 319 lbs/day of alkalinity should be added to the influent to maintain an effluent alkalinity concentration of 80 mg/L.

The two most cost-effective sources of alkalinity are 25 percent sodium hydroxide and hydrated lime. Due to the maintenance and cleaning requirements of lime systems and the ready availability of sodium hydroxide in the Ridgefield area, it is recommended that a temporary sodium hydroxide addition system be installed. A permanent alkalinity addition system will be installed during the next phase of WWTP improvements.

A temporary alkalinity addition system should be installed to provide up to 350 lb/day of alkalinity in the form of 25 percent sodium hydroxide (NaOH). In order to provide the 350 lb/day of alkalinity as $CaCO_3$, 105 gallons of 25 percent sodium hydroxide will need to be added each day. To provide the City with three weeks of storage, the alkalinity addition system should consist of one 2,500-gallon storage tank with secondary containment.

Two chemical metering pumps should be installed to feed the sodium hydroxide into the aeration basin influent box through flexible tubing. The pumps will be positive displacement peristaltic pumps complete with spring loaded pump heads, self-contained variable speed drives, and flexible extruded hose tubing. The pumps will each have a flow capacity of between 0.01 and 20 gph.

SECONDARY CLARIFIER CAPACITY

The WWTP has two 50-foot-diameter secondary clarifiers, which have the surface overflow rates and solids loading rates shown in Table 2-4. The values in Table 2-4 are functions of the influent flow rate, RAS recycle rate, MLSS concentration, and SVI. The clarifier surface overflow rates and solids loading rates at the recommended new design MLSS concentration of 4,000 mg/L and a RAS recycle rate of 0.53 of the influent flow are provided in Table 4-7.

As seen in Table 4-7, the secondary clarifiers meet accepted design criteria and provide more than adequate capacity to effectively settle activated sludge solids associated with the proposed design flows and loadings.

TABLE 4-7

Secondary Clarifier Design Criteria with New Proposed Loadings

Parameter	Criteria	Reference(1)	Ridgefield WWTF(2)	Meets Criteria?
Surface Overflow Rate				
Max. Month	400-700 gpd/sf, max. mo. 400-700 gpd/sf, max. mo.	M&E, 2003 WEF, 1998	178	Yes
Peak Hour	<1,200 gpd/sf, max. mo. 1,000-1,600 gpd/sf, average 1,000-1,600 gpd/sf, average	Ecology, 1998 M&E, 2003 WEF, 1998	382	Yes
Solids Loading Rate				
Max. Month	24-34 lb/sq. ft. d. 20-30 lb/sq. ft. d.	M&E, 2003 WEF, 1998	9	Yes
Peak Hour	43 lb/sq. ft. d. 50 lb/sq. ft. d.	M&E, 2003 WEF, 1998	22	Yes

(1) M&E, 2003: Metcalf & Eddy Fourth Edition, 2003; WEF, 1998: Water Environment Federation Manual of Practice No. 8, 1998; Ecology, 1998: Washington State Department of Ecology Criteria for Sewage Works Design, 1998.

(2) Assumes two 50-foot clarifiers in service, MLSS = 4,000 mg/L, and RAS flow rate equals 53 percent of the WWTP influent flow, with a maximum flow of 1.08 mgd. Maximum month flow equals 0.7 mgd and peak hour flow equals 1.51 mgd.

EFFLUENT TREATMENT CAPACITY

Following the secondary clarifiers, effluent is disinfected by a UV disinfection system, sampled, and then conveyed by gravity through an outfall into Lake River. The 10-inch outfall pipe has been extended into mid-channel of the river and has a submerged discharge.

The effluent treatment processes (UV disinfection, sampling and outfall) are designed and operated based on hydraulic loading rates. The design flow rates to the WWTP are not proposed to be modified. Therefore, the UV disinfection system, effluent sampler and outfall have capacity for the proposed BOD and TSS loading rates.

SOLIDS HANDLING CAPACITY

The facility has sufficient capacity in the aerobic digesters to handle the load resulting from 1,240 influent BOD_5 and TSS loads. Digested solids generated in the treatment process will be hauled to the Clark County Salmon Creek wastewater treatment plant for further treatment and disposition. The aerobic digesters process design criteria is outlined in Table 4-8.

Aerobically digested biosolids can be demonstrated to have met the Class "B" pathogen reduction standards (WAC 173-308) through two commonly used methods:

1. Aerobic digestion, as a process to significantly reduce pathogens (PSRP): provide a solids retention time (SRT) between 40 days at 20 degrees C and 60 days at 15 degrees C.

2. The geometric mean fecal coliform density of seven digested biosolids samples must be less than 2,000,000 mpn/g-TS.

The aerobic digester design calculations are presented below and the aerobic digester design criteria are summarized at the end of this section.

The total solids in the aerobic digesters is calculated as follows:

Total Solids In Digesters = (0.178 MG)(30,000 mg/L)(8.34) = 44,540 lb

With a VSS production of 873 lb/d, inert suspended solids of 402 lb/d and assuming 40 percent VSS destruction in the aerobic digesters, the mass of solids to be removed is:

Mass of Solids Wasted = (873 lb/d)(0.6) + 402 = 926 lb/d

The SRT is then estimated:

SRT = (Mass of solids in the digester)/(mass flow rate of solids leaving the digester)
SRT = (44,540 lb)/(926 lb/d) = 48 days

Assuming 2.3 lb of oxygen is required for each lb of VSS destroyed, the total actual oxygen required for treatment is:

40% (VSS production) (2.3) = 803 lb/d

Standard conditions in the aerobic digesters are converted to actual conditions for oxygen transfer using the following equation:

$$AOR = SOR \times \alpha\ ((\beta \times C_{SW} - C_L)/C_{ST}) \times 1.024^{(T-20)}$$

Where

AOR	=	Actual Oxygen Requirement
SOR	=	Standard Oxygen Requirement
α	=	Ratio of oxygen transfer in wastewater to that in clean water = 0.25
β	=	Ratio of oxygen saturation in wastewater to that in clean water = 0.95
C_{SW}	=	Saturation value of oxygen at 15°C and 40 feet elevation = 12.94 mg/L

C_L	=	Operating dissolved oxygen level = 1.0 mg/L
C_{ST}	=	Saturation value of oxygen used in test operation = 9.09 mg/L
T	=	Temperature of wastewater = 15°C

With these factors, the AOR calculates to 0.28 (SOR); therefore, the SOR equals 2,908 lb/d.

With an oxygen transfer efficiency of 0.75 percent per foot of submergence for coarse bubble diffusers and a submergence of 17.00 feet for Aerobic Digester (AD) No. 1, 15.25 feet for Aerobic Digester (AD) No. 2, and 3.5 feet for the Sludge Storage Tank, the oxygen transfer efficiency (OTE) is 12.8 percent for AD No. 1, 11.4 percent for AD No. 2, and 2.6 percent for the Sludge Storage Tank.

Assuming the respective efficiencies and that the oxygen demand for AD No. 1, AD No. 2, and the Sludge Storage Tank are 50, 40, and 10 percent of the total demand, respectively, then the air flow requirement to AD No. 1 is 458 scfm based on oxygen demand, the air flow requirement to AD No. 2 is 408 scfm, and to the Sludge Storage Tank is 481 scfm.

The air required for mixing is calculated at the mixing requirement of 20 scfm/1,000 ft^3:

AD No. 1 mixing requirement = (54,000 gallons)/7.48*(20 scfm/1,000 ft^3) = 144 scfm

AD No. 2 mixing requirement = (64,000 gallons)/7.48*(20 scfm/1,000 ft^3) = 172 scfm

Sludge storage tank mixing requirement = (60,000 gallons)/7.48*(20 scfm/1,000 ft^3) = 160 scfm

The existing 25-hp (345 scfm capacity) and 100-hp (1,477 scfm capacity) aerobic digester blowers have sufficient capacity to aerate and mix the digester tanks, although the air distribution between the tanks must be carefully controlled.

The aerobic digesters will provide an SRT of 48 days. During most of the year the digestion system will be classified as a PSRP. When temperatures are low during the winter, the fecal coliform testing method may be used to demonstrates compliance with Class "B" standards. The City plans to continue to haul biosolids to the Clark County Salmon Creek WWTP for further treatment and land application.

TABLE 4-8

Aerobic Digesters Process Design Criteria with New Proposed Loadings

Parameter	Value	Units	Description and Assumptions
X_{VSS} (VSS production)	873	lb/d	(1)
X_{ITSS} (inert TSS)	402	lb/d	(1)
$P_{x,TSS}$ (TSS production)	1,275	lb/d	Mass of waste activated sludge per day
WAS_{Conc} mg/L	10,000	mg/L	Estimate
WAS flowrate	10.6	gpm	$694*P_{x,TSS}/(WAS_{conc}*8.34)$
WAS flowrate	15,280	gpd	Conversion
D%, Percent VSS destruction	40	%	Estimate(2)
M_w, Mass of solids Wasted	926	lb/d	$X_{VSS}*(1\text{-}D\%)+X_{iTSS}$
Xdig	30,000	mg/L	Digester MLSS
SRTdig	48	days	Vdig * MW *8.34 / Xdig
Vdig	0.178	Mgal	$SRTdig*M_w/(Xdig*8.34)$
Volatile fraction of digester	0.57	NA	Estimate(3)
VSS destroyed	349	lb/d	$D\%/100*X_{VSS}$
Total Actual Oxygen Required (AOR)	803	lb/d	Assumes 2.3lb Oxygen/lb VSS
Standard Oxygen Required (SOR)	2,908	lb/d	(1)
OTE Digester No. 1	12.8	%	0.75% per foot
OTE Digester No. 2	11.4	%	0.75% per foot
OTE Sludge Storage Tank	2.6	%	0.75% per foot
Digester No. 1 air flow for treatment(4)	458	scfm	0.5 SOR/1440/0.0173/OTE Dig No. 1*100
Digester No. 2 air flow for treatment(4)	408	scfm	0.4 SOR/1440/0.0173/OTE Dig No. 2*100
Sludge Storage Tank air flow for treatment(4)	481	scfm	0.1 SOR/1440/0.0173/OTE Storage Tank * 100
Digester No. 1 Mixing Requirement	144	scfm	20/1000*54,000/7.48
Digester No. 2 Mixing Requirement	172	scfm	20/1000*64,000/7.48
Sludge Storage Tank Mixing Requirement	160	scfm	20/1000*60,000/7.48

(1) See Appendix D for more details.
(2) Metcalf and Eddy Fourth Edition, 2003, Figure 14-31.
(3) See details in the text above.
(4) Estimated at 50 percent of the total volatile solids destruction for Digester No. 1, 40 percent for Digester No. 2, and 10 percent for the Sludge Storage Tank.

CONCLUSION

The existing WWTF has capacity to treat the new proposed loading rates of 1,240 lb/day BOD_5 and 1,240 lb/day TSS with the flow capacity of 0.7 mgd (maximum month) with the recommended alkalinity addition system installed. The aeration basin system, if both basins are brought into service, has sufficient treatment capacity for the projected loading rates to meet the NPDES permits, including ammonia removal. The secondary clarifiers have sufficient capacity at mixed liquor concentrations less than or equal to 4,000 mg/L. The City is able to aerobically digest waste solids to Class B quality, but will continue to haul biosolids to the Clark County Salmon Creek wastewater treatment plant for further treatment and disposition.

APPENDIX A

NPDES PERMIT

Issuance Date: December 12, 2003
Effective Date: January 1, 2004
Expiration Date: December 31, 2009

WASHINGTON STATE DEPARTMENT OF ECOLOGY

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM WASTE DISCHARGE PERMIT No. WA0023272

State of Washington
DEPARTMENT OF ECOLOGY
Olympia, Washington 98504-7600

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1251 et seq.

City of Ridgefield

116 North Main Street

Ridgefield, WA 98642

Plant Location: West Cook Street	Receiving Water: Lake River
Water Body I.D. No.: Old ID # WA-28-1010, New ID# 1220169456238	Discharge Location: Latitude: 45° 49' 18" N Longitude: 122° 45' 09" W
Plant Type: Activated sludge with secondary clarifier and UV disinfection	

is authorized to discharge in accordance with the special and general conditions that follow.

Kelly Susewind, P.E., P.G.
Southwest Regional Manager
Water Quality Program
Washington State Department of Ecology

TABLE OF CONTENTS

GENERAL CONDITIONS

SUMMARY OF PERMIT REPORT SUBMITTALS

Refer to the Special and General Conditions of this permit for additional submittal requirements.

Permit Section	Submittal	Frequency	First Submittal Date
S3.	Discharge Monitoring Report	Monthly	February 15, 2004
S3.E	Noncompliance Notification	As necessary	
S4.B.	Plans for Maintaining Adequate Capacity	As necessary	
S4.C.	Notification of New or Altered Sources	As necessary	
S4.E.	Infiltration and Inflow Evaluation	Annually	October 15, 2004
S4.F.	Waste load Assessment	Annually .	October 15, 2004
S5.G.	Operations and Maintenance Manual	1/permit	March 15, 2006
S6.D.	Industrial User Survey	1/permit cycle	June 15, 2005
S8.A.	Effluent Mixing Plan of Study	(Prior to study)	May 15, 2004
S8.B.	Effluent Mixing Report	1/permit cycle	January 15, 2005
S9.	Receiving Water and Effluent Study Sampling and Quality Assurance Plan	(Prior to study)	February 15, 2005
S9.	Receiving Water and Effluent Study Results	1/permit cycle (2-summers of data)	November 15, 2006
S10.A.	Acute Toxicity Characterization Data	2/permit (once in summer and once in winter	September 15, 2004, April 15, 2005
S10.A.	Acute Toxicity Tests Characterization Summary Report	1/permit cycle	September 15, 2005
S11.D	Acute Toxicity: "Causes and Preventative Measures for Transient Events."	As necessary	
S11.D	Acute Toxicity TI/TRE Plan	As necessary	
S11.A	Chronic Toxicity Characterization Data	2/permit (once in summer and once in winter	September 15, 2004, April 15, 2005
S11.A	Chronic Toxicity Tests Characterization Summary Report	1/permit cycle	September 15, 2005
S11.D	Chronic Toxicity: "Causes and Preventative Measures for Transient Events."	As necessary	
S11.D	Chronic Toxicity TI/TRE Plan	As necessary	
S12.	Outfall Evaluation	1/permit cycle	October 15, 2006

Permit Section	Submittal	Frequency	First Submittal Date
G1.	Notice of Change in Authorization	As necessary	
G4.	Permit Application for Substantive Changes to the Discharge	As necessary	
G5.	Engineering Report for Construction or Modification Activities	As necessary	
G7.	Application for Permit Renewal	1/permit cycle	April 1, 2008
G21	Notice of Planned Changes	As necessary	
G22	Reporting Anticipated Non-compliance	As necessary	

SPECIAL CONDITIONS

S1. DISCHARGE LIMITATIONS

A. Effluent Limitations

All discharges and activities authorized by this permit shall be consistent with the terms and conditions of this permit. The discharge of any of the following pollutants more frequently than, or at a level in excess of, that identified and authorized by this permit shall constitute a violation of the terms and conditions of this permit.

Beginning on the effective date of this permit and lasting through the expiration date the Permittee is authorized to discharge municipal wastewater at the permitted location subject to complying with the following limitations:

	EFFLUENT LIMITATIONS[a]: OUTFALL # 001	
Parameter	**Average Monthly**	**Average Weekly**
Biochemical Oxygen Demand[b] (5 day)	30 mg/L,	45 mg/L,
	125 lbs/day,	188 lbs/day,
	85% Removal	
Total Suspended Solids[b]	30 mg/L,	45 mg/L,
	125 lbs/day	188 lbs/day
	85% Removal	
Fecal Coliform Bacteria	100/100 ml	200/100 ml
pH[c]	Daily minimum is equal to or greater than 6 and the daily maximum is less than or equal to 9.	
[a]The average monthly and weekly effluent limitations are based on the arithmetic mean of the samples taken with the exception of fecal coliform, which is based on the geometric mean.		
[b]The average monthly effluent concentration for BOD_5 and Total Suspended Solids shall not exceed 30 mg/L or 15 percent of the respective monthly average influent concentrations, whichever is more stringent.		
[c]Indicates the range of permitted values. The instantaneous maximum and minimum pH shall be reported monthly.		

B. Mixing Zone Descriptions

The mixing zone appears to fit the model of the estuary best because of the tide reversals. The maximum boundaries of the mixing zones are therefore defined as:

Chronic boundary extends 200 feet upstream and 200 feet downstream. The width of Lake River is 240 feet wide and the mixing zone is allowed only 25 percent of the width which is 60 feet.

The Acute boundary is 10 percent of the 200-foot value established above, which is a 20-foot radius from the end of the pipe.

S2. MONITORING REQUIREMENTS

A. Monitoring Schedule

Category	Parameter	Units	Sample Point	Minimum Sampling Frequency	Sample Type
Wastewater Influent	BOD_5	mg/L lbs/day	Influent at Headworks past the screening	2/week	24-hr. Composite
Wastewater Influent	TSS	mg/L lbs/day	Influent at Headworks past the screening	2/week	24-hr. Composite
Wastewater Effluent	Flow	MGD	Effluent past the weir	Continuous[a]	Recording
Wastewater Effluent	BOD_5	mg/L lbs/day	Effluent past the weir	2/week	24-hr. Composite
Wastewater Effluent	TSS	mg/L lbs/day	Effluent past the weir	2/week	24-hr. Composite
Wastewater Effluent	pH	Standard Units	Effluent past the weir	Daily	Grab
Wastewater Effluent	Fecal Coliform	#/100 ml	Effluent past the weir	2/week	Grab
Receiving Water and Effluent Study	Total Ammonia, pH (Standard Units), alkalinity as $CaCo_3$, hardness, dissolved oxygen, BOD_5, CBOD	mg/L	Receiving Water and Effluent	2/week May-Oct.	Grab

Category	Parameter	Units	Sample Point	Minimum Sampling Frequency	Sample Type
	Maximum Temperature see footnote[b]	°C (± 0.1°)	Receiving Water and Effluent	Continuous May-Oct.	(using micro recorders "tidbits")
	Metals listed in 40 CFR Part 122, Appendix D, Table III [c]	µg/L	Influent, Effluent, Sludge	2/permit, once in the 1st winter, and once in the next summer	24-hour composite except for sludge which is a grab
Acute Toxicity Testing	Section S10 for details on monitoring (Test 2/year for one year unless a limit is needed in which case testing shall be 2/year each following year)				
Chronic Toxicity Testing	Section S11 for details on monitoring (Test 2/year for one year unless a limit is needed in which case testing shall be 2/year each following year)				

[a] Continuous means uninterrupted except for brief lengths of time for calibration, for power failure, or for unanticipated equipment repair or maintenance. Sampling shall be taken twice daily when continuous monitoring is not possible.

[b] To determine the daily maximum temperature, recorders may be set for reading every half-hour and choosing highest value during the 24-hour period.

[c] Clean sampling techniques are required for all metals sampling to avoid false positive errors. The Permittee should also follow lab testing that uses EPA method 200.8 that specifies the use of Induced Coupled Plasma with Mass Spectrometry (ICP/MS). Mercury shall be tested using EPA method 1631 Revision C (in 40 CFR part 136).

B. Sampling and Analytical Procedures

Samples and measurements taken to meet the requirements of this permit shall be representative of the volume and nature of the monitored parameters, including representative sampling of any unusual discharge or discharge condition, including bypasses, upsets, and maintenance-related conditions affecting effluent quality.

Sampling and analytical methods used to meet the monitoring requirements specified in this permit shall conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 Code of Federal Regulations (CFR) Part 136 or to the latest revision of *Standard Methods for the Examination of Water and Wastewater* (APHA), unless otherwise specified in this permit or approved in writing by the Department of Ecology (Department).

C. Flow Measurement

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the quantity of monitored flows. The devices shall be installed, calibrated, and maintained to ensure that the accuracy of the measurements are consistent with the accepted industry standard for that type of device. Frequency of calibration shall be in conformance with manufacturer's recommendations and at a minimum frequency of at least one calibration per year. Calibration records shall be maintained for at least three years.

D. Laboratory Accreditation

All monitoring data required by the Department shall be prepared by a laboratory registered or accredited under the provisions of, *Accreditation of Environmental Laboratories*, Chapter 173-50 Washington Administrative Code (WAC). Flow, temperature, settleable solids, conductivity, pH, and internal process control parameters are exempt from this requirement. Conductivity and pH shall be accredited if the laboratory must otherwise be registered or accredited. The Department exempts crops, soils, and hazardous waste data from this requirement pending accreditation of laboratories for analysis of these media.

S3. REPORTING AND RECORDKEEPING REQUIREMENTS

The Permittee shall monitor and report in accordance with the following conditions. The falsification of information submitted to the Department shall constitute a violation of the terms and conditions of this permit.

A. Reporting

The first monitoring period begins on the effective date of the permit. Monitoring results shall be submitted monthly. Monitoring data obtained during each monitoring period shall be summarized, reported, and submitted on a Discharge Monitoring Report (DMR) form provided, or otherwise approved, by the Department. DMR forms shall be received by the Department no later than the 15th day of the month following the completed monitoring period, unless otherwise specified in this permit. Metals monitoring (shown in S2) for priority pollutant analysis data shall be submitted no later than 45 days following the monitoring period. Unless otherwise specified, all toxicity test data shall be submitted within 60 days after the sample date. The report(s) shall be sent to the Department of Ecology, P.O. Box 47775, Olympia, Washington 98504-7775.

All laboratory reports providing data for organic and metal parameters shall include the following information: sampling date, sample location, date of analysis, parameter name, CAS number, analytical method/number, method detection limit (MDL), laboratory practical quantitation limit (PQL), reporting units, and concentration detected.

DMR forms must be submitted monthly whether or not the facility was discharging. If there was no discharge during a given monitoring period, submit the form as required with the words "no discharge" entered in place of the monitoring results.

All laboratory reports providing data for organic and metal parameters shall include the following information: sampling date, sample location, date of analysis, parameter name, CAS number, analytical method/number, method detection limit (MDL), lab practical quantitation limit (PQL), reporting units and concentration detected.

DMR forms must be submitted quarterly whether or not the facility was discharging. If there was no discharge during a given monitoring period, submit the form as required with the words "no discharge" entered in place of the monitoring results.

B. Records Retention

The Permittee shall retain records of all monitoring information for a minimum of three years. Such information shall include all calibration and maintenance records and all original recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit. This period of retention shall be extended during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by the Department.

C. Recording of Results

For each measurement or sample taken, the Permittee shall record the following information: (1) the date, exact place, method, and time of sampling or measurement; (2) the individual who performed the sampling or measurement; (3) the dates the analyses were performed; (4) the individual who performed the analyses; (5) the analytical techniques or methods used; and (6) the results of all analyses.

D. Additional Monitoring by the Permittee

If the Permittee monitors any pollutant more frequently than required by this permit using test procedures specified by Condition S2 of this permit, then the results of such monitoring shall be included in the calculation and reporting of the data submitted in the Permittee's DMR.

E. Noncompliance Notification

In the event the Permittee is unable to comply with any of the terms and conditions of this permit due to any cause, the Permittee shall:

1. Immediately take action to stop, contain, and cleanup unauthorized discharges or otherwise stop the noncompliance, correct the problem and, if applicable, repeat sampling and analysis of any noncompliance immediately and submit the results to the Department within 30 days after becoming aware of the violation.

2. Immediately notify the Department of the failure to comply.

3. Submit a detailed written report to the Department within 30 days (five days for upsets and bypasses), unless requested earlier by the Department. The report shall contain a description of the noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply.

S4. FACILITY LOADING

A. Design Criteria

Flows or waste loadings of the following design criteria for the permitted treatment facility shall not be exceeded:

Average flow for the maximum month:	0.5 mgd
BOD_5 loading for maximum month:	1,083 lbs/day
TSS loading for maximum month:	1,083 lbs/day

B. Plans for Maintaining Adequate Capacity

The Permittee shall submit to the Department a plan and a schedule for continuing to maintain capacity when:

1. The actual flow or waste load reaches 85 percent of any one of the design criteria in S4.A for three consecutive months; or

2. When the projected increase would reach design capacity within five years,

whichever occurs first. If such a plan is required, it shall contain a plan and schedule for continuing to maintain capacity. The capacity as outlined in this plan must be sufficient to achieve the effluent limitations and other conditions of this permit. This plan shall address any of the following actions or any others necessary to meet the objective of maintaining capacity.

a. Analysis of the present design including the introduction of any process modifications that would establish the ability of the existing facility to achieve the effluent limits and other requirements of this permit at specific levels in excess of the existing design criteria specified in paragraph A above.

b. Reduction or elimination of excessive infiltration and inflow of uncontaminated ground and surface water into the sewer system.

c. Limitation on future sewer extensions or connections or additional waste loads.

d. Modification or expansion of facilities necessary to accommodate increased flow or waste load.

e. Reduction of industrial or commercial flows or waste loads to allow for increasing sanitary flow or waste load.

Engineering documents associated with the plan must meet the requirements of WAC 173-240-060, "Engineering Report," and be approved by the Department prior to any construction. The plan shall specify any contracts, ordinances, methods for financing, or other arrangements necessary to achieve this objective.

C. Duty to Mitigate

The Permittee is required to take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment

D. Notification of New or Altered Sources

The Permittee shall submit written notice to the Department whenever any new discharge or a substantial change in volume or character of an existing discharge into the Publicly Owned Treatment Works (POTW) is proposed which: (1) would interfere with the operation of, or exceed the design capacity of, any portion of the POTW; (2) is not part of an approved general sewer plan or approved plans and specifications; or (3) would be subject to pretreatment standards under 40 CFR Part 403 and Section 307(b) of the Clean Water Act. This notice shall include an evaluation of the POTW's ability to adequately transport and treat the added flow and/or waste load, the quality and volume of effluent to be discharged to the POTW, and the anticipated impact on the Permit tee's effluent [40 CFR 122.42(b)].

E. Infiltration and Inflow Evaluation

1. The Permittee shall conduct an infiltration and inflow evaluation. Refer to the U.S. EPA publication, *I/I Analysis and Project Certification*, available as Publication No. 97-03 at: Publications Office, Department of Ecology, P.O. Box 47600, Olympia, Washington 98504-7600. Plant monitoring records may be used to assess measurable infiltration and inflow.

2. A report shall be prepared which summarizes any measurable infiltration and inflow. If infiltration and inflow have increased by more than 15 percent from that found in the first report based on equivalent rainfall, the report shall contain a plan and a schedule for: (1) locating the sources of infiltration and inflow; and (2) correcting the problem.

3. The report shall be submitted by **October 15, 2004,** and annually thereafter.

F. Waste load Assessment

The Permittee shall conduct an annual assessment of their flow and waste load and submit a report to the Department by **October 15, 2004,** and annually thereafter. The report shall contain the following: an indication of compliance or noncompliance with the permit effluent limitations; a comparison between the existing and design monthly average dry weather and wet weather flows, peak flows, BOD, and total suspended solids loadings; and (except for the first report) the percentage increase in these parameters since the last annual report. The report shall also state the present and design population or population equivalent, projected population growth rate, and the estimated date upon which the design capacity is projected to be reached, according to the most restrictive of the parameters above. The interval for review and reporting may be modified if the Department determines that a different frequency is sufficient.

S5. OPERATION AND MAINTENANCE

The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems, which are installed by a Permittee only when the operation is necessary to achieve compliance with the conditions of this permit.

A. Certified Operator

An operator certified for at least a Class II plant by the state of Washington shall be in responsible charge of the day-to-day operation of the wastewater treatment plant. An operator certified for at least a Class I plant shall be in charge during all regularly scheduled shifts.

B. O & M Program

The Permittee shall institute an adequate operation and maintenance program for their entire sewage system. Maintenance records shall be maintained on all major electrical and mechanical components of the treatment plant, as well as the sewage system and pumping stations. Such records shall clearly specify the frequency and type of maintenance recommended by the manufacturer and shall show the frequency and type of maintenance performed. These maintenance records shall be available for inspection at all times.

C. Short-term Reduction

If a Permittee contemplates a reduction in the level of treatment that would cause a violation of permit discharge limitations on a short-term basis for any reason, and such reduction cannot be avoided, the Permittee shall give written notification to the Department, if possible, 30 days prior to such activities, detailing the reasons for, length of time of, and the potential effects of the reduced level of treatment. This notification does not relieve the Permittee of their obligations under this permit.

D. Electrical Power Failure

The Permittee is responsible for maintaining adequate safeguards to prevent the discharge of untreated wastes or wastes not treated in accordance with the requirements of this permit during electrical power failure at the treatment plant and/or sewage lift stations either by means of alternate power sources, standby generator, or retention of inadequately treated wastes.

The Permittee shall maintain Reliability Class II (EPA 430-99-74-001) at the wastewater treatment plant, which requires a backup power source sufficient to operate all vital components and critical lighting and ventilation during peak wastewater flow conditions, except vital components used to support the secondary processes (i.e., mechanical aerators or aeration basin air compressors) need not be operable to full levels of treatment, but shall be sufficient to maintain the biota.

E. Prevent Connection of Inflow

The Permittee shall strictly enforce their sewer ordinances and not allow the connection of inflow (roof drains, foundation drains, etc.) to the sanitary sewer system.

F. Bypass Procedures

Bypass, which is the intentional diversion of waste streams from any portion of a treatment facility, is prohibited, and the Department may take enforcement action against a Permittee for bypass unless one of the following circumstances (1, 2, or 3) is applicable.

1. Bypass for essential maintenance without the potential to cause violation of permit limits or conditions.

   Bypass is authorized if it is for essential maintenance and does not have the potential to cause violations of limitations or other conditions of this permit, or adversely impact public health as determined by the Department prior to the bypass. The Permittee shall submit prior notice, if possible at least 10 days before the date of the bypass.

2. Bypass which is unavoidable, unanticipated and results in noncompliance of this permit.

   This bypass is permitted only if:

   a. Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.

   b. There are no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment downtime (but not if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance), or transport of untreated wastes to another treatment facility.

c. The Department is properly notified of the bypass as required in Condition S3E of this permit.

3. Bypass which is anticipated and has the potential to result in noncompliance of this permit.

The Permittee shall notify the Department at least 30 days before the planned date of bypass. The notice shall contain: (1) a description of the bypass and its cause; (2) an analysis of all known alternatives which would eliminate, reduce, or mitigate the need for bypassing; (3) a cost-effectiveness analysis of alternatives including comparative resource damage assessment; (4) the minimum and maximum duration of bypass under each alternative; (5) a recommendation as to the preferred alternative for conducting the bypass; (6) the projected date of bypass initiation; (7) a statement of compliance with State Environmental Policy Act (SEPA); (8) a request for modification of water quality standards as provided for in WAC 173-201A-110, if an exceedance of any water quality standard is anticipated; and (9) steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass.

For probable construction bypasses, the need to bypass is to be identified as early in the planning process as possible. The analysis required above shall be considered during preparation of the engineering report or facilities plan and plans and specifications and shall be included to the extent practical. In cases where the probable need to bypass is determined early, continued analysis is necessary up to and including the construction period in an effort to minimize or eliminate the bypass.

The Department will consider the following prior to issuing an administrative order for this type bypass:

a. If the bypass is necessary to perform construction or maintenance-related activities essential to meet the requirements of this permit.

b. If there are feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment down time, or transport of untreated wastes to another treatment facility.

c. If the bypass is planned and scheduled to minimize adverse effects on the public and the environment.

After consideration of the above and the adverse effects of the proposed bypass and any other relevant factors, the Department will approve or deny the request. The public shall be notified and given an opportunity to comment on bypass incidents of significant duration, to the extent feasible. Approval of a request to bypass will be by administrative order issued by the Department under Revised Code of Washington (RCW) 90.48.120.

G. Operations and Maintenance Manual

The approved Operations and Maintenance Manual shall be kept available at the treatment plant and all operators shall follow the instructions and procedures of this manual.

An Operations and Maintenance (O&M) Manual shall be updated by the Permittee in accordance with WAC 173-240-080 and be submitted to the Department for approval by **March 15, 2006.** In addition to requirements of WAC 173-240-080 (1) through (5) the O&M Manual shall include:

1. Emergency procedures for plant shutdown and cleanup in event of wastewater system upset or failure.

2. Wastewater system maintenance procedures that contribute to the generation of process wastewater

3. Any directions to maintenance staff when cleaning, or maintaining other equipment or performing other tasks which are necessary to protect the operation of the wastewater system (e.g., defining maximum allowable discharge rate for draining a tank, blocking all floor drains before beginning the overhaul of a stationary engine.)

4. The treatment plant process control monitoring schedule.

The O&M Manual shall be reviewed by the Permittee at least annually and the Permittee shall confirm this review by letter to the Department. Substantial changes or updates to the O&M Manual shall be submitted to the Department whenever they are incorporated into the manual.

S6. PRETREATMENT

A. General Requirements

The Permittee shall work with the Department to ensure that all commercial and industrial users of the POTW are in compliance with the pretreatment regulations promulgated in 40 CFR Part 403 and any additional regulations that may be promulgated under Section 307(b) (pretreatment) and 308 (reporting) of the Federal Clean Water Act.

B. Wastewater Discharge Permit Required

The Permittee shall not allow significant industrial users (SIUs) to discharge wastewater to the Permittee's sewerage system until such user has received a wastewater discharge permit from the Department in accordance with Chapter 90.48 RCW and Chapter 173-216 WAC, as amended.

C. Identification and Reporting of Existing, New, and Proposed Industrial Users

1. The Permittee shall take continuous, routine measures to identify all existing, new, and proposed SIUs and potential significant industrial users (PSIUs) discharging or proposing to discharge to the Permittee's sewerage system (see Appendix B of Fact Sheet for definitions).

2. Within 30 days of becoming aware of an unpermitted existing, new, or proposed industrial user who may be an SIU, the Permittee shall notify such user by registered mail that, if classified as an SIU, they shall be required to apply to the Department and obtain a State Waste Discharge Permit. A copy of this notification letter shall also be sent to the Department within this same 30-day period.

3. The Permittee shall also notify all PSIUs, as they are identified, that if their classification should change to an SIU, they shall be required to apply to the Department for a State Waste Discharge Permit within 30 days of such change.

D. Industrial User Survey

The Permittee shall complete and submit to the Department an Industrial User Survey listing all SIUs and PSIUs discharging to the POTW. The survey shall be conducted once during the permit and shall be received by the Department by **June 15, 2005**. At a minimum, the list of SIUs and PSIUs shall be developed by means of a telephone book search, a water utility billing records search, and a physical reconnaissance of the service area. Information on PSIUs shall at least include: the business name, telephone number, address, description of the industrial process(es), and the known wastewater volumes and characteristics. For assistance with the development of the Industrial User Survey, the Permittee shall refer to the Department's guidance document entitled "Performing an Industrial User Survey."

E. Duty to Enforce Discharge Prohibitions

1. In accordance with 40 CFR 403.5(a), the Permittee shall not authorize or knowingly allow the discharge of any pollutants into its POTW which cause pass through or interference, or which otherwise violates general or specific discharge prohibitions contained in 40 CFR Part 403.5 or WAC-173-216-060.

2. The Permittee shall not authorize or knowingly allow the introduction of any of the following into their treatment works:

   a. Pollutants which create a fire or explosion hazard in the POTW (including, but not limited to waste streams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test methods specified in 40 CFR 261.21).

   b. Pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.0, or greater than 11.0 standard units, unless the works are specifically designed to accommodate such discharges.

c. Solid or viscous pollutants in amounts that could cause obstruction to the flow in sewers or otherwise interfere with the operation of the POTW.

d. Any pollutant, including oxygen demanding pollutants, (BOD, etc.) released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the POTW.

e. Petroleum oil, nonbiodegradable cutting oil, or products of mineral origin in amounts that will cause interference or pass through.

f. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity which may cause acute worker health and safety problems.

g. Heat in amounts that will inhibit biological activity in the POTW resulting in interference but in no case heat in such quantities such that the temperature at the POTW headworks exceeds 40°C (104°F) unless the Department, upon request of the Permittee, approves, in writing, alternate temperature limits.

h. Any trucked or hauled pollutants, except at discharge points designated by the Permittee.

i. Wastewaters prohibited to be discharged to the POTW by the Dangerous Waste Regulations (Chapter 173-303 WAC), unless authorized under the Domestic Sewage Exclusion (WAC 173-303-071).

3. All of the following are prohibited from discharge to the POTW unless approved in writing by the Department under extraordinary circumstances (such as a lack of direct discharge alternatives due to combined sewer service or the need to augment sewage flows due to septic conditions):

a. Noncontact cooling water in significant volumes.

b. Stormwater, and other direct inflow sources.

c. Wastewaters significantly affecting system hydraulic loading, which do not require treatment, or would not be afforded a significant degree of treatment by the system.

4. The Permittee shall notify the Department if any industrial user violates the prohibitions listed in this section.

S7. RESIDUAL SOLIDS

Residual solids include screenings, grit, scum, primary sludge, waste activated sludge, and other solid waste. The Permittee shall store and handle all residual solids in such a manner so as to prevent their entry into state ground or surface waters. The Permittee shall not discharge leachate from residual solids to state surface or ground waters.

S8. EFFLUENT MIXING STUDY

A. General Requirements

The Permittee shall determine the degree of effluent and receiving water mixing which occurs within the mixing zone (as defined in permit condition S1.B). The degree of mixing shall be determined during critical conditions, as defined in WAC 173-201A-020 Definitions-"Critical Condition," or as close to critical conditions as reasonably possible.

The critical condition scenarios shall be established in accordance with *Guidance for Conducting Mixing Zone Analyses* (Ecology, 1996). The dilution ratio shall be measured in the field with dye using study protocols specified in the *Guidance*, section 5.0 "Conducting a Dye Study," as well as other protocols listed in subpart C Protocols. The use of mixing models is an acceptable alternative or adjunct to a dye study if the critical ambient conditions necessary for model input are known or will be established with field studies; and if the diffuser is visually inspected for integrity or has been recently tested for performance by the use of tracers. The modeling shall include a design for a diffuser. The *Guidance* mentioned above shall be consulted when choosing the appropriate model. The use of models is also required if critical condition scenarios that need to be examined are quite different from the set of conditions present during the dye study.

Validation (and possibly calibration) of a model may be necessary and shall be done in accordance with the *Guidance* mentioned above - in particular subsection 5.2 "Quantify Dilution." The resultant dilution ratios for acute and chronic boundaries shall be applied in accordance with directions found in the Department's *Permit Writer's Manual* (1994) - in particular Chapter VI.

A Plan of Study shall be submitted to the Department for review by **May 15, 2004,** prior to initiation of the effluent mixing study.

B. Reporting Requirements

If the Permittee has information on the background physical conditions or background concentration of chemical substances (for which there are criteria in Chapter 173-201A WAC) in the receiving water, this information shall be submitted to the Department as part of the Effluent Mixing Report.

The results of the effluent mixing study shall be included in the Effluent Mixing Report, which shall be submitted to the Department for approval no later than **January 15, 2005.**

If the results of the mixing study, toxicity tests, and chemical analysis indicate that the concentration of any pollutant(s) exceeds or has a reasonable potential to exceed the State Water Quality Standards, Chapter 173-201A WAC, the Department may issue a regulatory order to require a reduction of pollutants or modify this permit to impose effluent limitations to meet the Water Quality Standards.

The Permittee shall use some method of fixing and reporting the location of the outfall and mixing zone boundaries [i.e., triangulation off the shore, microwave navigation system, or using Loran or Global Positioning System (GPS) coordinates]. The method of fixing station location and the actual station locations shall be identified in the report.

C. Protocols

The Permittee shall determine the dilution ratio using protocols outlined in the following references, approved modifications thereof, or by another method approved by the Department:

-Akar, P.J. and G.H. Jirka, *Cormix2: An Expert System for Hydrodynamic Mixing Zone Analysis of Conventional and Toxic Multiport Diffuser Discharges,* USEPA Environmental Research Laboratory, Athens, GA, Draft, July 1990.

-Baumgartner, D.J., W.E. Frick, P.J.W. Roberts, and C.A. Bodeen, *Dilution Models for Effluent Discharges,* USEPA, Pacific Ecosystems Branch, Newport, OR, 1993.

-Doneker, R.L. and G.H. Jirka, *Cormix1: An Expert System for Hydrodynamic Mixing Zone Analysis of Conventional and Toxic Submerged Single Port Discharges,* USEPA, Environmental Research Laboratory, Athens, GA, EPA/600-3-90/012, 1990.

-Ecology, *Permit Writer's Manual,* Water Quality Program, Department of Ecology, Olympia WA 98504, July, 1994, including most current addenda.

-Ecology, *Guidance for Conducting Mixing Zone Analyses*, Permit Writer's Manual, (Appendix 6.1), Water Quality Program, Department of Ecology, Olympia WA 98504, October 1996.

-Kilpatrick, F.A., and E.D. Cobb, Measurement of Discharge Using Tracers, Chapter A16, *Techniques of Water-Resources Investigations of the USGS, Book 3, Application of Hydraulics,* USGS, U.S. Department of the Interior, Reston, VA 1985.

-Wilson, J.F., E.D. Cobb, and F.A. Kilpatrick, Fluorometric Procedures for Dye Tracing, Chapter A12. *Techniques of Water-Resources Investigations of the USGS, Book 3, Application of Hydraulics,* USGS, U.S. Department of the Interior, Reston, VA 1986.

S9. RECEIVING WATER AND EFFLUENT STUDY

The Permittee shall collect receiving water information necessary to determine if the effluent has a reasonable potential to cause a violation of the water quality standards. If reasonable potential exists the Department will use this information to calculate effluent limits. All sampling and analysis shall be conducted in accordance with the guidelines given in *Guidelines and Specifications for Preparing Quality Assurance Project Plans*, Ecology Publication 91-16. The Permittee shall submit a sampling and quality assurance plan for Department review and approval by **February 15, 2005**.

A. Effluent Analysis

The Permittee shall sample and analyze the receiving water for total suspended solids, Ammonia, pH alkalinity, hardness, dissolved oxygen, BOD_5, CBOD, salinity, and temperature. The time of sampling shall be as close as possible to the time of critical period. Sampling shall occur over two summer seasons (May through October) with samples taken twice weekly during the critical period. (Metals shall be examined less frequently as part of a priority pollutant scan for metals as described below):

Priority pollutant metals scan. A metals scan shall be conducted once in the winter and once in the summer. One of the sample times shall coincide with the receiving water study. All analysis for metals must use the methods given in 40 CFR Part 136 and be reported as total recoverable. The metals tested shall be those listed in 40 CFR Part 122, Appendix D, Table III. The detection levels used for the analysis must be those described in the federal regulations:

The Permittee shall follow the clean sampling techniques (*Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels*, EPA Publication No. 821-R-95-034, April 1995). The sampling station accuracy requirements are ± 20 meters. The receiving water sampling location should be outside the zone of influence of the effluent. The Department considers ten receiving water samples to be the optimal data set and four to be the minimum, for determining reasonable potential to cause a violation of the water quality standards. All chemical analysis shall be conducted according to methods given in 40 CFR 136 and shall have the following detection levels:

POLLUTANT PARAMETER	DETECTION LIMIT REQUIRED
Copper	1.0 µg/L
Lead	1.0 µg/L
Nickel	1.0 µg/L
Chromium	1.0 µg/L
Zinc	2.0 µg/L
Cadmium	0.1 µg/L
Selenium	2.0 µg/L
Silver	0.2 µg/L
Mercury	0.2 µg/L
Arsenic	1.0 µg/L

Any subsequent sampling and analysis shall also meet these requirements. The Permittee may conduct a cooperative receiving water study with other NPDES Permittees discharging in the same vicinity. The Permittee shall submit the results of the study to the Department within 90 days of completing the effluent and receiving water studies.

The Permittee should use the clean sampling guidance for collection of metals samples. Effluent samples shall be collected as 24-hour composite samples.

Mercury should be tested using EPA method 1631 Revision C which may be found in 40 CFR Part 136. This method for mercury has a minimum detection level of 0.5 ppt.

B. Receiving Water Analysis

The Permittee shall sample and analyze the receiving water for total suspended solids, Ammonia, pH, alkalinity, hardness, dissolved oxygen, BOD_5, CBOD, salinity, and temperature. The metals listed in 40 CFR Part 122, Appendix D table III shall be analyzed for both total recoverable and dissolved. (Metals shall be examined less frequently as part of a priority pollutant scan for metals as described below):

> Antimony, arsenic, beryllium, cadmium, chromium copper, lead, mercury, nickel, selenium, thallium, zinc, cyanide, and phenols. Metals not listed in the minimum detection table above shall follow minimum detection levels according the recommended testing procedures.

The permittee shall follow the clean sampling techniques (*Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels*, EPA Publication No. 821-R-95-034, April 1995). The sampling station accuracy requirements are ± 20 meters. The receiving water sampling location should be outside the zone of influence of the effluent. The Department considers ten receiving water samples to be the optimal data set and four to be the minimum for determining reasonable potential to cause a violation of the water quality standards. All chemical analysis shall be conducted according to methods given in 40 CFR 136 and shall meet the detection levels described in the federal regulation.

Any subsequent sampling and analysis shall also meet these requirements. The Permittee may conduct a cooperative receiving water study with other NPDES Permittees discharging in the same vicinity. The Permittee shall submit the results of the study to the Department by **November 15, 2006.**

S10. ACUTE TOXICITY

A. Effluent Characterization

The Permittee shall conduct acute toxicity testing on the final effluent to determine the presence and amount of acute (lethal) toxicity. The two acute toxicity tests listed below shall be conducted on each sample taken for effluent characterization.

Effluent characterization for acute toxicity shall be conducted twice in one year. Acute toxicity testing shall follow protocols, monitoring requirements, and quality assurance/quality control procedures specified in this section. A dilution series consisting of a minimum of five concentrations and a control shall be used to estimate the concentration lethal to 50 percent of the organisms (LC_{50}). The percent survival in 100 percent effluent shall also be reported.

Testing shall begin within 60 days of the permit effective date. A submittal of the acute toxicity characterization data are due **September 15, 2004,** for the summer sampling and **April 15, 2005,** for the winter sampling. A written report the the acute toxicity characterization in the form of a summary report shall be due by **September 15, 2005.**

Acute toxicity tests shall be conducted with the following species and protocols:

1. Fathead minnow, *Pimephales promelas* (96 hour static-renewal test, method: EPA/600/4-90/027F).

2. Daphnid, *Ceriodaphnia dubia*, *Daphnia pulex*, or *Daphnia magna* (48 hour static test, method: EPA/600/4-90/027F). The Permittee shall choose one of the three species and use it consistently throughout effluent characterization.

B. Effluent Limit for Acute Toxicity

The Permittee has an effluent limit for acute toxicity if, after completing one year of effluent characterization, either:

1. The median survival of any species in 100 percent effluent is below 80 percent, or

2. Any one test of any species exhibits less than 65 percent survival in 100 percent effluent.

If an effluent limit for acute toxicity is required by subsection B at the end of one year of effluent characterization, the Permittee shall immediately complete all applicable requirements in subsections C, D, and F.

If no effluent limit is required by subsection B at the end of one year of effluent characterization, then the Permittee shall complete all applicable requirements in subsections E and F.

The effluent limit for acute toxicity is no acute toxicity detected in a test concentration representing the acute critical effluent concentration (ACEC).

In the event of failure to pass the test described in subsection C of this section for compliance with the effluent limit for acute toxicity, the Permittee is considered to be in compliance with all permit requirements for acute whole effluent toxicity as long as the requirements in subsection D are being met to the satisfaction of the Department.

The ACEC means the maximum concentration of effluent during critical conditions at the boundary of the zone of acute criteria exceedance assigned pursuant to WAC 173-201A-100. The zone of acute criteria exceedance is authorized in Section S1.B of this permit. The ACEC equals 33 percent effluent.

C. Monitoring for Compliance With an Effluent Limit for Acute Toxicity

Monitoring to determine compliance with the effluent limit shall be conducted two times per year for the remainder of the permit term using each of the species listed in subsection A on a rotating basis and performed using at a minimum 100 percent effluent, the ACEC, and a control. The Permittee shall schedule the toxicity tests in the order listed in the permit unless the Department notifies the Permittee in writing of another species rotation schedule. The percent survival in 100 percent effluent shall be reported for all compliance monitoring.

Compliance with the effluent limit for acute toxicity means no statistically significant difference in survival between the control and the test concentration representing the ACEC. The Permittee shall immediately implement subsection D if any acute toxicity test conducted for compliance monitoring determines a statistically significant difference in survival between the control and the ACEC using hypothesis testing at the 0.05 level of significance (Appendix H, EPA/600/4-89/001). If the difference in survival between the control and the ACEC is less than 10 percent, the hypothesis test shall be conducted at the 0.01 level of significance.

D. Response to Noncompliance With an Effluent Limit for Acute Toxicity

If the Permittee violates the acute toxicity limit in subsection B, the Permittee shall begin additional compliance monitoring within one week from the time of receiving the test results. This additional monitoring shall be conducted weekly for four consecutive weeks using the same test and species as the failed compliance test. Testing shall determine the LC_{50} and effluent limit compliance. The discharger shall return to the original monitoring frequency in subsection C after completion of the additional compliance monitoring.

If the Permittee believes that a test indicating noncompliance will be identified by the Department as an anomalous test result, the Permittee may notify the Department that the compliance test result might be anomalous and that the Permittee intends to take only one additional sample for toxicity testing and wait for notification from the Department before completing the additional monitoring required in this subsection. The notification to the Department shall accompany the report of the compliance test result and identify the reason for considering the compliance test result to be anomalous. The Permittee shall complete all of the additional monitoring required in this subsection as soon as possible after notification by the Department that the compliance test result was not anomalous. If the one additional sample fails to comply with the effluent limit for acute toxicity, then the Permittee shall proceed without delay to complete all of the additional monitoring required in this subsection. The one additional test result shall replace the compliance test result upon determination by the Department that the compliance test result was anomalous.

If all of the additional compliance monitoring conducted in accordance with this subsection complies with the permit limit, the Permittee shall search all pertinent and recent facility records (operating records, monitoring results, inspection records, spill reports, weather records, production records, raw material purchases, pretreatment records, etc.) and submit a report to the Department on possible causes and preventive measures for the transient toxicity event which triggered the additional compliance monitoring.

If toxicity occurs in violation of the acute toxicity limit during the additional compliance monitoring, the Permittee shall submit a Toxicity Identification/Reduction Evaluation (TI/RE) plan to the Department. The TI/RE plan submittal shall be within 60 days after the sample date for the fourth additional compliance monitoring test. If the Permittee decides to forgo the rest of the additional compliance monitoring tests required in this subsection because one of the first three additional compliance monitoring tests failed to meet the acute toxicity limit, then the Permittee shall submit the TI/RE plan within 60 days after the sample date for the first additional monitoring test to violate the acute toxicity limit. The TI/RE plan shall be based on WAC 173-205-100(2) and shall be implemented in accordance with WAC 173-205-100(3).

E. Monitoring When There Is No Permit Limit for Acute Toxicity

The Permittee shall test final effluent once in the last summer and once in the last winter prior to submission of the application for permit renewal. All species used in the initial acute effluent characterization or substitutes approved by the Department shall be used and results submitted to the Department as a part of the permit renewal application process.

F. Sampling and Reporting Requirements

1. All reports for effluent characterization or compliance monitoring shall be submitted in accordance with the most recent version of Department of Ecology Publication #WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* in regards to format and content. Reports shall contain bench sheets and reference toxicant results for test methods. If the lab provides the toxicity test data on floppy disk for electronic entry into the Department's database, then the Permittee shall send the disk to the Department along with the test report, bench sheets, and reference toxicant results.

2. Testing shall be conducted on 24-hour composite effluent samples or grab samples. Composite samples taken for toxicity testing shall be cooled to 4 degrees Celsius while being collected and shall be sent to the lab immediately upon completion. Grab samples must be shipped on ice to the lab immediately upon collection. If a grab sample is received at the testing lab within one hour after collection, it must have a temperature below 20°C at receipt. If a grab sample is received at the testing lab within 4 hours after collection, it must be below 12°C at receipt. All other samples must be below 8°C at receipt. The lab shall begin the toxicity testing as soon as possible but no later than 36 hours after sampling was ended. The lab shall store all samples at 4°C in the dark from receipt until completion of the test.

3. All samples and test solutions for toxicity testing shall have water quality measurements as specified in Department of Ecology Publication #WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* or most recent version thereof.

4. All toxicity tests shall meet quality assurance criteria and test conditions in the most recent versions of the EPA manual listed in subsection A and the Department of Ecology Publication #WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria.* If test results are determined to be invalid or anomalous by the Department, testing shall be repeated with freshly collected effluent.

5. Control water and dilution water shall be laboratory water meeting the requirements of the EPA manual listed in subsection A or pristine natural water of sufficient quality for good control performance.

6. The whole effluent toxicity tests shall be run on an unmodified sample of final effluent.

7. The Permittee may choose to conduct a full dilution series test during compliance monitoring in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control. The series of concentrations must include the ACEC.

8. All whole effluent toxicity tests, effluent screening tests, and rapid screening tests that involve hypothesis testing, and do not comply with the acute statistical power standard of 29 percent as defined in WAC 173-205-020, must be repeated on a fresh sample with an increased number of replicates to increase the power.

S11. CHRONIC TOXICITY

A. Effluent Characterization

The Permittee shall conduct chronic toxicity testing on the final effluent. The two chronic toxicity tests listed below shall be conducted on each sample taken for effluent characterization.

Testing shall be conducted twice in the first year of the permit effective date with one test in the summer and one in the winter. Testing shall be completed and data submitted to Ecology by **September 15, 2004,** for the summer sampling and **April 15, 2005,** for the winter sampling. A summary report of the characterization data is due by **September 15, 2005.**

Effluent testing for chronic toxicity shall be conducted twice in one year. The Permittee shall conduct chronic toxicity testing during effluent characterization on a series of at least five concentrations of effluent in order to determine appropriate point estimates. This series of dilutions shall include the ACEC. The Permittee shall compare the ACEC to the control using hypothesis testing at the 0.05 level of significance as described in Appendix H, EPA/600/4-89/001.

Chronic toxicity tests shall be conducted with the following two species and the most recent version of the following protocols:

Freshwater Chronic Toxicity Test Species		Method
Fathead minnow	*Pimephales promelas*	EPA/600/4-91/002
Water flea	*Ceriodaphnia dubia*	EPA/600/4-91/002

B. Effluent Limit for Chronic Toxicity

After completion of effluent characterization, the Permittee has an effluent limit for chronic toxicity if any test conducted for effluent characterization shows a significant difference between the control and the ACEC at the 0.05 level of significance using hypothesis testing (Appendix H, EPA/600/4-89/001) and shall complete all applicable requirements in subsections C, D, and F.

If no significant difference is shown between the ACEC and the control in any of the chronic toxicity tests, the Permittee has no effluent limit for chronic toxicity and only subsections E and F apply.

The effluent limit for chronic toxicity is no toxicity detected in a test concentration representing the chronic critical effluent concentration (CCEC).

In the event of failure to pass the test described in subsection C, of this section, for compliance with the effluent limit for chronic toxicity, the Permittee is considered to be in compliance with all permit requirements for chronic whole effluent toxicity as long as the requirements in subsection D are being met to the satisfaction of the Department.

The CCEC means the maximum concentration of effluent allowable at the boundary of the mixing zone assigned in Section S1.B pursuant to WAC 173-201A-100. The CCEC equals 6 percent effluent.

C. Monitoring for Compliance with an Effluent Limit for Chronic Toxicity

Monitoring to determine compliance with the effluent limit shall be conducted twice a year for the remainder of the permit term using each of the species listed in subsection A on a rotating basis and performed using at a minimum the CCEC, the ACEC, and a control. The Permittee shall schedule the toxicity tests in the order listed in the permit unless the Department notifies the Permittee in writing of another species rotation schedule.

Compliance with the effluent limit for chronic toxicity means no statistically significant difference in response between the control and the test concentration representing the CCEC. The Permittee shall immediately implement subsection D if any chronic toxicity test conducted for compliance monitoring determines a statistically significant difference in response between the control and the CCEC using hypothesis testing at the 0.05 level of significance (Appendix H, EPA/600/4-89/001). If the difference in response between the control and the CCEC is less than 20 percent, the hypothesis test shall be conducted at the 0.01 level of significance.

In order to establish whether the chronic toxicity limit is eligible for removal from future permits, the Permittee shall also conduct this same hypothesis test (Appendix H, EPA/600/4-89/001) to determine if a statistically significant difference in response exists between the ACEC and the control.

D. Response to Noncompliance with an Effluent Limit for Chronic Toxicity

If a toxicity test conducted for compliance monitoring under subsection C determines a statistically significant difference in response between the CCEC and the control, the Permittee shall begin additional compliance monitoring within one week from the time of receiving the test results.. This additional monitoring shall be conducted monthly for three consecutive months using the same test and species as the failed compliance test. Testing shall be conducted using a series of at least five effluent concentrations and a control in order to be able to determine appropriate point estimates. One of these effluent concentrations shall equal the CCEC and be compared statistically to the nontoxic control in order to determine compliance with the effluent limit for chronic toxicity as described in subsection C. The discharger shall return to the original monitoring frequency in subsection C after completion of the additional compliance monitoring.

If the Permittee believes that a test indicating noncompliance will be identified by the Department as an anomalous test result, the Permittee may notify the Department that the compliance test result might be anomalous and that the Permittee intends to take only one additional sample for toxicity testing and wait for notification from the Department before completing the additional monitoring required in this subsection. The notification to the Department shall accompany the report of the compliance test result and identify the reason for considering the compliance test result to be anomalous. The Permittee shall complete all of the additional monitoring required in this subsection as soon as possible after notification by the Department that the compliance test result was not anomalous. If the one additional sample fails to comply with the effluent limit for chronic toxicity, then the Permittee shall proceed without delay to complete all of the additional monitoring required in this subsection. The one additional test result shall replace the compliance test result upon determination by the Department that the compliance test result was anomalous.

If all of the additional compliance monitoring conducted in accordance with this subsection complies with the permit limit, the Permittee shall search all pertinent and recent facility records (operating records, monitoring results, inspection records, spill reports, weather records, production records, raw material purchases, pretreatment records, etc.) and submit a report to the Department on possible causes and preventive measures for the transient toxicity event which triggered the additional compliance monitoring.

If toxicity occurs in violation of the chronic toxicity limit during the additional compliance monitoring, the Permittee shall submit a Toxicity Identification/Reduction Evaluation (TI/RE) plan to the Department. The TI/RE plan submittal shall be within 60 days after the sample date for the third additional compliance monitoring test. If the Permittee decides to forgo the rest of the additional compliance monitoring tests required in this subsection because one of the first two additional compliance monitoring tests failed to meet the chronic toxicity limit, then the Permittee shall submit the TI/RE plan within 60 days after the sample date for the first additional monitoring test to violate the chronic toxicity limit. The TI/RE plan shall be based on WAC 173-205-100(2) and shall be implemented in accordance with WAC 173-205-100(3).

E. <u>Monitoring When There Is No Permit Limit for Chronic Toxicity</u>

The Permittee shall test final effluent once in the last summer and once in the last winter prior to submission of the application for permit renewal. All species used in the initial chronic effluent characterization or substitutes approved by the Department shall be used and results submitted to the Department as a part of the permit renewal application process.

F. Sampling and Reporting Requirements

1. All reports for effluent characterization or compliance monitoring shall be submitted in accordance with the most recent version of Department of Ecology Publication #WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* in regards to format and content. Reports shall contain bench sheets and reference toxicant results for test methods. If the lab provides the toxicity test data on floppy disk for electronic entry into the Department's database, then the Permittee shall send the disk to the Department along with the test report, bench sheets, and reference toxicant results.

2. Testing shall be conducted on 24-hour composite effluent samples. Composite samples taken for toxicity testing shall be cooled to 4 degrees Celsius while being collected and shall be sent to the lab immediately upon completion. Grab samples must be shipped on ice to the lab immediately upon collection. If a grab sample is received at the testing lab within one hour after collection, it must have a temperature below 20°C at receipt. If a grab sample is received at the testing lab within 4 hours after collection, it must be below 12°C at receipt. All other samples must be below 8°C at receipt. The lab shall begin the toxicity testing as soon as possible but no later than 36 hours after sampling was ended. The lab shall store all samples at 4°C in the dark from receipt until completion of the test.

3. All samples and test solutions for toxicity testing shall have water quality measurements as specified in Department of Ecology Publication #WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* or most recent version thereof.

4. All toxicity tests shall meet quality assurance criteria and test conditions in the most recent versions of the EPA manual listed in subsection A and the Department of Ecology Publication #WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria.* If test results are determined to be invalid or anomalous by the Department, testing shall be repeated with freshly collected effluent.

5. Control water and dilution water shall be laboratory water meeting the requirements of the EPA manual listed in subsection A or pristine natural water of sufficient quality for good control performance.

6. The whole effluent toxicity tests shall be run on an unmodified sample of final effluent.

7. The Permittee may choose to conduct a full dilution series test during compliance monitoring in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control. The series of concentrations must include the ACEC and the CCEC.

8. All whole effluent toxicity tests, effluent screening tests, and rapid screening tests that involve hypothesis testing, and do not comply with the chronic statistical power standard of 39 percent as defined in WAC 173-205-020, must be repeated on a fresh sample with an increased number of replicates to increase the power.

S12. OUTFALL EVALUATION

The Permittee shall inspect, the submerged portion of the outfall line and any future attachments such as a diffuser to document its integrity and continued function. If conditions allow for a photographic verification, it shall be included in the report. By **October 15, 2007**, the inspection report shall be submitted to the Department.

GENERAL CONDITIONS

G1. SIGNATORY REQUIREMENTS

All applications, reports, or information submitted to the Department shall be signed and certified.

A. All permit applications shall be signed by either a principal executive officer or a ranking elected official.

B. All reports required by this permit and other information requested by the Department shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

1. The authorization is made in writing by a person described above and submitted to the Department.

2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

C. Changes to authorization. If an authorization under paragraph B.2 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph B.2 above must be submitted to the Department prior to or together with any reports, information, or applications to be signed by an authorized representative.

D. Certification. Any person signing a document under this section shall make the following certification:

> I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

G2. RIGHT OF INSPECTION AND ENTRY

The Permittee shall allow an authorized representative of the Department, upon the presentation of credentials and such other documents as may be required by law:

A. To enter upon the premises where a discharge is located or where any records must be kept under the terms and conditions of this permit.

B. To have access to and copy - at reasonable times and at reasonable cost - any records required to be kept under the terms and conditions of this permit.

C. To inspect - at reasonable times - any facilities, equipment (including monitoring and control equipment), practices, methods, or operations regulated or required under this permit.

D. To sample or monitor - at reasonable times - any substances or parameters at any location for purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act.

G3. PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated either at the request of any interested person (including the Permittee) or upon the Department's initiative. However, the permit may only be modified, revoked and reissued, or terminated for the reasons specified in 40 CFR 122.62, 122.64 or WAC 173-220-150 according to the procedures of 40 CFR 124.5.

A. The following are causes for terminating this permit during its term, or for denying a permit renewal application:

1. Violation of any permit term or condition.

2. Obtaining a permit by misrepresentation or failure to disclose all relevant facts.

3. A material change in quantity or type of waste disposal.

4. A determination that the permitted activity endangers human health or the environment, or contributes to water quality standards violations and can only be regulated to acceptable levels by permit modification or termination [40 CFR Part 122.64(3)].

5. A change in any condition that requires either a temporary or permanent reduction, or elimination of any discharge or sludge use or disposal practice controlled by the permit [40 CFR Part 122.64(4)].

6. Nonpayment of fees assessed pursuant to RCW 90.48.465.

7. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090.

B. The following are causes for modification but not revocation and reissuance except when the Permittee requests or agrees:

1. A material change in the condition of the waters of the state.

2. New information not available at the time of permit issuance that would have justified the application of different permit conditions.

3. Material and substantial alterations or additions to the permitted facility or activities which occurred after this permit issuance.

4. Promulgation of new or amended standards or regulations having a direct bearing upon permit conditions, or requiring permit revision.

5. The Permittee has requested a modification based on other rationale meeting the criteria of 40 CFR Part 122.62.

6. The Department has determined that good cause exists for modification of a compliance schedule, and the modification will not violate statutory deadlines.

7. Incorporation of an approved local pretreatment program into a municipality's permit.

C. The following are causes for modification or alternatively revocation and reissuance:

1. Cause exists for termination for reasons listed in A1 through A7 of this section, and the Department determines that modification or revocation and reissuance is appropriate.

2. The Department has received notification of a proposed transfer of the permit. A permit may also be modified to reflect a transfer after the effective date of an automatic transfer (General Condition G8) but will not be revoked and reissued after the effective date of the transfer except upon the request of the new Permittee.

G4. REPORTING PLANNED CHANGES

The Permittee shall, as soon as possible, but no later than sixty (60) days prior to the proposed changes, give notice to the Department of planned physical alterations or additions to the permitted facility, production increases, or process modification which will result in: 1) the permitted facility being determined to be a new source pursuant to 40 CFR 122.29(b); 2) a significant change in the nature or an increase in quantity of pollutants discharged; or 3) a significant change in the Permittee's sludge use or disposal practices. Following such notice, and the submittal of a new application or supplement to the existing application, along with required engineering plans and reports, this permit may be modified, or revoked and reissued pursuant to 40 CFR 122.62(a) to specify and limit any pollutants not previously limited. Until such modification is effective, any new or increased discharge in excess of permit limits or not specifically authorized by this permit constitutes a violation of the terms and conditions of this permit.

G5. PLAN REVIEW REQUIRED

Prior to constructing or modifying any wastewater control facilities, an engineering report and detailed plans and specifications shall be submitted to the Department for approval in accordance with Chapter 173-240 WAC. Engineering reports, plans, and specifications shall be submitted at least 180 days prior to the planned start of construction unless a shorter time is approved by the Department. Facilities shall be constructed and operated in accordance with the approved plans.

G6. COMPLIANCE WITH OTHER LAWS AND STATUTES

Nothing in this permit shall be construed as excusing the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G7. DUTY TO REAPPLY

The Permittee shall apply for permit renewal at least 180 days prior to the specified expiration date of this permit.

G8. TRANSFER OF THIS PERMIT

In the event of any change in control or ownership of facilities from which the authorized discharge emanate, the Permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the Department.

A. Transfers by Modification

Except as provided in paragraph (B) below, this permit may be transferred by the Permittee to a new owner or operator only if this permit has been modified or revoked and reissued under 40 CFR 122.62(b)(2), or a minor modification made under 40 CFR 122.63(d), to identify the new Permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

B. Automatic Transfers

This permit may be automatically transferred to a new Permittee if:

1. The Permittee notifies the Department at least 30 days in advance of the proposed transfer date.

2. The notice includes a written agreement between the existing and new Permittees containing a specific date transfer of permit responsibility, coverage, and liability between them.

3. The Department does not notify the existing Permittee and the proposed new Permittee of its intent to modify or revoke and reissue this permit. A modification under this subparagraph may also be minor modification under 40 CFR 122.63. If this notice is not received, the transfer is effective on the date specified in the written agreement.

G9. REDUCED PRODUCTION FOR COMPLIANCE

The Permittee, in order to maintain compliance with its permit, shall control production and/or all discharges upon reduction, loss, failure, or bypass of the treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails.

G10. REMOVED SUBSTANCES

Collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall not be resuspended or reintroduced to the final effluent stream for discharge to state waters.

G11. DUTY TO PROVIDE INFORMATION

The Permittee shall submit to the Department, within a reasonable time, all information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee shall also submit to the Department upon request, copies of records required to be kept by this permit.

G12. OTHER REQUIREMENTS OF 40 CFR

All other requirements of 40 CFR 122.41 and 122.42 are incorporated in this permit by reference.

G13. ADDITIONAL MONITORING

The Department may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G14. PAYMENT OF FEES

The Permittee shall submit payment of fees associated with this permit as assessed by the Department.

G15. PENALTIES FOR VIOLATING PERMIT CONDITIONS

Any person who is found guilty of willfully violating the terms and conditions of this permit shall be deemed guilty of a crime, and upon conviction thereof shall be punished by a fine of up to $10,000 and costs of prosecution, or by imprisonment in the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit shall incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to $10,000 for every such violation. Each and every such violation shall be a separate and distinct offense, and in case of a continuing violation, every day's continuance shall be deemed to be a separate and distinct violation.

G16. UPSET

Definition – "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of the following paragraph are met.

A Permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that: 1) an upset occurred and that the Permittee can identify the cause(s) of the upset; 2) the permitted facility was being properly operated at the time of the upset; 3) the Permittee submitted notice of the upset as required in Condition S3.E; and 4) the Permittee complied with any remedial measures required under S4.C of this permit.

In any enforcement proceeding the Permittee seeking to establish the occurrence of an upset has the burden of proof.

G17. PROPERTY RIGHTS

This permit does not convey any property rights of any sort, or any exclusive privilege.

G18. DUTY TO COMPLY

The Permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

G19. TOXIC POLLUTANTS

The Permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

G20. PENALTIES FOR TAMPERING

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two years per violation, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this Condition, punishment shall be a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or by both.

G21. REPORTING ANTICIPATED NON-COMPLIANCE

The Permittee shall give advance notice to the Department by submission of a new application or supplement thereto at least 180 days prior to commencement of such discharges, of any facility expansions, production increases, or other planned changes, such as process modifications, in the permitted facility or activity which may result in noncompliance with permit limits or conditions. Any maintenance of facilities, which might necessitate unavoidable interruption of operation and degradation of effluent quality, shall be scheduled during noncritical water quality periods and carried out in a manner approved by the Department.

G22. REPORTING OTHER INFORMATION

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to the Department, it shall promptly submit such facts or information.

G23. COMPLIANCE SCHEDULES

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

APPENDIX B

DMR SUMMARY

8.34

Month	Day	Flow (MGD)	Influent BOD (mg/l)	Influent BOD (lb/d))	Influent TSS (mg/l)	Influent TSS (lb/d)	Effluent BOD (mg/l)	Effluent BOD (lb/d))	Effluent TSS (mg/l)	Effluent TSS (lb/d)	BOD Removal (%)	TSS Removal (%)	Rainfall for Month (inches)	Total Ammonia mg/L
Jan-04		0.319	162	431	206	548	2.4	6	5.6	14.9	98.5%	97.3%		
														0.09
														0.66
														0.09
														0.09
														0.09
														0.09
														0.19
														0.36
														0.09
Feb-04		0.305	169	430	263	669	1.7	4	4.1	10.4	99.0%	98.4%		
														0.14
														0.1
														0.2
														0.15
														0.14
														0.14
														0.17
														0.12
Mar-04		0.233	211	410	319	620	2.2	4	3.8	7.4	99.0%	98.8%		
														0.26
														0.21
														0.16
														0.15
														0.1
														0.12
														0.1
														0.21
														0.1
Apr-04		0.201	227	381	350	587	1.2	2	1.3	2.2	99.5%	99.6%		
														0.09
														0.09
														0.09

													0.09
													0.09
													0.09
													0.09
													0.09
May-04	4	0.112	191	178	515	481	1	0.93	1	0.9	99.5%	99.8%	0.09
	5												0.13
	6	0.106	239	211	428	378	1	0.88	1.8	1.6	99.6%	99.6%	0.09
	11	0.121	256	258.	576	581	1.1	1.11	1.6	1.6	99.6%	99.7%	
	12												0.14
	13	0.107	276	246	554	494	1.4	1.25	1.4	1.2	99.5%	99.7%	
	14												0.15
	18	0.112	227	212	518	484	1.4	1.31	1.3	1.2	99.4%	99.7%	
	19												0.13
	20	0.11	205	188	282	259	1	0.92	2.3	2.1	99.5%	99.2%	
	21												0.09
	25	0.098	280	229	372	304	1.3	1.06	1.2	1.0	99.5%	99.7%	
	26												0.09
	27	0.147	186	228	312	383	1	1.23	2.9	3.6	99.5%	99.1%	
	28												0.09
Jun-04	1	0.106	136	120	303	268	1.3	1.15	1.5	1.3	99.0%	99.5%	
	2												0.09
	3	0.107	272	243	481	429	1.6	1.43	1.6	1.4	99.4%	99.7%	
	4												0.09
	8	0.116	156	151	287	278	1.2	1.16	1.8	1.7	99.2%	99.4%	
	9												0.09
	10	0.129	228	245	330	355	1	1.08	2	2.2	99.6%	99.4%	
	11												0.09
	15	0.111	184	170	379	351	1.3	1.20	2.3	2.1	99.3%	99.4%	
	16												0.09
	17	0.091	203	154	395	300	1.2	0.91	3	2.3	99.4%	99.2%	
	18												0.09
	22	0.113	173	163	280	264	1.4	1.32	1.5	1.4	99.2%	99.5%	
	23												0.26
	24	0.102	167	142	199	169	1.3	1.11	1.5	1.3	99.2%	99.2%	
	25												0.09

	29	0.104	163	141	322	279	1.4	1.21	3.1	2.7	99.1%	99.0%	
	30												0.09
Jul-04	1	0.1	254	212	341	284	1.7	1.42	1.9	1.6	99.3%	99.4%	
	2												1.7
	6	0.088	187	137	385	283	1.5	1.10	2.3	1.7	99.2%	99.4%	
	7												0.09
	8	0.116	193	187	245	237	1.6	1.55	2.5	2.4	99.2%	99.0%	
	9												0.1
	13	0.088	352	258	430	316	1.5	1.10	3	2.2	99.6%	99.3%	
	14												0.09
	15	0.102	260	221	281	239	1.4	1.19	3.1	2.6	99.5%	98.9%	
	16												0.09
	20	0.1	437	364	1210	1009	3	2.50	2.6	2.2	99.3%	99.8%	
	21												0.15
	22	0.089	216	160	250	186	4.2	3.12	2.4	1.8	98.1%	99.0%	
	23												0.09
	27	0.099	261	215	394	325	4.3	3.55	3.6	3.0	98.4%	99.1%	
	28												0.09
	29	0.108	227	204	262	236	3.6	3.24	2.2	2.0	98.4%	99.2%	
	30												0.02
Aug-04	3	0.104	281	244	296	257	3.6	3.12	2.6	2.3	98.7%	99.1%	
	4												0.19
	5	0.106	274	242	282	249	3.3	2.92	3.2	2.8	98.8%	98.9%	
	6												0.09
	10	0.101	169	142	284	239	2.4	2.02	2.5	2.1	98.6%	99.1%	
	11												0.1
	12	0.104	238	206	298	258	2.6	2.26	2.6	2.3	98.9%	99.1%	
	17	0.108	277	249	582	524	2.8	2.52	1.8	1.6	99.0%	99.7%	
	18												0.14
	19	0.106	236	209	373	330	2	1.77	1.9	1.7	99.2%	99.5%	
	20												0.13
	24	0.129	154	166	322	346	1.9	2.04	2.3	2.5	98.8%	99.3%	
	25												0.9
	26	0.151	209	263	341	429	1.8	2.27	1.4	1.8	99.1%	99.6%	
	27												0.09
	31	0.116	196	190	337	326	2.3	2.23	2	1.9	98.8%	99.4%	
	1												0.1

Sep-04	2	0.122	405	412	532	541	2	2.03	1.1	1.1	99.5%	99.8%	
	3												0.09
	7	0.115	264	253	344	330	2.1	2.01	0.4	0.4	99.2%	99.9%	
	8												0.1
	9	0.113	256	241	282	266	1.7	1.60	1.2	1.1	99.3%	99.6%	
	10												1.44
	14	0.129	280	301	244	263	2.1	2.26	1.8	1.9	99.3%	99.3%	
	15												0.09
	16	0.128	271	289	320	342	1.9	2.03	1.5	1.6	99.3%	99.5%	
	17												0.09
	21	0.136	218	247	274	311	1.6	1.81	2.1	2.4	99.3%	99.2%	
	22												0.13
	23	0.128	212	226	339	362	1.7	1.81	2.1	2.2	99.2%	99.4%	
	24												0.09
	28	0.119	239	237	283	281	1.9	1.89	1.6	1.6	99.2%	99.4%	
	30	0.122	237	241	347	353	1.4	1.42	1.4	1.4	99.4%	99.6%	0.09
	1												0.09
Oct-04	5	0.205	505	863	330	564	2	3.42	3.2	5.5	99.6%	99.0%	
	6												0.09
	7	0.205	185	316	348	595	1.3	2.22	1.8	3.1	99.3%	99.5%	
	8												0.14
	12	0.209	220	383	319	556	2.7	4.71	5.9	10.3	98.8%	98.2%	
	13												0.09
	14	0.213	193	343	251	446	1.2	2.13	2	3.6	99.4%	99.2%	
	15												0.09
	19	0.243	156	316	263	533	1.6	3.24	3.4	6.9	99.0%	98.7%	
	20												0.05
	21	0.212	219	387	268	474	1.3	2.30	2.6	4.6	99.4%	99.0%	
	22												0.08
	26	0.244	187	381	219	446	2.3	4.68	3.7	7.5	98.8%	98.3%	
	27												0.06
	28	0.228	163	310	240	456	1.7	3.23	4.1	7.8	99.0%	98.3%	
	29												0.02
Nov-04	2	0.318	157	416	273	724	1.5	3.98	3.7	9.8	99.0%	98.6%	
	3												0.09
	4	0.246	206	423	237	486	4.5	9.23	2.4	4.9	97.8%	99.0%	
	5												0.09

	9	0.22	274	503	264	484	1.6	2.94	1.8	3.3	99.4%	99.3%	
	10												0.09
	11	0.213	285	506	306	544	1.4	2.49	3	5.3	99.5%	99.0%	
	12												0.12
	16	0.223	200	372	324	603	1.4	2.60	1.6	3.0	99.3%	99.5%	
	17												0.09
	18	0.241	162	326	401	806	1.9	3.82	2.1	4.2	98.8%	99.5%	
	19												0.15
	22	0.226	197	371	341	643	2.1	3.96	2.2	4.1	98.9%	99.4%	
	23												0.2
	25	0.236	289	569	327	644	2.1	4.13	3	5.9	99.3%	99.1%	
	26												0.09
	30	0.238	322	639	422	838	1.4	2.78	2.2	4.4	99.6%	99.5%	
	1												0.09
Dec-04	2	0.241	218	438	313	629	1	2.01	1.9	3.8	99.5%	99.4%	
	3												0.21
	7	0.294	173	424	274	672	2	4.90	4.4	10.8	98.8%	98.4%	
	8												0.09
	9	0.311	180	467	325	843	2.1	5.45	3.4	8.8	98.8%	99.0%	
	10												0.09
	14	0.269	191	429	284	637	2.6	5.83	4.3	9.6	98.6%	98.5%	
	15												0.09
	16	0.246	292	599	331	679	2	4.10	2	4.1	99.3%	99.4%	
	17												0.15
	21	0.25	209	436	242	505	1.6	3.34	1.8	3.8	99.2%	99.3%	
	22												0.09
	23	0.243	229	464	315	638	1	2.03	2.2	4.5	99.6%	99.3%	
	24												0.09
	28	0.241	277	557	354	712	2.8	5.63	3.3	6.6	99.0%	99.1%	
	29												0.14
	30	0.233	392	762	237	461	2.4	4.66	1.9	3.7	99.4%	99.2%	
	31												0.09
Jan-05	4	0.259	153	330	338	730	1.7	3.67	1.6	3.5	98.9%	99.5%	0.28
	6	0.235	236	463	244	478	1.6	3.14	2	3.9	99.3%	99.2%	
	7												0.12
	11	0.238	222	441	278	552	1.4	2.78	2.2	4.4	99.4%	99.2%	

	12													0.03
	13	0.237	205	405	243	480	1.2	2.37	1.6	3.2	99.4%	99.3%		
	14													0.17
	18	0.282	340	800	294	691	2.6	6.11	4.2	9.9	99.2%	98.6%		
	19													0.03
	20	0.252	217	456	231	485	3	6.31	6.4	13.5	98.6%	97.2%		
	21													0.13
	25	0.252	217	456	275	578	2.6	5.46	1.5	3.2	98.8%	99.5%		
	26													0.03
	27	0.229	230	439	256	489	1.2	2.29	1.4	2.7	99.5%	99.5%	1.99	
	28													0.03
Feb-05	1	0.249	213	442	256	532	1.2	2.49	1.4	2.9	99.4%	99.5%		
	2													0.9
	3	0.243	245	497	253	513	1.7	3.45	1.3	2.6	99.3%	99.5%		
	4													0.13
	8	0.268	178	398	202	451	1	2.24	1.8	4.0	99.4%	99.1%		
	9													0.9
	10	0.245	212	433	275	562	1.9	3.88	1.7	3.5	99.1%	99.4%		
	11													0.03
	15	0.242	157	317	286	577	1.4	2.83	2	4.0	99.1%	99.3%		
	16													0.03
	17	0.227	244	462	397	752	1.6	3.03	1.9	3.6	99.3%	99.5%		
	18													0.03
	22	0.217	186	337	250	452	1.5	2.71	1.8	3.3	99.2%	99.3%		
	23													0.9
	24	0.22	335	615	405	743	1.9	3.49	2.7	5.0	99.4%	99.3%	1.2	
	25													1.38
Mar-05	1	0.227	262	496	275	521	1.4	2.65	2.2	4.2	99.5%	99.2%		
	2													0.1
	3	0.221	287	529	426	785	1.9	3.50	2.1	3.9	99.3%	99.5%		
	4													0.1
	8	0.211	166	292	95	167	1.2	2.11	2.7	4.8	99.3%	97.2%		
	9													0.14
	10	0.207	352	608	481	830	1.3	2.24	1.1	1.9	99.6%	99.8%		
	11													0.12
	15	0.225	255	479	294	552	1.5	2.81	1.6	3.0	99.4%	99.5%		
	16													0.14

	17	0.225	221	415	289	542	1.5	2.81	1.8	3.4	99.3%	99.4%		
	18													
	22	0.24	212	424	334	669	1.2	2.40	2.5	5.0	99.4%	99.3%		0.19
	23													
	24	0.237	160	316	271	536	1.7	3.36	1.7	3.4	98.9%	99.4%		0.1
	25													
	29	0.421	106	372	145	509	1.4	4.92	3.8	13.3	98.7%	97.4%		0.16
	30													
	31	0.298	108	268	108	268	1.6	3.98	1.9	4.7	98.5%	98.2%	4.34	0.08
	1													
Apr-05	5	0.282	121	285	175	412	1.5	3.53	2.5	5.9	98.8%	98.6%		0.14
	6													
	7	0.322	208	559	452	1214	2.1	5.64	2.6	7.0	99.0%	99.4%		0.11
	8													
	12	0.316	153	403	218	575	1.6	4.22	3.2	8.4	99.0%	98.5%		0.03
	13													
	14	0.282	185	435	260	611	1.5	3.53	2.7	6.4	99.2%	99.0%		0.03
	15													
	19	0.301	153	384	197	495	1	2.51	2.5	6.3	99.3%	98.7%		0.14
	20													
	21	0.268	215	481	276	617	1.7	3.80	2	4.5	99.2%	99.3%		0.11
	22													
	26	0.284	177	419	237	561	1.6	3.79	2.7	6.4	99.1%	98.9%		0.03
	27													
	28	0.255	216	459	270	574	1	2.13	1.9	4.0	99.5%	99.3%	3.26	0.1
	29													
May-05	3	0.252	201	422	248	521	1.7	3.57	4.3	9.0	99.2%	98.3%		0.14
	4													
	5	0.253	261	551	364	768	2.2	4.64	2.9	6.1	99.2%	99.2%		0.17
	6													
	10	0.408	177	602	210	715	1.4	4.76	3.5	11.9	99.2%	98.3%		0.13
	11													
	12	0.255	324	689	293	623	1.2	2.55	2.3	4.9	99.6%	99.2%		0.09
	13													
	17	0.271	341	771	354	800	1.7	3.84	3	6.8	99.5%	99.2%		0.1
	18													
	19	0.349	211	614	299	870	1.8	5.24	3.3	9.6	99.1%	98.9%		0.11

	20												0.09
	24	0.295	196	482	262	645	1.3	3.20	2.8	6.9	99.3%	98.9%	
	25												0.11
	26	0.228	201	382	325	618	1.4	2.66	3.3	6.3	99.3%	99.0%	
	27												0.09
	29												
	31	0.23	253	485	445	854	2.6	4.99	8.9	17.1	99.0%	98.0%	
	1												0.09
Jun-05	2	0.248	231	478	368	761	2.4	4.96	6.7	13.9	99.0%	98.2%	
	3												0.23
	7	0.228	309	588	374	711	1.8	3.42	4.1	7.8	99.4%	98.9%	
	8												0.11
	9	0.229	228	435	218	416	1.6	3.06	3.2	6.1	99.3%	98.5%	
	10												1.41
	14	0.243			523	1060			3.7	7.5		99.3%	
	15	0.243	358	726			1.9	3.85			99.5%		0.34
	16	0.231	350	674	582	1121	1.2	2.31	2.3	4.4	99.7%	99.6%	
	17												0.03
	21	0.217	331	599	449	813	1.6	2.90	4.1	7.4	99.5%	99.1%	
	22												0.09
	23	0.21	331	580	525	919	1.9	3.33	3	5.3	99.4%	99.4%	
	24												0.08
	28	0.224	358	669	595	1112	2.3	4.30	5.5	10.3	99.4%	99.1%	
	29												0.03
	30	0.219	272	497	406	742	2.2	4.02	3.1	5.7	99.2%	99.2%	
	31												0.18
Jul-05	5	0.202	383	645	408	687	1.6	2.70	2.4	4.0	99.6%	99.4%	
	6												0.2
	7	0.208	300	520	358	621	1.7	2.95	2.2	3.8	99.4%	99.4%	
	8												0.1
	12	0.21	239	419	389	681	1	1.75	3.1	5.4	99.6%	99.2%	
	13												0.15
	14	0.207	322	556	426	735	1.7	2.93	2.3	4.0	99.5%	99.5%	
	15												0.22
	19	0.196	320	523	521	852	1.3	2.13	2.9	4.7	99.6%	99.4%	
	20												0.03
	21	0.209	292	509	381	664	1.2	2.09	2.4	4.2	99.6%	99.4%	

	22												
	26	0.199	400	664	556	923	1.2	1.99	2.2	3.7	99.7%	99.6%	0.15
	27												
	28	0.209	273	476	453	790	1.1	1.92	0.9	1.6	99.6%	99.8%	0.13
	29												
Aug-05	2	0.207	343	592	433	748	1.4	2.42	2.1	3.6	99.6%	99.5%	0.13
	3												
	4	0.193	322	518	596	959	1	1.61	1.2	1.9	99.7%	99.8%	0.07
	5												
	9	0.215	345	620	556	999	1.4	2.52	2.6	4.7	99.6%	99.5%	0.05
	10												
	11	0.22	456	837	751	1378	1.3	2.39	1.1	2.0	99.7%	99.9%	0.02
	12												
	16	0.215	340	610	504	904	1.2	2.15	2.8	5.0	99.6%	99.4%	0.18
	17												
	18	0.216	292	526	378	681	1.1	1.98	2.3	4.1	99.6%	99.4%	0.34
	19												
	23	0.223	365	679	487	906	1.6	2.98	3.1	5.8	99.6%	99.4%	0.06
	24												
	25	0.199	243	403	495	822	7.4	12.28	2.3	3.8	97.0%	99.5%	0.11
	26												
	30	0.229	233	445	460	879	1.4	2.67	2.9	5.5	99.4%	99.4%	0.06
	31												
Sep-05	1	0.212	342	605	422	746	1.3	2.30	2	3.5	99.6%	99.5%	0.03
	2												
	6	0.228	354	673	734	1396	1.6	3.04	4.7	8.9	99.5%	99.4%	0.23
	7												
	8	0.224	274	512	717	1339	1.5	2.80	2.3	4.3	99.5%	99.7%	0
	9												
	13	0.23	356	683	548	1051	1.7	3.26	4	7.7	99.5%	99.3%	0.03
	14												
	15	0.242	302	610	536	1082	1.1	2.22	3.8	7.7	99.6%	99.3%	0.11
	16												
	20	0.248	288	596	517	1069	1.6	3.31	5	10.3	99.4%	99.0%	0.03
	21												
	22	0.246	289	593	398	817	1.9	3.90	2.9	5.9	99.3%	99.3%	0.09
	23												0.11

	27	0.232	181	350	491	950	1.1	2.13	3.3	6.4	99.4%	99.3%	
	28												0
	29	0.233	306	595	510	991	1.4	2.72	2.1	4.1	99.5%	99.6%	
	30												0.03
Oct-05	4	0.251	337	705	489	1024	1	2.09	1.8	3.8	99.7%	99.6%	
	5												0.15
	6	0.239	309	616	317	632	2.2	4.39	1.3	2.6	99.3%	99.6%	
	7												0.09
	11	0.242	352	710	337	680	1.2	2.42	1.3	2.6	99.7%	99.6%	
	12												0.03
	13	0.247	235	484	293	604	1.2	2.47	1.2	2.5	99.5%	99.6%	
	14												0.1
	18	0.237	239	472	434	858	1.7	3.36	1.7	3.4	99.3%	99.6%	
	19												0.18
	20	0.247	221	455	404	832	2.2	4.53	3.5	7.2	99.0%	99.1%	
	21												0.03
	25	0.246	239	490	381	782	1	2.05	1.3	2.7	99.6%	99.7%	
	26												0.03
	27	0.263	229	502	338	741	1.1	2.41	1.2	2.6	99.5%	99.6%	
	28												0.06
Nov-05	1	0.423	209	737	317	1118	1.7	6.00	3.8	13.4	99.2%	98.8%	
	2												0.03
	3	0.381	147	467	302	960	1	3.18	1.9	6.0	99.3%	99.4%	
	4												0.1
	8	0.297	240	594	269	666	1	2.48	1.6	4.0	99.6%	99.4%	
	9												0
	10	0.292	304	740	475	1157	1.1	2.68	2.1	5.1	99.6%	99.6%	
	11												0
	15	0.295	244	600	508	1250	1	2.46	1.9	4.7	99.6%	99.6%	
	16												0.05
	17	0.296	255	630	356	879	1	2.47	1.4	3.5	99.6%	99.6%	
	18												0.01
	21	0.28	214	500	371	866	1	2.34	1.1	2.6	99.5%	99.7%	
	22	0.267	377	839	379	844	2.1	4.68	1.7	3.8	99.4%	99.6%	0.05
	23												0.12
	29	0.4	261	871	550	1835	1	3.34	2.8	9.3	99.6%	99.5%	
	30												0

	1	0.351	218	638	491	1437	1.2	3.51	3.7	10.8	99.4%	99.2%	
	2												0.03
	6	0.286	263	627	587	1400	1.4	3.34	1.9	4.5	99.5%	99.7%	
	7												0.03
	8	0.274	260	594	376	859	2.5	5.71	2.0	4.6	99.0%	99.5%	
	9												0.06
	13	0.273	312	710	359	817	1.3	2.96	2.1	4.8	99.6%	99.4%	
	14												0.03
	15	0.271	268	606	375	848	1.3	2.94	1.7	3.8	99.5%	99.5%	
	16												0.15
	20	0.353	277	815	583	1716	1.6	4.71	3.3	9.7	99.4%	99.4%	
	21												0.03
	22	0.568	270	1279	215	1018	1.6	7.58	7.7	36.5	99.4%	96.4%	
	23												0.03
	27	0.533	185	822	368	1636	3.1	13.78	12.2	54.2	98.3%	96.7%	
	28												0.03
	29	0.488	138	562	266	1083	2.6	10.58	15.1	61.5	98.1%	94.3%	
	30												0.03
Jan-06	3	0.48	184	737	316	1265	2.5	10.01	6.6	26.4	98.6%	97.9%	
	4												0.03
	5	0.395	160	527	355	1169	2.2	7.25	6	19.8	98.6%	98.3%	
	6												0.03
	10	0.747	103	642	132	822	3.4	21.18	11.2	69.8	96.7%	91.5%	
	11												0.03
	12	0.523	132	576	198	864	3	13.09	8.1	35.3	97.7%	95.9%	
	13												0.16
	17	0.568	126	597	322	1525	2.9	13.74	9.2	43.6	97.7%	97.1%	
	18												0.11
	19	0.419	136	475	319	1115	2.6	9.09	7.3	25.5	98.1%	97.7%	
	20												0.46
	24	0.337	219	616	377	1060	3.3	9.27	4.2	11.8	98.5%	98.9%	
	25												0.03
	26	0.344	171	491	300	861	2.5	7.17	4.2	12.0	98.5%	98.6%	
	27												0.23
	31	0.575	128	614	179	858	3.2	15.35	7.7	36.9	97.5%	95.7%	
	1												0.98
Feb-06	2	0.51	112	476	170	723	2.8	11.91	6.6	28.1	97.5%	96.1%	

	3												0.11
	7	0.36	186	558	194	582	3	9.01	1.7	5.1	98.4%	99.1%	
	8												0.32
	9	0.329	264	724	290	796	4.9	13.44	5.2	14.3	98.1%	98.2%	
	10												0.02
	14	0.288	247	593	582	1398	3	7.21	4.3	10.3	98.8%	99.3%	
	15												0
	16	0.289	380	916	403	971	3.5	8.44	3.7	8.9	99.1%	99.1%	
	17												0
	21	0.287	215	515	324	776	1.9	4.55	3.9	9.3	99.1%	98.8%	
	22												0.99
	23	0.276	420	967	334	769	3.3	7.60	3.3	7.6	99.2%	99.0%	
	24												0.13
	28	0.371	185	572	278	860	1.9	5.88	4.4	13.6	99.0%	98.4%	
	1												0.03
Mar-06	2	0.303	284	718	322	814	3.4	8.59	4.1	10.4	98.8%	98.7%	
	3												0
	7	0.299	357	890	425	1060	3	7.48	7.8	19.5	99.2%	98.2%	
	8												0.19
	9	0.414	205	708	208	718	5.2	17.95	6.8	23.5	97.5%	96.7%	
	10												0.12
	14	0.32	205	547	294	785	1.2	3.20	6.4	17.1	99.4%	97.8%	
	15												0.07
	16	0.358	294	878	307	917	5	14.93	6.2	18.5	98.3%	98.0%	
	17												0
	21	0.31	347	897	478	1236	2	5.17	5.4	14.0	99.4%	98.9%	
	22												0.09
	23	0.279	376	875	333	775	3.2	7.45	3.4	7.9	99.1%	99.0%	
	24												0
	28	0.271	367	829	472	1067	2.2	4.97	5.4	12.2	99.4%	98.9%	
	29												0
	30	0.274	286	654	312	713	3.1	7.08	3.7	8.5	98.9%	98.8%	
	31												0
Apr-06	4	0.264	396	872	333	733	2.5	5.50	3	6.6	99.4%	99.1%	
	5												0.04
	6	0.251	578	1210	661	1384	2.8	5.86	2.4	5.0	99.5%	99.6%	
	7												0.03

	11	0.323	339	913	372	1002	1.8	4.85	2.5	6.7	99.5%	99.3%	
	12												0.09
	13	0.308	354	909	347	891	2.2	5.65	2.3	5.9	99.4%	99.3%	
	14												0.03
	18	0.298	287	713	441	1096	1.8	4.47	2.5	6.2	99.4%	99.4%	
	19												0.03
	20	0.275	318	729	283	649	2.9	6.65	2	4.6	99.1%	99.3%	
	22												0.03
	25	0.256	246	525	261	557	1.5	3.20	3.1	6.6	99.4%	98.8%	
	26												0.03
	27	0.24	313	627	270	540	1.9	3.80	1.6	3.2	99.4%	99.4%	
	28												0
May-06	2	0.264	302	665	326	718	1.8	3.96	2.5	5.5	99.4%	99.2%	
	3												0.15
	4	0.25	373	778	281	586	3.1	6.46	2.5	5.2	99.2%	99.1%	
	5												0.17
	9	0.259	187	404	321	693	0.4	0.86	2.4	5.2	99.8%	99.3%	
	10												0.13
	11	0.262	415	907	436	953	3	6.56	3.7	8.1	99.3%	99.2%	
	12												0.05
	16	0.222	270	500	336	622	1.4	2.59	3	5.6	99.5%	99.1%	
	17												0.03
	18	0.239	322	642	294	586	3	5.98	2.4	4.8	99.1%	99.2%	
	19												0.06
	23	0.281	362	848	473	1108	1.2	2.81	1.9	4.5	99.7%	99.6%	
	24												0
	25	0.293	218	533	200	489	3.8	9.29	2.2	5.4	98.3%	98.9%	
	26												0
	30	0.258	248	534	412	887	0.7	1.51	1.7	3.7	99.7%	99.6%	
	31												0
Jun-06	1	0.272	380	862	451	1023	3.8	8.62	2.4	5.4	99.0%	99.5%	
	2												0.03
	6	0.258	328	706	483	1039	2.3	4.95	2.8	6.0	99.3%	99.4%	
	7												0.27
	8	0.251	381	798	337	705	3.5	7.33	3.2	6.7	99.1%	99.1%	
	9												0.09
	13	0.247	285	587	396	816	1.5	3.09	3.2	6.6	99.5%	99.2%	

14														0.12
15	0.245	288	588	181	370	3.9	7.97	3.0	6.1	98.6%	98.3%			
16														0.09
20	0.241	343	689	344	691	3.3	6.63	5.3	10.7	99.0%	98.5%			
21														0.04
22	0.240	253	506	168	336	3.3	6.61	2.7	5.4	98.7%	98.4%			
23														0.11
27	0.229	413	789	613	1171	2.9	5.54	4.6	8.8	99.3%	99.2%			
28														0.1
29	0.236	438	862	840	1653	3.8	7.48	4.4	8.7	99.1%	99.5%		0.59	
30														0.13
7/1/2006	0.222													
7/2/2006	0.238													
7/3/2006	0.240													
7/4/2006	0.246	366	751	495	1016	1.5	3.10	4.4	9.0	99.6%	99.1%			
7/5/2006	0.249													0.16
7/6/2006	0.239	480	957	844	1682	2.9	5.80	1.6	3.2	99.4%	99.8%			
7/7/2006	0.234													0.03
7/8/2006	0.222													
7/9/2006	0.233													
7/10/2006	0.240													
7/11/2006	0.235	364	713	440	862	1.4	2.70	3.6	7.1	99.6%	99.2%			
7/12/2006	0.251													0.03
7/13/2006	0.233	436	847	454	882	3.0	5.80	3.4	6.6	99.3%	99.3%			
7/14/2006	0.235													0.06
7/15/2006	0.223													
7/16/2006	0.238													
7/17/2006	0.241													
7/18/2006	0.243	329	667	374	758	2.9	5.90	3.1	6.3	99.1%	99.2%			
7/19/2006	0.229													0.03
7/20/2006	0.225	325	610	373	700	2	3.8	2.7	5.1	99.4%	99.3%			
7/21/2006	0.207													0.12
7/22/2006	0.218													
7/23/2006	0.223													
7/24/2006	0.228													
7/25/2006	0.232	331	640	393	760	4.8	9.30	2.9	5.6	98.5%	99.3%			
7/26/2006	0.225													0.03

7/27/2006	0.234	216	422	132	258	1.8	3.50	2.9	5.7	99.2%	97.8%	
7/28/2006	0.239											0.03
7/29/2006	0.235											
7/30/2006	0.246											
7/31/2006	0.244											
8/1/2006	0.236	231	455	371	730	0.7	1.40	2.7	5.3	99.7%	99.3%	
8/2/2006	0.233											0.03
8/3/2006	0.234	353	689	595	1161	1.2	2.30	3.9	7.6	99.7%	99.3%	
8/4/2006	0.229											0.03
8/5/2006	0.236											
8/6/2006	0.246											
8/7/2006	0.243											
8/8/2006	0.232	224	433	304	588	2.0	3.90	0.8	1.5	99.1%	99.7%	0.03
8/9/2006	0.238											
8/10/2006	0.241	367	738	395	794	2.0	4.00	2.6	5.2	99.5%	99.3%	0.03
8/11/2006	0.237											
8/12/2006	0.244											
8/13/2006	0.239											
8/14/2006	0.239											
8/15/2006	0.233	242	470	380	738	2.0	3.90	1.4	2.7	99.2%	99.6%	0.04
8/16/2006	0.238											
8/17/2006	0.240	289	578	236	472	2.0	4.00	1.7	3.4	99.3%	99.3%	0.13
8/18/2006	0.231											
8/19/2006	0.242											
8/20/2006	0.253											
8/21/2006	0.244											
8/22/2006	0.253	459	968	504	1063	2.0	4.20	2.8				0.03
8/23/2006	0.260											
8/24/2006	0.270	355	799	367	826	1.3	2.90	2.7	6.1	99.6%	99.3%	0.03
8/25/2006	0.249											
8/26/2006	0.230											
8/27/2006	0.245											
8/28/2006	0.250											
8/29/2006	0.258	567	1220	457	983	1.8	3.90	1.7	3.7	99.7%	99.6%	0.03
8/30/2006	0.277											
8/31/2006	0.264	308	678	192	423	2.4	5.30	1.6	3.5	99.2%	99.2%	
9/1/2006	0.242											0.03

9/2/2006	0.216											
9/3/2006	0.236											
9/4/2006	0.282											
9/5/2006	0.263	313	687	366	803	2.2	4.80	3.1	6.8	99.3%	99.2%	
9/6/2006	0.260											0.03
9/7/2006	0.274	370	846	448	1024	1.0	2.30	3.5	8.0	99.7%	99.2%	
9/8/2006	0.265											0.03
9/9/2006	0.263											
9/10/2006	0.275											
9/11/2006	0.276											
9/12/2006	0.256	484	1033	493	1053	3.2	6.80	7.5	16.0	99.3%	98.5%	
9/13/2006	0.276											0.03
9/14/2006	0.249	348	723	244	507	3.6	7.50	6.2	12.9	99.0%	97.5%	
9/15/2006	0.280											0.03
9/16/2006	0.280											
9/17/2006	0.287											
9/18/2006	0.292											
9/19/2006	0.279	481	1119	413	961	4.2	9.80	7.2	16.8	99.1%	98.3%	
9/20/2006	0.317											0.03
9/21/2006	0.290	350	847	445	1076	3.0	7.30	4.9	11.9	99.1%	98.9%	
9/22/2006	0.281											0.03
9/23/2006	0.272											
9/24/2006	0.262											
9/25/2006	0.263											
9/26/2006	0.262	447	977	394	861	2.6	5.70	2.7	5.9	99.4%	99.3%	
9/27/2006	0.264											0.03
9/28/2006	0.261	304	662	191	416	1.9	4.10	2.2	4.8	99.4%	98.8%	
9/29/2006	0.268											0.03
9/30/2006	0.265											
10/1/2006	0.292											
10/2/2006	0.289											
10/3/2006	0.285	479	1139	584	1388	1.7	4.00	2.4	5.7	99.6%	99.6%	
10/4/2006	0.287											0.03
10/5/2006	0.278	298	691	230	533	2.0	4.60	1.7	3.9	99.3%	99.3%	
10/6/2006	0.283											0.03
10/7/2006	0.266											
10/8/2006	0.297											

10/9/2006	0.289												
10/10/2006	0.287	449	1075	555	1328	2.0	4.80	2.4	5.7	99.6%	99.6%		
10/11/2006	0.273												0.03
10/12/2006	0.276	565	1301	914	2104	2.1	4.80	2.0	4.6	99.6%	99.8%		
10/13/2006	0.283												0.03
10/14/2006	0.286												
10/15/2006	0.324												
10/16/2006	0.317												
10/17/2006	0.283	506	1194	702	1657	2.2	5.20	2.3	5.4	99.6%	99.7%		
10/18/2006	0.290												0.03
10/19/2006	0.330	290	798	260	716	1.9	5.20	2.0	5.5	99.3%	99.2%		
10/20/2006	0.275												0.03
10/21/2006	0.279												
10/22/2006	0.286												
10/23/2006	0.293												
10/24/2006	0.278	317	735	252	584	2.4	5.60	2.2	5.1	99.2%	99.1%		
10/25/2006	0.281												0.03
10/26/2006	0.276	420	967	366	842	1.9	4.40	1.4	3.2	99.5%	99.6%		
10/27/2006	0.277												0.03
10/28/2006	0.290												
10/29/2006	0.298												
10/30/2006	0.297												
10/31/2006	0.284	315	746	232	550	3.2	7.60	2.2	5.2	99.0%	99.1%		
Avg	0.249	271	546	367	732	2.0	4.23	3.0	7.1	99.2%	99.0%	2.276	0.13
Max	0.747	578	1301	1210	2104	7.4	21.18	15.1	69.8	99.8%	99.9%	4.340	1.70
Avg Summer '06	0.248	356	740	403	834	2.5	5.21	3.3	6.9	99.3%	99.1%	0.590	0.06
Avg Winter '05 to '06	0.316	227	568	323	832	2.0	5.64	3.6	11.5	99.0%	98.7%	1.595	0.17
Sept and Oct '06	0.278	396	914	417	965	2.4	5.56	3.3	7.5	99.4%	99.1%		0.03

APPENDIX C

ACTIVATED SLUDGE MODELING RESULTS

Results	Units	Actual Winter Results	Winter Model Results
DO in Anoxic Reactor	mg/L	NA	1
Settling Behavior (0-1; 1 is good)	-	NA	0.2
WAS	mgd	0.009	0.014
MLSS	mg/L	2710	2709
Effluent BOD_5	mg/L	5.6	4.196
Effluent Ammonia	mg/L	0.17	3.01
Effluent TSS	mg/L	11.5	13.08

NA: Not Available

Wastewater Influent
bodbased
Influent Composition

Influent Composition	
total carbonaceous BOD5	227 [mgO2/L]
total suspended solids	323 [mg/L]
total TKN	57 [mgN/L]
Organic Variables	
soluble inert organic material	30 [mgCOD/L]
active heterotrophic biomass	0 [mgCOD/L]
active autotrophic biomass	0 [mgCOD/L]
unbiodegradable particulates from cell decay	0 [mgCOD/L]
internal cell storage product	0 [mgCOD/L]
Dissolved Oxygen	
dissolved oxygen	0 [mgO2/L]
Nitrogen Compounds	
nitrate and nitrite	0 [mgN/L]
dinitrogen	0 [mgN/L]
Alkalinity	
alkalinity	350 [mgCaCO3/L]
Influent Stoichiometry	
Local Model Selection	
base composite variables on ...	Mantis
Influent Fractions	
XCOD/VSS ratio	1.42 [mgCOD/mgVSS]
BOD5/BODultimate ratio	0.66 [-]
Mantis Nutrient Fractions	
N content of active biomass	0.068 [mgN/mgCOD]
N content of endogenous/inert mass	0.015 [mgN/mgCOD]
BODbased Model Coefficients	
soluble substrate/BODultimate	0.3 [-]
ammonium/TKN ratio	0.667 [-]
part. org. N/total org. N ratio	0.9 [-]
VSS/TSS ratio	0.85 [mgVSS/mgTSS]

Plug-Flow Tank
mantis
Physical
Dimensions

number of reactors	2
individual volumes	0.048 [MG(US)]
	0.175

Operational
Aeration Control

DO setpoint	1
	2

Stoichiometry

Organic Fractions	
XCOD/VSS	1.42 [mgCOD/mgVSS]
BOD5/BODultimate ratio	0.66 [-]
Nutrient Fractions	
N content of active biomass	0.068 [mgN/mgCOD]
N content of endogenous/inert mass	0.068 [mgN/mgCOD]
P content of active biomass	0.021 [mgP/mgCOD]
P content of endogenous/inert mass	0.021 [mgP/mgCOD]
Active Heterotrophic Biomass	
heterotrophic yield	0.666 [mgCOD/mgCOD]
heterotrophic endogenous fraction	0.08 [mgCOD/mgCOD]
Active Autotrophic Biomass	
autotrophic yield	0.15 [gCOD/gN]
autotrophic endogenous fraction	0.08 [mgCOD/mgCOD]

Kinetic

Active Heterotrophic Biomass	
heterotrophic maximum specific growth rate	6 [1/d]
readily biodegradable substrate half saturation coefficient	10 [mgCOD/L]
aerobic oxygen half saturation coefficient	0.2 [mgO2/L]
anoxic oxygen half saturation coefficient	0.2 [mgO2/L]
anoxic growth factor	0.8 [-]
nitrate half saturation coefficient	0.5 [mgN/L]
ammonia (as nutrient) half saturation coefficient	0.05 [mgN/L]
heterotrophic decay rate	0.62 [1/d]
Active Autotrophic Biomass	
autotrophic maximum specific growth rate	0.8 [1/d]
ammonia (as substrate) half saturation coefficient	0.74 [mgN/L]
oxygen half saturation coefficient	0.5 [mgO2/L]
autotrophic decay rate	0.08 [1/d]
Hydrolysis	
maximum specific hydrolysis rate	2.81 [1/d]
slowly biodegradable substrate half saturation coefficient	0.15 [mgCOD/mgCOD]
anoxic hydrolysis factor	0.6 [-]
Ammonification	
ammonification rate	0.016 [L/(mgCOD·d)]
Temperature	
Temperature coefficient for muh	1.07 [-]
Temperature coefficient for bh	1.04 [-]
Temperature coefficient for mua	1.07 [-]
Temperature coefficient for ba	1.04 [-]
Temperature coefficient for kh	1.07 [-]
Temperature coefficient for ka	1.03 [-]

Circular Secondary Clarifier
simple1d
Physical
Clarifier Type

clarifier type	Sloping Bottom
number of layers	10

Input Required for All Types of Clarifiers

feed point from bottom	3.28 [ft]

Sloping Bottom Clarifier Input

surface	1960 [ft2]
water depth at sidewall	14 [ft]
water depth at center	16 [ft]

Operational
Underflow

underflow rate	0.111 [Mgal/d(US)]

Pumped Flow

pumped flow	0.014 [MGD(US)]

Settling
Double Exponential Parameters

use SVI to estimate settling parameters	On
sludge volume index	127 [mL/g]
clarification (0 - bad, 1 - good)	0.2 [-]
maximum settling velocity	6720 [gal(US)/(ft2·d)]
maximum Vesilind settling velocity	10100 [gal(US)/(ft2·d)]
hindered zone settling parameter	0.0004 [L/mgTSS]
flocculant zone settling parameter	0.0025 [L/mgTSS]
non-settleable fraction	0.001 [-]
maximum non-settleable solids	20 [mgTSS/L]

Flow Distribution

quiescent zone maximum upflow velocity	2450 [gal(US)/(ft2·d)]
complete mix maximum upflow velocity	7360 [gal(US)/(ft2·d)]

Wastewater Influent
bodbased

Influent Composition	
total carbonaceous BOD5	212 [mgO2/L]
total suspended solids	212 [mg/L]
total TKN	53 [mgN/L]
Organic Variables	
soluble inert organic material	30 [mgCOD/L]
active heterotrophic biomass	0 [mgCOD/L]
active autotrophic biomass	0 [mgCOD/L]
unbiodegradable particulates from cell decay	0 [mgCOD/L]
internal cell storage product	0 [mgCOD/L]
Dissolved Oxygen	
dissolved oxygen	0 [mgO2/L]
Nitrogen Compounds	
nitrate and nitrite	0 [mgN/L]
dinitrogen	0 [mgN/L]
Alkalinity	
alkalinity	350 [mgCaCO3/L]
Influent Stoichiometry	
Local Model Selection	
base composite variables on ...	Mantis
Influent Fractions	
XCOD/VSS ratio	1.42 [mgCOD/mgVSS]
BOD5/BODultimate ratio	0.66 [-]
Mantis Nutrient Fractions	
N content of active biomass	0.068 [mgN/mgCOD]
N content of endogenous/inert mass	0.015 [mgN/mgCOD]
BODbased Model Coefficients	
soluble substrate/BODultimate	0.3 [-]
ammonium/TKN ratio	0.667 [-]
part. org. N/total org. N ratio	0.9 [-]
VSS/TSS ratio	0.85 [mgVSS/mgTSS]

Circular Secondary Clarifier
simple1d
Physical

Clarifier Type	
clarifier type	Sloping Bottom
number of layers	10
Input Required for All Types of Clarifiers	
feed point from bottom	3.28 [ft]
Sloping Bottom Clarifier Input	
surface	3928 [ft2]
water depth at sidewall	14 [ft]
water depth at center	16 [ft]
Operational	
Underflow	
underflow rate	.525 [Mgal/d(US)]
Pumped Flow	
pumped flow	0.0175 [MGD(US)]
Settling	
Double Exponential Parameters	
use SVI to estimate settling parameters	On
sludge volume index	127 [mL/g]
clarification (0 - bad, 1 - good)	0.2 [-]
maximum settling velocity	6720 [gal(US)/(ft2·d)]
maximum Vesilind settling velocity	10100 [gal(US)/(ft2·d)]
hindered zone settling parameter	0.0004 [L/mgTSS]
flocculant zone settling parameter	0.0025 [L/mgTSS]
non-settleable fraction	0.001 [-]
maximum non-settleable solids	20 [mgTSS/L]
Flow Distribution	
quiescent zone maximum upflow velocity	2450 [gal(US)/(ft2·d)]
complete mix maximum upflow velocity	7360 [gal(US)/(ft2·d)]

Plug-Flow Tank
mantis
Physical
Dimensions

number of reactors	2

Individual Volumes

individual volumes	0.048 [MG(US)]
	0.35

Operational
Aeration Control

DO setpoint	0
	2

Stoichiometry
Organic Fractions

XCOD/VSS	1.42 [mgCOD/mgVSS]
BOD5/BODultimate ratio	0.66 [-]

Nutrient Fractions

N content of active biomass	0.068 [mgN/mgCOD]
N content of endogenous/inert mass	0.068 [mgN/mgCOD]
P content of active biomass	0.021 [mgP/mgCOD]
P content of endogenous/inert mass	0.021 [mgP/mgCOD]

Active Heterotrophic Biomass

heterotrophic yield	0.666 [mgCOD/mgCOD]
heterotrophic endogenous fraction	0.08 [mgCOD/mgCOD]

Active Autotrophic Biomass

autotrophic yield	0.15 [gCOD/gN]
autotrophic endogenous fraction	0.08 [mgCOD/mgCOD]

Kinetic
Active Heterotrophic Biomass

heterotrophic maximum specific growth rate	6 [1/d]
readily biodegradable substrate half saturation coefficient	10 [mgCOD/L]
aerobic oxygen half saturation coefficient	0.2 [mgO2/L]
anoxic oxygen half saturation coefficient	0.2 [mgO2/L]
anoxic growth factor	0.8 [-]
nitrate half saturation coefficient	0.5 [mgN/L]
ammonia (as nutrient) half saturation coefficient	0.05 [mgN/L]
heterotrophic decay rate	0.62 [1/d]

Active Autotrophic Biomass

autotrophic maximum specific growth rate	0.8 [1/d]
ammonia (as substrate) half saturation coefficient	0.74 [mgN/L]
oxygen half saturation coefficient	0.5 [mgO2/L]
autotrophic decay rate	0.08 [1/d]

Hydrolysis

maximum specific hydrolysis rate	2.81 [1/d]
slowly biodegradable substrate half saturation coefficient	0.15 [mgCOD/mgCOD]
anoxic hydrolysis factor	0.6 [-]

Ammonification

ammonification rate	0.016 [L/(mgCOD·d)]

Temperature

Temperature coefficient for muh	1.07 [-]
Temperature coefficient for bh	1.04 [-]
Temperature coefficient for mua	1.07 [-]
Temperature coefficient for ba	1.04 [-]
Temperature coefficient for kh	1.07 [-]
Temperature coefficient for ka	1.03 [-]

APPENDIX D

HAND PROCESS CALCULATIONS – EXCEL SPREADSHEETS

Ridgefield WWTP Design Calculations (BOD:TSS=1)

Maximum Month Flow-Maximum Month Load Conditions

Design Year	Existing	Cap. Analysis	Units	Equation	Comments
Influent Flows					
Annual Average Flow	0.45	0.45	mgd		
Maximum Month Flow	0.7	0.7	mgd		
Peak Day Flow	1.1	1.1	mgd		
Peak Hour Flow	1.5	1.5	mgd		
Influent Loading					
MM BOD	1083	1240	lb/day		
MM BOD	186	212	mg/L		At MMF
MM TSS	1083	1240	lb/day		
MM TSS	186	212	mg/L		At MMF
MM NH4-N	181	207	lb/day		
MM NH4-N	31	35	mg/L		At MMF
MM TKN	271	310	lb/day		
MM TKN	46	53	mg/L		At MMF
Additional Parameters					
COD	2,383	2,728	lb/day	Assumes COD/BOD_5 Ratio =	2.2
bCOD (biodegradable COD)	1,776	2,034	lb/day	Assumes bCOD/BOD_5 Ratio =	1.64
nbCOD (non-biodegradable COD)	606	694	lb/day	[COD] - [bCOD]	
$sBOD_5$ (soluble BOD_5)	542	620	lb/day	Assumes $sBOD_5$/BOD_5 Ratio =	0.5
rbCOD (readily biodegradable COD)	542	620	lb/day	Assumes rbCOD = $sBOD_5$	
sCOD (soluble COD)	953	1,091	lb/day	Assumes sCOD/COD ratio =	0.4
$sCOD_e$ (effluent soluble COD)	87	99	lb/day	sCOD - (1.6*$sBOD_5$)	
VSS	812	930	lb/day	Assumes VSS/TSS Ratio =	0.75
nbVSS (non-biodegradable VSS)	308	352	lb/day	VSS*{1-[(bCOD/BOD)*(BOD-sBOD)/(COD-sCOD)]}	
*i*TSS (inert TSS)	271	310	lb/day	TSS - VSS	
TKN	271	310	lb/day		
nbTKN (non-biodegradable TKN)	14	16	lb/day	Assumes nbTKN/TKN Ratio =	0.05
bTKN (biodegradable TKN)	257	295	lb/day	TKN - nbTKN	
Assumptions:					
Y_H (heterotrophic yield)	0.4	0.4	lb/lb		Typ. Per M&E Table 8-10
Y_n (autotrophic yield)	0.12	0.12	lb/lb		Typ. Per M&E Table 8-11

Ridgefield WWTP Design Calculations (BOD:TSS=1)

Maximum Month Flow-Maximum Month Load Conditions

Design Year	Existing	Cap. Analysis	Units	Equation	Comments
f_d (fraction of cell mass remaining as cell debris)	0.15	0.15	lb/lb		Typ. Per M&E Table 8-10
$k_{d,20}$ (endogenous heterotrophic decay coefficient)	0.12	0.12	d^{-1}		Typ. Per M&E Table 8-10
$k_{dn,20}$ (endogenous nitrogenous decay coefficient)	0.08	0.08	d^{-1}		Edited 11/3/07 to match M&E typ. Value
$\mu_{m, max, 20}$ (heterotrophic growth rate)	6.0	6.0	g/g*d		Typ. Per M&E Table 8-10
$\mu_{n, max, 20}$ (autotrophic growth rate)	0.9	0.9	d-1		Max. per M&E Table 8-11 (.2-.9)
K_s (substrate half-saturation coefficient)	20	20	g/m^3		Typ. Per M&E Table 8-10
$K_{n,20}$ (ammonia half-saturation coefficient)	0.74	0.74	g/m^3		Range per M&E Table 8-11 (.5-1.0)
K_o (oxygen half-saturation coefficient)	0.5	0.5	g/m^3		Typ. Per M&E Table 8-11
Kinetic and Stoichiometric Constants					
Design Temperature T	13	13	°C		Max temp = 20.5C per effluent mixing studies
$\mu_{m, max, t}$ (heterotrophic growth rate)	3.74	3.74	g/g*d	$\mu_{m,max,20}$ * 1.07^(T-20)	
$k_{d,t}$ (endogenous heterotrophic decay coefficient)	0.091	0.091	d^{-1}	$k_{d,20}$ * 1.04^(T-20)	
$\mu_{n, max, t}$ (autotrophic growth rate)	0.553	0.553	g/g*d	$\mu_{n,max,20}$ * 1.072^(T-20)	
$k_{dn,t}$ (endogenous nitrogenous decay coefficient)	0.0608	0.0608	d^{-1}	$k_{dn,20}$ * 1.04^(T-20)	
$K_{n,t}$ (ammonia half-saturation coefficient)	0.516	0.516	g/m^3	$K_{n,20}$ * 1.053^(T-20)	
SRT Required					
N	1	1	mg/L	Assumed Effluent NH4-N Conc.	
DO	2	2	mg/L	Reactor DO Conc.	
μ_n	0.231	0.231	g/g*d	$\mu_n=\mu_{n,max}$*(N/K_N+N)*(DO/K_o+DO)-k,dn	
SF	2	2		Peaking and Safety Factor	
$SRT_{ox,reqd}$	8.6	8.6	d	Aerobic SRT = SF/μ_n	
SRT Selected	9.8	9.1	d		
Aeration Basin Sizing (per M&E 2003)					
Aerobic Zone:					
VSS/TSS fraction of biomass produced	0.85	0.85			
Assumed effluent bTKN	1	1	mg/L		
Effluent TKN mass	19	21	lb/day	nbTKN + $bTKN_{eff}$	

Ridgefield WWTP Design Calculations (BOD:TSS=1)

Maximum Month Flow-Maximum Month Load Conditions

Design Year	Existing	Cap. Analysis	Units	Equation	Comments
$TKNo_x$ (estimated)	251	289	lb/d	$TKN_{inf} - TKN_{eff}$	Mass of NH_4-N in influent that is nitrified
S (effluent bCOD)	1.09	1.14	mg/L	$\{K_s*[1+(k_{d,t} * SRT)]\} / \{ [SRT * (\mu_{m,max,t} - k_{d,t})] - 1\}$	
S (effluent bCOD)	6	7	lb/d		
$P_{x,bio}$ (biomass production)	442	521	lb/d	$\{ [(bCOD_{inf} - bCOD_{eff})*Y_H] / [1+(k_{d,t} * SRT)] \} + \{ [f_d * k_{d,t} * Y_H * (bCOD_{inf} - bCOD_{eff}) * SRT] / [1+(k_{d,t} * SRT)] \} + \{ [Y_n * TKN_{ox}]/[1+(k_{dn,t} * SRT)] \}$	
$P_{x,VSS}$ (VSS production)	750	873	lb/d	$P_{x,bio}$ + nbTSS	
$P_{x,TSS}$ (TSS production)	1,099	1,275	lb/d	$P_{x,bio}$/0.85 + nbTSS + iTSS	
Yield (TSS)	1.01	1.03	lb TSS/lb BOD		
WAS:					
assumed bTKN/$P_{x,bio}$ ratio	0.12	0.12			
TSS	**1,099**	**1,275**	lb/d		
VSS	750	873	lb/d		
nbVSS	308	352	lb/d		
*i*TSS	349	402	lb/d	$P_{x,TSS} - P_{x,VSS}$	
bTKN	53	62	lb/d	$P_{x,bio} * 0.12$	
MLSS	3720	4000	mg/L		
V_{ox}	0.348	0.348	MG	$(P_{x,TSS} * SRT) / (MLSS * 8.34)$	
AB SWD	12	12	ft		
Existing AB Vol	0.348	0.348	MG		
F/M Ratio	0.10	0.11	lb BOD5/lb MLSS/day		
BOD Loading Rate	23	27	lb BOD5/1000 ft3/day		
Detention time at PHF	5.6	5.6			
Addn AB Ox Vol Req'd	0.000	0.000	MG		
Selector Volume					
Selector No.1:					
V_{sx-1}	11665	11665	gal		
X	3720	4000	mg/L	MLSS	
F	1083	1240	lb/d	Influent BOD	

Ridgefield WWTP Design Calculations (BOD:TSS=1)

Maximum Month Flow-Maximum Month Load Conditions

Design Year	Existing	Cap. Analysis	Units	Equation	Comments
M	362	389	lb	$M = V_{sx-1} * MLSS * 8.34$	
F/M	2.99	3.19	lb BOD5/lb TSS		
Selector No.2:					
V_{sx-2}	11762	11762	gal		
X	3720	4000	mg/L	MLSS	
F	1083	1240	lb/d	Influent BOD	
M	365	392	lb	$M = V_{sx-2} * MLSS * 8.34$	
F/M	1.49	1.59	lb BOD5/lb TSS		
Selector No.3:					
V_{sx-3}	23427	23427	gal		
X	3720	4000	mg/L	MLSS	
F	1083	1240	lb/d	Influent BOD	
M	727	782	lb	$M = V_{sx-3} * MLSS * 8.34$	
F/M	0.75	0.79	lb BOD5/lb TSS		
Tot V	46855	46855	gal		
Mixing Rate	0.02	0.02	$scfm/ft^3$		
Total Air Required	126	126	scfm	(Tot V)*(mixing rate)*0.134	
Nitrogen Balance					
TKN_{in}	271	310	lb/d		
TKN_{eff}	19	21	lb/d	$nbTKN + bTKN_{eff}$	
WAS Org-N	53	62	lb/d	WAS bTKN	
TKNox	198	226	lb/d	$TKN_{in} - TKN_{eff} - WAS_{Org-N}$	
Sx-1 DN rate	0.08	0.09	lb NO3-N/ lb MLSS-d	[(0.03*(F/M) + 0.029] * 1.05^(T-20)	
Sx-2 DN rate	0.05	0.05	lb NO3-N/ lb MLSS-d	[(0.03*(F/M) + 0.029] * 1.05^(T-20)	
Sx-3 DN rate	0.04	0.04	lb NO3-N/ lb MLSS-d	[(0.03*(F/M) + 0.029] * 1.05^(T-20)	
NO_3-N Denitrified in Selectors	76	85	lb/d	$SDNR*MLSS*(V_{sel}/1,000,000)*8.34$	
$NO\text{-}N_{eff}$	122	141	lb/d	$TKN_{ox} - NO_{3\text{-}DEN}$	
$NO\text{-}N_{eff}$ Conc.	21	24	mg/L		
Alk Consumed	1416	1615	lb/d	$TKN_{ox} * 7.14$	
Alk Produced	272	304	lb/d	$NO_{3\text{-}DEN} * 3.57$	

Ridgefield WWTP Design Calculations (BOD:TSS=1)

Maximum Month Flow-Maximum Month Load Conditions

Design Year	Existing	Cap. Analysis	Units	Equation	Comments
Residual Alk Req'd to Maintain neutral pH	80	80	mg/l		M&E pg 712
Residual Alk Req'd to Maintain neutral pH	467	467	lb/d		
Req'd Influent Alk	276	305	mg/l	{Alk consumed + Residual Alk req'd - Alk produced} / (Q*8.34)	
Actual Influent Alk	250	250	mg/l		
Req'd Alk Addition	151	319	lb/d	{Alk req'd - Infl. Alk}*Q*8.34	
Req'd Alk Addition (100% NaOH)	121	255	lb/d		
Req'd Alk Addition (25% NaOH)	45	95	gal/day		
<u>AB Aeration Parameters</u>					
β	0.95	0.95			
$C_{s,T,H}$	11.53	11.53	mg/L		
$C_{s,20}$	9.1	9.1	mg/L		
$C_{s,13}$	10.53	10.53	mg/L		M&E Pg. 1745
α	0.50	0.50			
F (fouling factor)	0.90	0.90			
elevation of site	35.00	35.00	ft		
relative pressure	0.9987	0.9987			
γ_T	9.8004	9.8004			M&E Pg. 1742
P_{atm}	101.325	101.325	kN/m^2		
% O_2 conc. leaving the aeration tank	19	19	%		
$P_{atm,H}$	10.33	10.33	m		
$C_{s\_,T,H}$	12.94	12.94	mg/L		
height of air release above diffusers	0.1524	0.1524	m		
$\rho_{T,P}$					
<u>AB Aeration</u>					
Carbonaceous O_2 Demand	1148	1294	lb/d	$bCOD_{inf}$ - 1.42*$P_{x,bio}$	
Nitrogenous O_2 Demand	641	736	lb/d	4.33*TKN_{ox} - 2.86*$NO_{3\text{-}DEN}$	
Total O_2 Demand	1789	2030	lb/d	C-Demand + N-Demand	
Diurnal PF	1.3	1.3			
Design O_2 Demand (AOR)	2325	2639	lb/d	Total demand * PF	
SOR	5383	6111	lb/d	AOR * {$C_{s,20}$ / [$\alpha F(\beta * C_{s,T,H}$-DO)]}*1.024^(20-T)	

Ridgefield WWTP Design Calculations (BOD:TSS=1)

Maximum Month Flow-Maximum Month Load Conditions

Design Year	Existing	Cap. Analysis	Units	Equation	Comments
Diffuser Efficiency	2.25	2.25	%/ft		
Total Efficiency	0.25	0.25		(SWD - 1)*(Dif. Eff./100)	
Air Flow	873	991	scfm	SOR / {1440 * 0.0173 * Total Eff}	
Total Air Flow Required (incl. selector mixing)	999	1117	scfm	Air flow + Sel air flow	
Secondary Clarifiers					
Q_{PHF}	1.5	1.5	mgd		
Existing SF (2 clarifiers)	3926	3926	ft^2		
SOR at AAF	115	115	gpd/ft^2	Q/A	
SOR at MMF	178	178	gpd/ft^2	Q/A	
SOR at PHF	382	382	gpd/ft^2	Q/A	
SLR at AAF	5.4	5.9	lb $MLSS/ft^2/d$	$(Q+Q_{RAS})$*MLSS*8.34/A	
SLR at MMF	8.5	9.1	lb $MLSS/ft^2/d$	$(Q+Q_{RAS})$*MLSS*8.34/A	
SLR at PHF	20.4	21.9	lb $MLSS/ft^2/d$	$(Q+Q_{RAS})$*MLSS*8.34/A	
Detention time at AAF	21.9	21.9	hr	A * 24 / Q	
Detention time at MMF	14.1	14.1	hr	A * 24 / Q	
Detention time at PHF	6.6	6.6	hr	A * 24 / Q	
Digester					
$P_{x,VSS}$ (VSS production)	750	873	lb/day		
$P_{x,TSS}$ (TSS production)	1,099	1,275	lb/day		
X_{ITSS}	349	402	lb/day	$P_{x,TSS} - P_{x,VSS}$	
WAS Conc.	10000	10000	mg/L		
WAS flowrate	9.1	10.6	gpm		
WAS flowrate	13176	15284	gpd		
D%, Percent VSS destruction	40	40	%		
M_w, Mass of solids Wasted	799	926	lb/day	X_{VSS}*(1-D%)+X_{ITSS}	
Xdig	30000	30000	mg/L	Digester MLSS	
Vdig avaliable	0.178	0.178	MG		
SRT available	56	48	day	$(V_{dig}*X_{dig}*8.34)/M_w$	

Activated Sludge Model - Aerobic Digester Blower Requirements

Phase 1 - Capacity Study Loading

	Parameter	Unit	Total	Digester No. 1 (Imhoff)	Digester No. 2	Sludge Storage Tank	comment **Capacity Study Max Month Design Criteria**
	Influent Conditions						
	Digester Volatile Solids Reduction	%	40%	20%	16%	4%	
	Digester VS reduction	lb/day	349	175	140	35	
56	AOR	lb/d	803	401	321	80	2.3 lb O2/lb VS * VS destroyed
57							
58	*Standard Oxygen Requirement*						
59	AOR = SOR * alpha((beta*CSW - CL)/CST)*1.024^(T-20)						
60	alpha			0.25	0.25	0.25	O2 transfer in WW/O2 transfer in clean water
61	beta			0.95	0.95	0.95	O2 saturation in WW/O2 saturation in clean water
62	CSW	mg/L		12.94	12.94	12.94	Saturation of O2 at operating temperature and pressure
63	CL	mg/L		1.00	1.00	1.00	Desired Operating O2 concentration
64	CST	mg/L		9.08	9.08	9.08	Saturation of O2 at sea level at 20°C
65	T	°C		15	15	15	Winter minimum temperature
66	AOR = SOR * ______			0.28	0.28	0.28	[59]*(([60]*[61]-[62])/[63])*1.024^([64]-20)
67	SOR	lb/d	2908	1454	1163	291	standard oxygen requirement
68	SOR	lb/hr	121	61	48	12	standard oxygen requirement
69							
76	*Fine Bubble Diffuser Efficiency*						
77	Per-Foot Diffuser Efficiency	ft^{-1}		0.75%	0.75%	0.75%	
78	Maximum side water depth	ft		18	16.25	4.50	Depth @ MMF - see hydraulic calculations
79	Depth of Submergence	ft		17	15.25	3.50	[88]-1
80	Fine Bubble Diffuser Efficiency			12.8%	11.4%	2.6%	[87]*[89]
81	Air Flow Required	scfm	1311	458	408	445	[84]*(1 scf/0.0173 lb O2)*(1 d/1440 min)/[90]
82							
83				53856	64178	60000	
84	*Air Flow Required for Mixing*						
85	Unit Fine Bubble Flow for Mixing	scfm/ft2		0.24	0.24	0.24	
	Surface area of Digesters	ft2		400	528	2005	
86	Volume of Digesters	ft3		7200	8580	8021	
87	Air Flow for Mixing	scfm	704	96	127	481	[95]*[96]+[97]*[98]/1000
88							
89	***Air Flow Required***	**scfm**	**1347**	**458**	**408**	**481**	at standard temperature and pressure
90							
91	*Inlet Volume of Atmospheric Air*						Va=Vs*((Ps-(RHs*PVs))/(Pb-(RHa*PVa)))*(Ta/Ts)*(Pb/Pa)
92	Vs	scfm	1347	458	408	481	Inlet flow of air at standard temperature and pressure
93	Ps	psi	14.7	14.7	14.7	14.7	standard pressure of air (=1.0 atm)
94	RHs		0.36	0.36	0.36	0.36	standard relative humidity
95	PVs	psi	0.26	0.26	0.26	0.26	vapor pressure of water @ std temperature and pressure

96	**Pb**	psi	14.7	14.7	14.7	14.7	design atmospheric pressure
97	**RHa**		0.80	0.80	0.80	0.80	design relative humidity
98	**PVa**	psi	0.95	0.95	0.95	0.95	vapor pressure of water at design temperature and pressure
99	**Ta**	°R	560	560	560	560	design temperature (=100°F)
100	**Ts**	°R	520	520	520	520	standard temperature (=60°F)
101	**Pa**	psi	14.7	14.7	14.7	14.7	design pressure at inlet
102	**Va**	icfm	1530	520	470	550	Inlet flow of air at design conditions, from above equation
103							
104	*Blower Discharge Pressure*						
105	Diffuser submergence	ft		17	15.25	3.5	1' above bottom of aeration basins
106	static submergence pressure	psi		7.39	6.63	1.52	[117]/2.3
107	Equivalent length of 6" pipe	ft		300	100	200	approximate - pipe not designed yet
108	Unit Headloss in 6" pipe	psi/100ft		0.3	0.3	0.3	from friction loss chart
109	Friction headloss	psi		0.9	0.3	0.6	
110	Silencer headloss	psi		0.1	0.1	0.1	
111	Air filter pressure drop	psi		0.1	0.1	0.1	
112	Air diffuser headloss	psi		0.76	0.76	0.76	
113	**Discharge Pressure**	**psi**		**10.00**	**8.00**	**4.00**	rounded up to nearest 1 psi

APPENDIX E

MIXING ZONE STUDY

Memorandum

COSMOPOLITAN ENGINEERING GROUP

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DATE: November 21, 2006

TO: David Knight, Ecology SWRO

FROM: Bill Fox, Cosmopolitan Engineering Group

RE: **FINAL ADDENDUM TO THE CITY OF RIDGEFIELD MIXING ZONE STUDY**

FILE: G/O014

cc: Mike Johnson, Gray & Osborne

WILLIAM P. FOX
STATE OF WASHINGTON
23463
REGISTERED PROFESSIONAL ENGINEER
EXPIRES 10/29/07

11/22/06

PURPOSE AND SCOPE

This memorandum constitutes the FINAL ADDENDUM to the City of Ridgefield Mixing Zone Study, Part II – Future Discharge Alternatives, which was dated December 2005. This addendum includes the following additional data and analyses pursuant to comments received by Ecology on the Part II report:

- Final effluent design flows provided by Gray & Osborne from the Facility Planning documents
- Wastewater treatment plant and outfall improvements linked to the final effluent flow criteria
- Descriptions of Lake River and Columbia River outfall alternatives
- Documentation of critical ambient discharge for Lake River during the late summer low flow season
- Results of supplemental field studies in winter/spring 2006 to assess seasonal variability of ambient discharge in Lake River
- Final dilution model runs for each phased discharge alternative
- Calculation of ammonia limits for the Lake River discharge alternatives

PHASED WWTP DESIGN FLOWS

Per the City *of Ridgefield General Sewer and Wastewater Facility Plan* (Gray & Osborne, August 2006), the City intends to construct improvements to its Wastewater Treatment Plant (WWTP) to provide the following Design Flows.

Maximum Month Design Flow	Peak Day Design Flow	WWTP Improvements	Effluent Discharge Location
0.5 MGD	0.9 MGD	None	Lake River
0.7 MGD	1.14 MGD	Phase 1	Lake River
1.0 MGD	1.54 MGD	Phase 2A	Lake River
1.83 MGD	2.60 MGD	Phase 2A + Columbia River Outfall	Columbia River
2.68 MGD	3.71 MGD	Phase 2B + Columbia River Outfall	Columbia River

A summary of the WWTP improvements to be completed at each phase are provide below:

Phase I

1. Convert existing circular aerobic digester to a secondary clarifier.
2. Convert existing rectangular back-up secondary clarifier to an aerobic digester.
3. Construct a new waste sludge thickening facility.
4. Construct a new secondary clarifier splitter box.
5. Extend the existing outfall 100 feet into Lake River.

Phase 2A

1. Construct headworks improvements.
2. Construct new Aerations Basins No. 1 and No. 2.
3. Install new aeration basin blowers.
4. Convert existing aeration basins to aerobic digesters.
5. Construct modifications to the UV disinfection system.
6. Construct a new effluent pump station.
7. Construct a sludge dewatering and drying system along with a solids handling building.

Phase 2B

1. Construct a third aeration basin.
2. Construct a third secondary clarifier.
3. Construct UV disinfection system modifications.
4. Construct a laboratory and office building.

OUTFALL ALTERNATIVES

The City of Ridgefield has committed to extending the outfall to the Columbia River mainstem, and have initiated engineering and environmental studies to obtain the necessary permits. However, the schedule for completing the Columbia River outfall is uncertain due to federal permit and easement requirements. Therefore, the following two outfall alternatives are established for this mixing zone study:

Lake River

The existing outfall will be extended into Lake River on an interim basis until the Columbia River outfall is completed. Plans and specifications for the outfall extension have been completed. The outfall will be extended to a depth of –7 feet mean lower low water (MLLW) datum. The terminus of the outfall would consist of a single 8-inch diameter nozzle discharging at a vertical angle of 30 degrees.

Columbia River

No outfall siting or diffuser design studies have been completed for the Columbia River alternative. For this mixing zone study we have assumed the new outfall would extend to a depth of –17 feet MLLW datum, with a 22.5 foot diffuser consisting of ten 4-inch diameter ports spaced at 2.5 foot intervals.

DRY SEASON CRITICAL AMBIENT CONDITIONS

Section 2.2 of the December 2005 Mixing Zone Study presented the limited data on Lake River tributary flows during critical dry season conditions. Subsequent dye tracer studies during August and September 2004 demonstrated that residual circulation produced by tidal flux from the Columbia River mainstem was the dominant source of ambient discharge during this period. The following calculation of the critical ambient discharge rate from the dye study was also presented in the December 2005 report.

Fischer's *Mixing in Inland and Coastal Waters* in Chapter 7 introduces the concepts of flushing time and residual circulation, also known as "tidal pumping." Flushing time is the time it takes to replace the volume of water. Residual circulation is the net flow produced by the tides in an estuary that may be superimposed on the background freshwater runoff. The equations for flushing time and residual circulation are defined below:

$$dM/dt + M(Q/V_o) = 0$$

Where:

- Vo = mean volume of the estuary downstream of a tracer source
- M = mass of a conservative tracer in an estuary
- Q = the residual circulation
- t = time

The solution of this differential equation demonstrates that the mass of tracer in an estuary (or concentration) would be inversely proportional to the residual circulation:

$$M(t) = M_o\, e^{-t/\tau}$$

Where:

- τ = flushing time of the estuary = Vo/Q
- t = time
- M0 = initial mass of tracer discharged
- M(t) = tracer mass in estuary as a function of time

<u>Flushing Time (τ):</u>

44% of the tracer remained in Lake River after one tidal cycle (12.4 hours). Using a conservative estimate of approximately 50% mass remaining after one tide cycle:

$$\frac{dM}{dt} + M\frac{Q}{V_O} = 0$$

$$M = M_O e^{-t/\tau}$$

for

$$\begin{aligned} t &= 12.4\ hrs; \\ M/M_o &= 0.5 = e\text{-}12.4/\tau \\ \ell n(0.5) &= -12.4/\tau \\ \tau &= 18\ hrs \pm \end{aligned}$$

<u>Residual Circulation (Q):</u>

$$V_o = (10{,}000\ lf)(2600\ sf) = 26(10)^6\ cf$$

$$\tau = 18\ hrs = 64{,}800\ sec$$

$$Q = V_o/\tau = 26(10)^6/64{,}800 = 401\ cfs$$

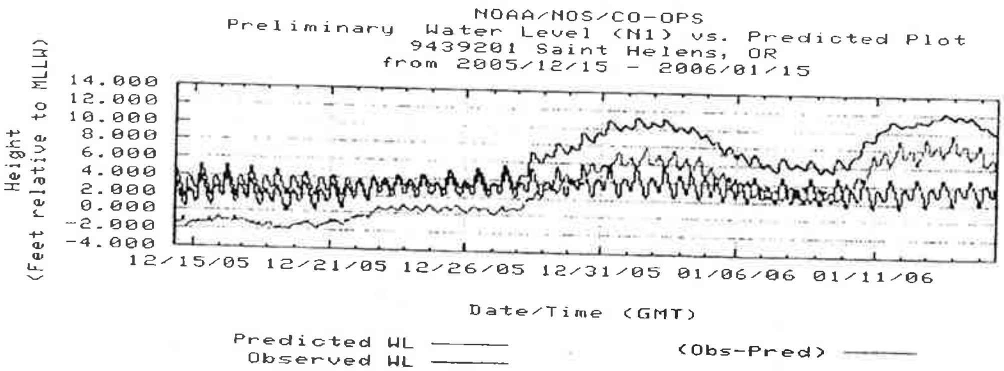
The residual circulation is by definition a consistent net flow of fresh ambient water past the outfall, which overshadows the 7Q10 total of the upstream creeks. Therefore, 400 cfs is the critical ambient discharge rate stipulated in the mixing zone criteria [WAC 173-201A-100(7)(a) and -(8)(a)].

WET SEASON CRITICAL AMBIENT CONDITIONS

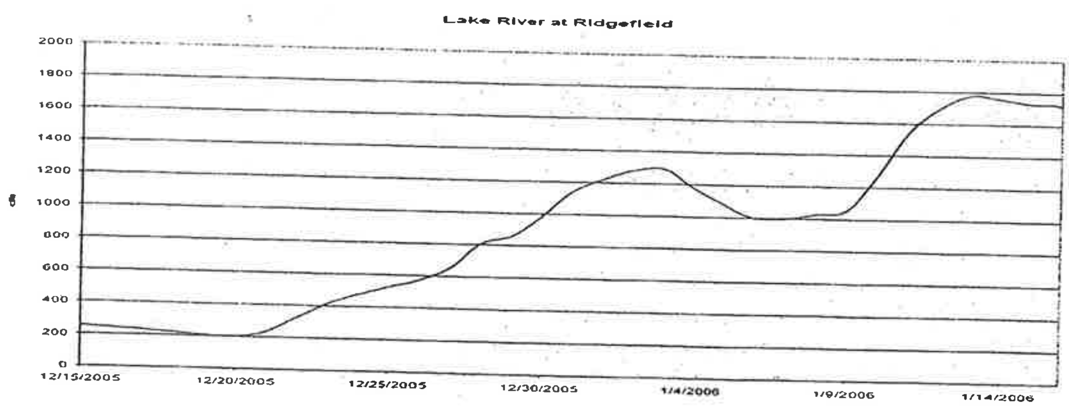
In a meeting on February 15, 2006, Ecology raised concerns regarding the ambient conditions that exist during the wet season, since the dye tracer study was conducted during dry, low flow conditions. Cosmopolitan Engineering concurred that ambient discharge during the wet season had not been documented, and supplemental field studies were collaboratively planned to obtain relevant data.

Peak Wet Weather Conditions

NOAA tide gauge records from St. Helens, OR demonstrate that tidal influences persist in Lake River during all but peak wet weather conditions. The graph below shows water surface elevation measured at St. Helens, approximately 2 miles downstream of Ridgefield, in December 2005 and January 2006. This was a period of very wet weather beginning in late December through early January, and again in late January. There was a strong tidal influence during early December when the river discharge was down around normal levels. As the river rose with the high flows, the tidal influence was dampened significantly. Tidal influence is very likely insignificant during these high flow events.



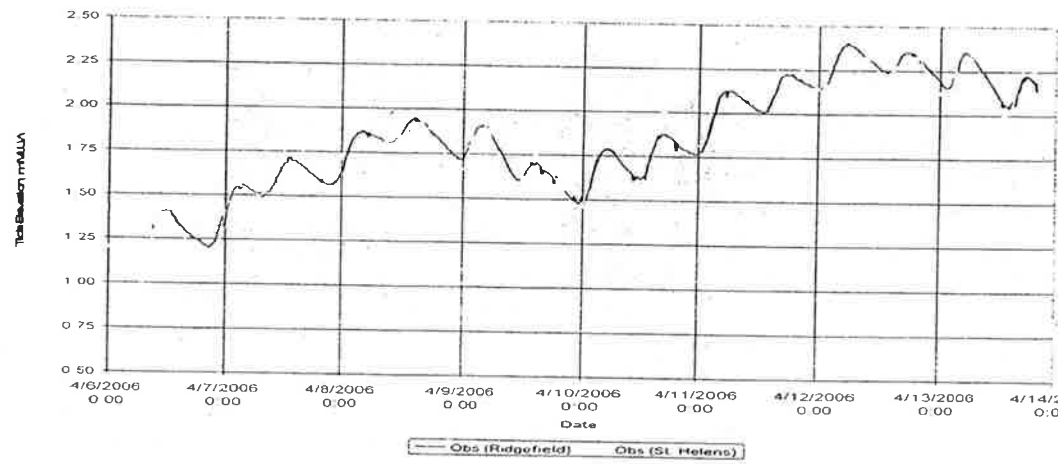
Upstream discharge in Lake River, shown in the graph below, followed a similar pattern associated with the very wet weather of this period. During the late December and early January periods of high flow and water level, it is clear that Lake River upstream discharge was well in excess of the critical 400 cfs residual circulation discharge observed during the dry season.



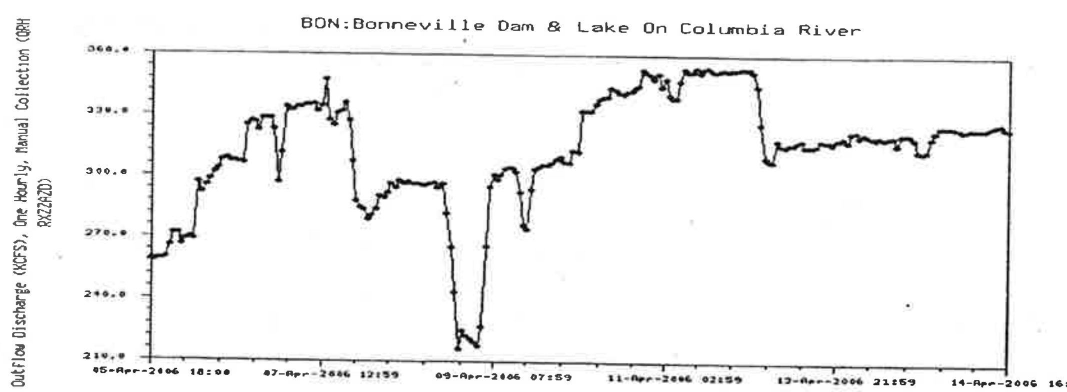
Moderate Wet Season Conditions

Water surface elevation was measured in Lake River near the Port of Ridgefield kayak dock from April 6 through April 13, 2006, using a SeaBird SBE16 Datalogger CTD. This period was selected to capture both neap and spring tide conditions, which are separated by approximately 7 days. The dates were selected based on projected upstream discharge in Lake River approaching 400 cfs.

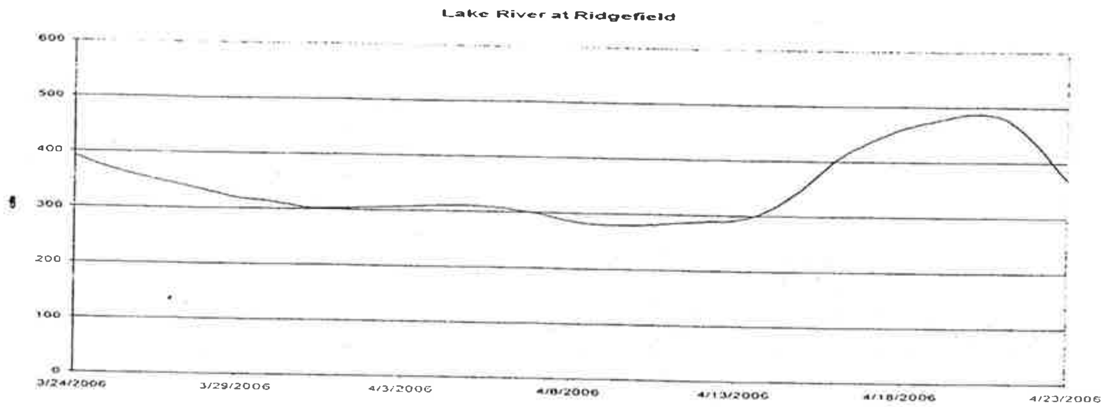
The water surface elevation measured at Ridgefield is plotted below, together with water surface elevation from St. Helens collected by NOAA. The tide data at Ridgefield slightly lag St. Helens, and amplitudes are similar, as they must be given the proximity of the two stations. The mean tidal amplitude was approximately 1 foot (0.3 m), or about half the tide amplitude during the September 2004 dry weather study.



Mean water surface elevation was also higher in April 2006 than in September 2004. This is due to the higher flow in the Columbia River during this period. Bonneville Dam release data are shown below. Mean discharge during this period was approximately 300,000 cfs, contrasted to the approximately 100,000 cfs discharge in September 2004. Note that the reduced discharge April 8 – 10 was reflected in a corresponding dip in tide elevations.

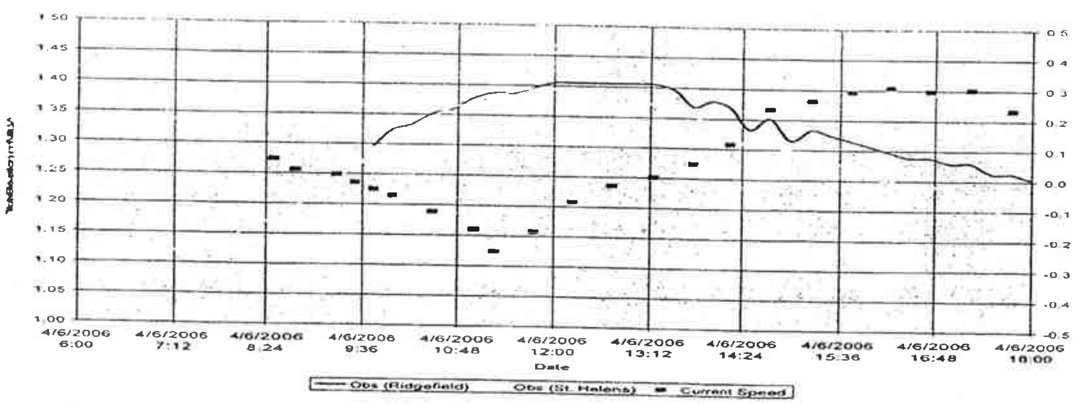


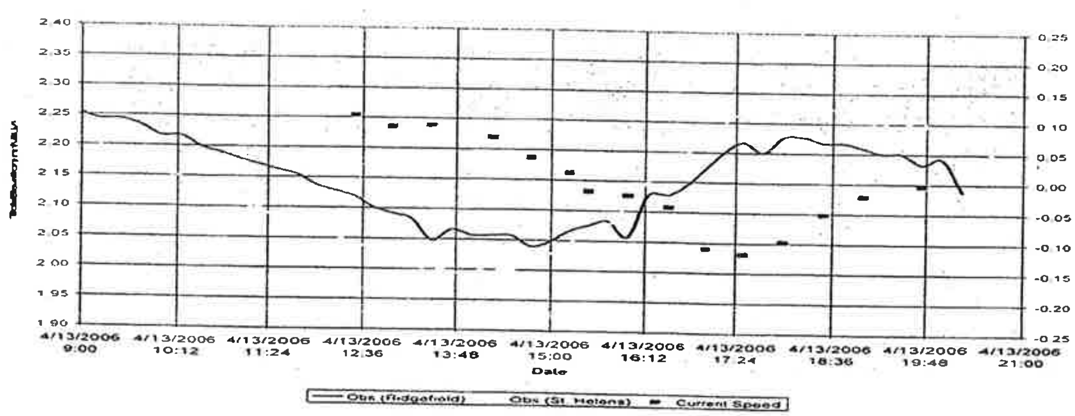
Using the regression equation for Lake River discharge, the target discharge rate was met in this period, ranging from 280 to 310 cfs. The upstream hydrograph for this period is shown below.



Currents were measured in Lake River on April 6 and 13, 2006. Currents were measured with a windowshade drogue consisting of a 1 m^2 vane suspended from a surface float at a depth of approximately 2 m. The drogue was deployed from mid-channel near the kayak dock approximately every half-hour through the entire flood tide. Drogue position was recorded using GPS, and the data and velocity calculations are provided in Attachment A.

The drogue velocity data are plotted together with water surface elevation data in the figures below. Negative current speed is upstream, positive is downstream. These data clearly demonstrate that currents moved upstream during the last half of the flood tides through slightly after high slack tide. The April 6 tides had both higher amplitude and higher velocities than April 13.





We may confidently conclude that during the April 2006 conditions, in which upstream flow approached 400 cfs, that there continued to be significant tidal influence in Lake River near Ridgefield. Residual circulation was not quantified. However, it follows that the combination of upstream flow and tidal influence produced net discharge exceeding that observed in September 2004 dry weather conditions, when net circulation was produced almost solely be downstream tidal influence.

These studies confirm the validity of the dry season ambient flow of 400 cfs is the appropriate critical condition. In addition, since the tidal influence persists during all but peak wet weather, this critical ambient flow may apply during all seasons, not just dry weather.

DILUTION MODELING

Model Selection and Calibration

The EPA model UM3 was selected for all dilution modeling in Lake River and the Columbia River. Reflux calculations. UM3 model calibration was presented in Chapter 5 of the December 2005 Mixing Zone Study. A dispersion value of 0.003 $cm^{2/3}$/sec was selected for the Brooks farfield model based on the model calibration.

Reflux

Reflux for the Lake River discharge was also presented in Chapter 5 of the December 2005 Mixing Zone Study. Reflux is proportional to effluent flow, and only applies to the Lake River discharge alternatives. Thus, reflux calculations from Table 9 of the 2005 report are amended as follows:

Phase	Effluent Flow Rate (mgd)		Reflux Concentration (%)	
	Max Month	Max Day	Chronic	Acute
Existing	0.5	0.9	0.33	0.59
1	0.7	1.14	0.46	0.75
2A	1.0	1.54	0.66	1.01

Reflux must also be determined for the Columbia River outfall alternatives. However, no site specific outfall studies have been conducted yet for that alternative, so there is no data to calculate reflux. However, based on the experience with the Salmon Creek dye tracer studies, reflux is anticipated to be negligible, and so will be ignored for this phase of analysis. Reflux should be determined when the Columbia River outfall studies commence.

Lake River Results

The dilution model UM3 was run for the existing, Phase 1 and Phase 2A flows. Critical ambient conditions included 10th and 90th percentile current speeds for acute, and median for chronic. Two of the measured ambient density profiles representing the range of conditions were run in the model. The buoyancy differences and density stratification were insignificant and did not affect the model predictions. The only differences between these model runs and those presented in the December 2005 Mixing Zone Study are the effluent flow rates. Model output files are provided in Attachment B.

Acute and chronic dilution factors are summarized below. The table includes the dilution model results, effective dilution adjusted for reflux, and the maximum allowable dilution based on the 7Q10. The critical dilution factors that shall be used for water quality and permit limit calculations are highlighted.

Lake River Dilution Summary

Case	Phase	Current Speed	DF Dilution	$\underline{V}$ Reflux	$\underline{DF}$ Eff Dil	Effluent Q (mgd)	Effluent Q (cfs)	Ambient Q (cfs)	Max Dilution
Acute	Exist	10%	4.8	0.0059	4.7	0.90	1.386	10	8.2
Acute	1	10%	4.7	0.0075	4.6	1.14	1.7556	10	6.7
Acute	2A	10%	4.4	0.0101	4.3	1.54	2.3716	10	5.2
Acute	Exist	90%	15.8	0.0059	14.5	0.90	1.386	10	8.2
Acute	1	90%	12.3	0.0075	11.3	1.14	1.7556	10	6.7
Acute	2A	90%	8.9	0.0101	8.2	1.54	2.3716	10	5.2
Chronic	Exist	Median	75	0.0033	60.3	0.50	0.77	100	131
Chronic	1	Median	52	0.0046	42.1	0.70	1.078	100	94
Chronic	2A	Median	36	0.0066	29.2	1.00	1.54	100	66

DF determined from UM3 model

Effective Dilution:
$\underline{DF} = DF/(1+\underline{V}*(DF-1))$

Allowable Ambient Discharge = 0.025 * 7Q10 for acute, = 0.25 * 7Q10 for chronic
Max Dilution Allowed under WAC 173-201A-100 = (Eff Q + Amb Q) / Eff Q

Shading denotes critical values used in water quality and permit limit calculations

Columbia River Results

The dilution model parameters for the Columbia River discharge alternative are the same as presented in Chapter 6 of the December 2005 Mixing Zone Study for the 10-port alternative, except for the revised effluent flow rates. Model output files are provided in Attachment B. Results are summarized below

Phase	Effluent Flow Rate (mgd)		Dilution Factor	
	Max Month	Max Day	Chronic	Acute
2A	1.83	2.60	56.3	29.5
2B	2.68	3.71	50.7	27.3

AMMONIA LIMITS FOR LAKE RIVER DISCHARGE ALTERNATIVES

Ammonia Criteria

Dry season is clearly the critical season for ammonia because of high pH in Lake River. The ambient monitoring program the City of Ridgefield conducted in 2004 and 2005 included twice-weekly sampling for pH and peak daily temperature. The data were presented in the *Effluent and Receiving Water Sampling Data Report* dated May 2006. The 90th percentile values were 8.84 for pH and 24.1 C for temperature. The sample sizes were 104 pH measurements and 337 daily maximum temperature measurements. The resulting water quality criteria for these values are 0.79 mg/L (as N) for acute and 0.13 mg/L (as N) for chronic, as shown in the following criteria spreadsheet.

INPUT	
1. Ambient Temperature (deg C; 0<T<30)	24.1
2. Ambient pH (6.5<pH<9.0)	8.84
3. Acute TCAP (Salmonids present- 20; absent- 25)	20
4. Chronic TCAP (Salmonids present- 15; absent- 20)	15
OUTPUT	
1. Intermediate Calculations:	
Acute FT	1.00
Chronic FT	1.41
FPH	1.00
RATIO	14
pKa	9.27
Fraction Of Total Ammonia Present As Un-ionized	26.9730%
2. Un-ionized Ammonia Criteria	
Acute (1-hour) Un-ionized Ammonia Criterion (ug NH3/L)	260.0
Chronic (4-day) Un-ionized Ammonia Criterion (ug NH3/L)	42.0
3. Total Ammonia Criteria:	
Acute Total Ammonia Criterion (mg NH3+ NH4/L)	0.96
Chronic Total Ammonia Criterion (mg NH3+ NH4/L)	0.16
4. Total Ammonia Criteria expressed as Nitrogen:	
Acute Ammonia Criterion as mg N	0.792
Chronic Ammonia Criterion as N	0.128

Ambient Ammonia Concentration

The City of Ridgefield also measured 104 ambient ammonia concentrations in the 2004/05 study. These are reported in the May 2006 *Effluent and Receiving Water Sampling Data Report*. The 90th percentile ambient ammonia measured in 2004/05 was 0.09 mg/L (as total ammonia). The equivalent critical ambient concentration expressed as N is 0.07 mg/L, which shall be used in the effluent limit calculations.

Effluent Ammonia Limits

Effluent ammonia limits for the Lake River discharge alternatives are calculated below based on the final values for dilution, ammonia criteria and ambient concentrations presented in this memorandum. Since the tidal influence exists year-round, we have assessed the limits on an annual basis rather than seasonal. While there may be some relaxing of the ammonia limits possible during the wet season, we do not have year-round ambient data to determine where the cutoff between seasons may be. Therefore, to be conservative we have assumed that the ammonia limits would apply year-round.

I have recalculated the ammonia limit for the proposed interim WWTP capacity of 1.0 mgd maximum month in the following table.

Lake River Ammonia Limit Calculation (mg/L as N)

	Month Average Flow (mgd)	Peak Day Flow (mgd)	Acute Dil'n Factor	Chronic Dil'n Factor	Ambient Concentration ug/L	Water Quality Standard Acute ug/L	Water Quality Standard Chronic ug/L	Average Monthly Limit (AML) ug/L	Maximum Daily Limit (MDL) ug/L
Existing	0.50	0.90	4.7	60.3	0.07	0.79	0.130	**1.53**	**3.45**
Phase 1	0.70	1.14	4.6	42.1	0.07	0.79	0.130	**1.50**	**3.38**
Phase 2A	1.00	1.54	4.3	29.2	0.07	0.79	0.130	**1.33**	**2.99**

Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations							Statistical variables for permit calculation			
WLA Acute	WLA Chronic	LTA Acute	LTA Chronic	LTA Coeff. Var. (CV)	LTA Prob'y Basis	Limiting LTA	Coeff. Var. (CV)	AML Prob'y Basis	MDL Prob'y Basis	# of Samples per Month
ug/L	ug/L	ug/L	ug/L	decimal	decimal	ug/L	decimal	decimal	decimal	n
3.5	3.69	1.11	1.95	0.60	0.99	1.11	0.60	0.95	0.99	8.00
3.4	2.60	**1.09**	1.37	0.60	0.99	1.09	0.60	0.95	0.99	8.00
3.2	1.82	**1.02**	0.96	0.60	0.99	0.96	0.60	0.95	0.99	8.00

ATTACHMENT A. LAKE RIVER DROGUE DATA

DATE: 6-Apr-06

DROGUE	TIME minutes	LAT 45 min	LONG 122 min	dT minutes	dY ft	dX ft	tot. dist. ft	speed ft/sec	speed m/sec	bearing degrees
A	8:22:00	49.294	45.265							
A	8:35:00	49.313	45.278	0:13:00	115	-54	127	0.16	0.050	335
A	8:53:00	49.319	45.281	0:18:00	36	-12	38	0.04	0.011	341
B	9:14:00	49.295	45.263							
B	9:40:00	49.293	45.261	0:26:00	-12	8	15	0.01	0.003	146
B	9:50:00	49.285	45.255	0:10:00	-49	25	55	0.09	0.028	153
B	10:04:20	49.264	45.244	0:14:20	-128	45	135	0.16	0.048	160
C	9:59:10	49.294	45.265							
C	10:13:20	49.265	45.246	0:14:10	-176	78	193	0.23	0.069	156
D	10:28:00	49.295	45.263							
D	10:36:50	49.263	45.243	0:08:50	-194	82	211	0.40	0.121	157
E	11:01:40	49.295	45.263							
E	11:08:00	49.261	45.242	0:06:20	-207	86	224	0.59	0.180	157
E	11:17:20	49.191	45.195	0:09:20	-425	193	467	0.83	0.254	156
F	11:31:30	49.297	45.267							
F	11:56:20	49.162	45.175	0:24:50	-820	379	903	0.61	0.185	155
G	12:01:00	49.295	45.264							
G	12:20:50	49.245	45.230	0:19:50	-304	140	334	0.28	0.086	155
H	12:33:00	49.295	45.263							
H	12:44:00	49.286	45.257	0:11:00	-55	25	60	0.09	0.028	156
I	12:58:40	49.297	45.265							
I	13:22:00	49.296	45.267	0:23:20	-6	-8	10	0.01	0.002	234
J	13:29:30	49.295	45.264							
J	13:38:40	49.308	45.274	0:09:10	79	-41	89	0.16	0.049	332
K	14:00:00	49.295	45.263							
K	14:20:00	49.364	45.309	0:20:00	419	-189	460	0.38	0.117	336
L	14:30:00	49.296	45.266							
L	14:42:10	49.38	45.32	0:12:10	510	-222	557	0.76	0.232	336
M	15:00:20	49.295	45.263							
M	15:11:50	49.384	45.321	0:11:30	541	-239	591	0.86	0.261	336
N	15:30:30	49.293	45.26							
N	15:40:50	49.383	45.316	0:10:20	547	-231	593	0.96	0.292	337
O	16:00:10	49.295	45.263							
O	16:10:20	49.388	45.321	0:10:10	565	-239	613	1.01	0.307	337
P	16:30:00	49.296	45.264							
P	16:40:10	49.387	45.317	0:10:10	553	-218	594	0.97	0.297	338
Q	17:00:00	49.295	45.264							
Q	17:10:00	49.385	45.319	0:10:00	547	-226	592	0.99	0.301	337
R	17:30:50	49.295	45.265							
R	17:43:30	49.382	45.321	0:12:40	528	-231	577	0.76	0.231	336

ATTACHMENT A. LAKE RIVER DROGUE DATA

DATE: 13-Apr-06

DROGUE	TIME minutes	LAT 45 min	LONG 122 min	dT minutes	dY ft	dX ft	tot. dist. ft	speed ft/sec	speed m/sec	bearing degrees
A	12:31:00	49.297	45.267							
				0:12:00	219	-103	242	0.34	0.102	335
A	12:43:00	49.333	45.292							
B	13:00:30	49.295	45.263							
				0:16:40	255	-124	283	0.28	0.086	334
B	13:17:10	49.337	45.293							
C	13:34:00	49.295	45.266							
				0:13:40	213	-99	234	0.29	0.087	335
C	13:47:40	49.33	45.29							
D	14:00:20	49.295	45.263							
				0:19:30	237	-119	265	0.23	0.069	333
D	14:19:50	49.334	45.292							
E	14:45:20	49.293	45.262							
				0:13:40	85	-41	94	0.12	0.035	334
E	14:59:00	49.307	45.272							
				0:20:00	49	-16	51	0.04	0.013	341
E	15:19:00	49.315	45.276							
F	15:30:20	49.297	45.267							
				0:14:00	-36	29	46	0.06	0.017	142
F	15:44:20	49.291	45.26							
G	16:00:00	49.294	45.264							
				0:10:10	-43	29	51	0.08	0.026	146
G	16:10:10	49.287	45.257							
H	16:31:00	49.295	45.263							
				0:07:10	-55	25	60	0.14	0.043	156
H	16:38:10	49.286	45.257							
I	17:00:00	49.297	45.267							
				0:09:40	-188	91	209	0.36	0.110	154
I	17:09:40	49.266	45.245							
J	17:30:30	49.296	45.265							
				0:07:10	-152	74	169	0.39	0.120	154
J	17:37:40	49.271	45.247							
K	18:00:00	49.295	45.263							
				0:08:30	-146	70	162	0.32	0.097	154
K	18:08:30	49.271	45.246							
L	18:30:00	49.297	45.266							
				0:14:50	-140	62	153	0.17	0.052	156
L	18:44:50	49.274	45.251							
M	19:00:10	49.295	45.264							
				0:26:50	-109	37	115	0.07	0.022	161
M	19:27:00	49.277	45.255							
N	19:33:20	49.293	45.262							
				0:18:00	-12	-4	13	0.01	0.004	199
N	19:51:20	49.291	45.263							

LAKE RIVER ACUTE
10^{TH} PERCENTILE CURRENT
EXISTING EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:26:35 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: ----------------------------------
      Depth    Amb-cur    Amb-dir    Amb-sal    Amb-tem    Amb-pol      Decay    Far-spd    Far-dir    Disprsn
          m        m/s        deg        psu          C      kg/kg        s-1        m/s        deg   m0.67/s2
        0.0     0.0427        0.0      0.066      21.43        0.0        0.0      0.427        0.0      0.003
       0.61     0.0427        0.0      0.066      21.35        0.0        0.0      0.427        0.0      0.003
      1.219     0.0427        0.0      0.066      21.29        0.0        0.0      0.427        0.0      0.003
      1.829     0.0427        0.0      0.066      21.28        0.0        0.0      0.427        0.0      0.003
      2.438     0.0427        0.0      0.066      21.28        0.0        0.0      0.427        0.0      0.003
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     8.0     6.0    30.0    90.0     1.0    20.7   207.0     7.0     0.9    0.05    24.0     1.0
Froude number:      38.56
         Depth  Amb-cur     P-dia  Polutnt    Dilutn   CL-diln   x-posn   y-posn
Step      (ft)    (m/s)      (in)  (kg/kg)        ()        ()     (ft)     (ft)
   0       7.0   0.0427     7.589      1.0       1.0       1.0      0.0      0.0;
  25     6.557   0.0427     12.32     0.61      1.64       1.0  0.00924    0.767;
  50     5.878   0.0427     20.19    0.372      2.69     1.394   0.0596    1.935;
  75     4.875   0.0427     32.99    0.226     4.414     2.275     0.22    3.647;
 100     3.456   0.0427     53.58    0.138     7.241     3.679    0.638    6.014;
 114     2.455   0.0427     69.93    0.105     9.554     4.777    1.079    7.636; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of      1.78 m
    conc   dilutn    width  distnce     time
 (kg/kg)               (m)      (m)    (hrs)  (kg/kg)    (s-1)    (m/s)(m0.67/s2)
5.11E-2     19.57    5.015     63.0   0.0395      0.0      0.0    0.427    0.003
```

ATTACHMENT B. DILUTION MODEL OUTPUT

LAKE RIVER ACUTE
10TH PERCENTILE CURRENT
PHASE 1 EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:26:44 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: ---------------------------------
     Depth    Amb-cur   Amb-dir   Amb-sal   Amb-tem   Amb-pol     Decay   Far-spd   Far-dir    Disprsn
         m        m/s       deg       psu         C     kg/kg       s-1       m/s       deg   m0.67/s2
       0.0     0.0427       0.0     0.066     21.43       0.0       0.0     0.427       0.0      0.003
      0.61     0.0427       0.0     0.066     21.35       0.0       0.0     0.427       0.0      0.003
     1.219     0.0427       0.0     0.066     21.29       0.0       0.0     0.427       0.0      0.003
     1.829     0.0427       0.0     0.066     21.28       0.0       0.0     0.427       0.0      0.003
     2.438     0.0427       0.0     0.066     21.28       0.0       0.0     0.427       0.0      0.003
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     8.0     6.0    30.0    90.0     1.0    20.7   207.0     7.0    1.14    0.05    24.0     1.0
Froude number:      48.85
        Depth   Amb-cur     P-dia  Polutnt    Dilutn  CL-diln    x-posn    y-posn
Step     (ft)     (m/s)      (in)  (kg/kg)        ()       ()      (ft)      (ft)
   0      7.0    0.0427     7.589      1.0       1.0      1.0       0.0      0.0;
  25    6.546    0.0427     12.32     0.61      1.64      1.0    0.0075    0.786;
  50    5.842    0.0427      20.2    0.372      2.69    1.395    0.0488    2.001;
  75    4.783    0.0427     33.06    0.226     4.414    2.281     0.183    3.818;
 100    3.251    0.0427     53.88    0.138     7.241    3.708     0.545    6.405;
 112    2.317    0.0427     67.92    0.109     9.183    4.662     0.869    7.952; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of       1.73 m
    conc   dilutn    width distnce     time
 (kg/kg)              (m)     (m)     (hrs) (kg/kg)    (s-1)    (m/s)(m0.67/s2)
 5.27E-2    18.96     4.91    63.0   0.0394     0.0      0.0    0.427   0.003
 3.82E-2    26.17    6.789   126.0   0.0804     0.0      0.0    0.427   0.003
count: 2
;
2:26:45 PM. amb fills: 2
```

ATTACHMENT B. DILUTION MODEL OUTPUT

LAKE RIVER ACUTE
10^{TH} PERCENTILE CURRENT
PHASE 2A EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:26:52 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: ----------------------------------
      Depth    Amb-cur    Amb-dir    Amb-sal    Amb-tem    Amb-pol     Decay    Far-spd    Far-dir    Disprsn
          m        m/s        deg        psu          C      kg/kg       s-1        m/s        deg   m0.67/s2
        0.0     0.0427        0.0      0.066      21.43        0.0       0.0      0.427        0.0      0.003
       0.61     0.0427        0.0      0.066      21.35        0.0       0.0      0.427        0.0      0.003
      1.219     0.0427        0.0      0.066      21.29        0.0       0.0      0.427        0.0      0.003
      1.829     0.0427        0.0      0.066      21.28        0.0       0.0      0.427        0.0      0.003
      2.438     0.0427        0.0      0.066      21.28        0.0       0.0      0.427        0.0      0.003
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     8.0     6.0    30.0    90.0     1.0    20.7   207.0     7.0   '1.54    0.05    24.0     1.0
Froude number:        65.98
        Depth  Amb-cur    P-dia  Polutnt   Dilutn  CL-diln   x-posn   y-posn
Step     (ft)    (m/s)     (in)  (kg/kg)       ()       ()     (ft)     (ft)
   0      7.0   0.0427    7.589      1.0      1.0      1.0      0.0      0.0;
  25    6.535   0.0427    12.33     0.61     1.64      1.0   0.0057    0.806;
  50    5.804   0.0427    20.21    0.372     2.69    1.396   0.0376     2.07;
  75    4.683   0.0427    33.11    0.226    4.414    2.286    0.144      4.0;
 100    3.021   0.0427    54.11    0.138    7.241    3.731    0.437    6.836;
 109     2.26   0.0427    64.51    0.115    8.653    4.443     0.63    8.121;  surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of       1.64 m
   conc   dilutn    width  distnce     time
(kg/kg)               (m)      (m)    (hrs)  (kg/kg)    (s-1)    (m/s)(m0.67/s2)
5.51E-2    18.13    4.733     63.0   0.0394      0.0      0.0    0.427    0.003
3.99E-2    25.05    6.551    126.0   0.0804      0.0      0.0    0.427    0.003
count: 2
;
2:26:52 PM. amb fills: 2
```

LAKE RIVER ACUTE
90^{TH} PERCENTILE CURRENT
EXISTING EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:27:09 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: ------------------------------------
      Depth    Amb-cur    Amb-dir    Amb-sal    Amb-tem    Amb-pol      Decay    Far-spd    Far-dir    Disprsn
          m        m/s        deg        psu          C      kg/kg        s-1        m/s        deg   m0.67/s2
        0.0      0.427        0.0      0.066      21.43        0.0        0.0      0.427        0.0      0.003
       0.61      0.427        0.0      0.066      21.35        0.0        0.0      0.427        0.0      0.003
      1.219      0.427        0.0      0.066      21.29        0.0        0.0      0.427        0.0      0.003
      1.829      0.427        0.0      0.066      21.28        0.0        0.0      0.427        0.0      0.003
      2.438      0.427        0.0      0.066      21.28        0.0        0.0      0.427        0.0      0.003
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     8.0     6.0    30.0    90.0     1.0    20.7   207.0     7.0     0.9    0.05    24.0     1.0
Froude number:      38.56
       Depth  Amb-cur     P-dia  Polutnt   Dilutn  CL-diln   x-posn   y-posn
Step    (ft)    (m/s)      (in)  (kg/kg)       ()       ()     (ft)     (ft)
   0     7.0    0.427     7.589      1.0      1.0      1.0      0.0      0.0;
  25   6.787    0.427     12.21     0.61     1.64      1.0   0.0424    0.368;
  50   6.589    0.427     18.07    0.396    2.523    1.104    0.175     0.71;
  52   6.576    0.427     18.55    0.384      2.6    1.125    0.189    0.733; begin overlap,
  75   6.422    0.427     24.12    0.275    3.641    1.351    0.394      1.0;
 100   6.248    0.427     31.08    0.187    5.349    1.651    0.772    1.298;
 103   6.227    0.427     32.05    0.177    5.635    1.702    0.834    1.335; bottom hit,
 110   6.175    0.427     34.46    0.156    6.391    1.843    0.996    1.423; end overlap,
 125    6.05    0.427     40.39    0.116    8.579    2.289    1.506    1.637;
 150   5.795    0.427      51.8    0.071    14.08    3.559    3.143    2.072;
 175   5.466    0.427     65.99   0.0433    23.09    5.794    6.672    2.622;
 200   5.036    0.427     84.06   0.0264    37.88    9.551    14.15    3.316;
 213    4.76    0.427     95.39   0.0204    49.01    12.39    20.83    3.745; acute zone,
 225   4.463    0.427     107.2   0.0161    62.15    15.76    29.69    4.186; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of      2.72 m
    conc   dilutn    width distnce     time
 (kg/kg)              (m)     (m)     (hrs)  (kg/kg)    (s-1)   (m/s)(m0.67/s2)
 9.29E-3    107.6    6.478    63.0    0.035      0.0      0.0   0.427   0.003
 6.66E-3    150.1    9.076   126.0    0.076      0.0      0.0   0.427   0.003
count: 2
;
2:27:10 PM. amb fills: 2
```

ATTACHMENT B. DILUTION MODEL OUTPUT

LAKE RIVER ACUTE
90TH PERCENTILE CURRENT
PHASE 1 EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:27:14 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: ----------------------------------
      Depth     Amb-cur     Amb-dir     Amb-sal     Amb-tem     Amb-pol       Decay     Far-spd     Far-dir     Disprsn
          m         m/s         deg         psu           C       kg/kg         s-1         m/s         deg   m0.67/s2
        0.0       0.427         0.0       0.066       21.43         0.0         0.0       0.427         0.0       0.003
       0.61       0.427         0.0       0.066       21.35         0.0         0.0       0.427         0.0       0.003
      1.219       0.427         0.0       0.066       21.29         0.0         0.0       0.427         0.0       0.003
      1.829       0.427         0.0       0.066       21.28         0.0         0.0       0.427         0.0       0.003
      2.438       0.427         0.0       0.066       21.28         0.0         0.0       0.427         0.0       0.003
   P-dia  P-elev V-angle H-angle    Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal     Temp Polutnt
    (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)      (C) (kg/kg)
     8.0     6.0    30.0    90.0     1.0    20.7   207.0     7.0    1.14    0.05     24.0     1.0
Froude number:      48.85
        Depth   Amb-cur     P-dia  Polutnt    Dilutn  CL-diln    x-posn    y-posn
Step     (ft)    (m/s)      (in)  (kg/kg)       ()       ()      (ft)      (ft)
  0       7.0     0.427    7.589       1.0      1.0      1.0       0.0       0.0;
 25     6.756     0.427    12.26      0.61     1.64      1.0    0.0387     0.422;
 50     6.483     0.427    19.25     0.376    2.657    1.217     0.193     0.895;
 67     6.328     0.427    24.45     0.284    3.519    1.462     0.354     1.162; begin overlap,
 75     6.261     0.427    26.96     0.251    3.983    1.572     0.447     1.278;
100     6.046     0.427    35.57     0.169    5.909    1.951     0.865     1.649;
106     5.992     0.427    37.93     0.153    6.546     2.07     1.005      1.74; bottom hit,
111     5.947     0.427    40.04      0.14    7.158    2.186     1.137     1.818; end overlap,
125     5.807     0.427    46.74     0.106    9.392    2.635     1.645     2.059;
150     5.504     0.427    60.52    0.0649    15.41    3.995     3.342     2.576;
175     5.113     0.427    77.43    0.0395    25.28    6.414     7.005     3.233;
200     4.606     0.427    98.81    0.0241    41.47    10.51     14.74     4.063;
208     4.412     0.427    106.8    0.0206    48.59    12.32      18.7     4.371; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of        2.71 m
   conc   dilutn    width distnce     time
 (kg/kg)              (m)     (m)    (hrs) (kg/kg)    (s-1)   (m/s)(m0.67/s2)
 1.15E-2    86.24    6.621    63.0  0.0372     0.0      0.0   0.427   0.003
 8.41E-3    118.9    9.167   126.0  0.0782     0.0      0.0   0.427   0.003
count: 2
 ;
2:27:15 PM. amb fills: 2
```

LAKE RIVER ACUTE
90^{TH} PERCENTILE CURRENT
PHASE 2A EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:27:19 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: ---------------------------------
       Depth    Amb-cur   Amb-dir   Amb-sal   Amb-tem   Amb-pol     Decay   Far-spd   Far-dir   Disprsn
           m        m/s       deg       psu         C     kg/kg       s-1       m/s       deg  m0.67/s2
         0.0      0.427       0.0     0.066     21.43       0.0       0.0     0.427       0.0     0.003
        0.61      0.427       0.0     0.066     21.35       0.0       0.0     0.427       0.0     0.003
       1.219      0.427       0.0     0.066     21.29       0.0       0.0     0.427       0.0     0.003
       1.829      0.427       0.0     0.066     21.28       0.0       0.0     0.427       0.0     0.003
       2.438      0.427       0.0     0.066     21.28       0.0       0.0     0.427       0.0     0.003
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     8.0     6.0    30.0    90.0     1.0    20.7   207.0     7.0    1.54    0.05    24.0     1.0
Froude number:     65.98
         Depth   Amb-cur     P-dia   Polutnt    Dilutn   CL-diln    x-posn    y-posn
Step      (ft)     (m/s)      (in)   (kg/kg)        ()        ()      (ft)      (ft)
   0       7.0     0.427     7.589       1.0       1.0       1.0       0.0       0.0;
  25     6.718     0.427     12.29      0.61      1.64       1.0    0.0335     0.489;
  50     6.368     0.427     19.78     0.372      2.69     1.297     0.183     1.093;
  75     6.015     0.427     29.98     0.232       4.3     1.835     0.502     1.703;
  88     5.863     0.427     35.66     0.187     5.344       2.1     0.718     1.967; begin overlap,
 100     5.726     0.427     41.22     0.154      6.51     2.355     0.968     2.203;
 116     5.537     0.427     49.55     0.116      8.59     2.773     1.422     2.527; bottom hit, end overlap,
 125     5.422     0.427     54.99    0.0981     10.19     3.094     1.779     2.725;
 150     5.049     0.427     72.35    0.0598     16.72     4.517     3.475     3.364;
 175     4.575     0.427     93.23    0.0364     27.43     7.085     7.081     4.166;
 187       4.3     0.427     105.0    0.0287     34.78     8.914     10.06     4.627; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of          2.67 m
    conc    dilutn     width   distnce      time
 (kg/kg)                 (m)       (m)     (hrs)   (kg/kg)     (s-1)     (m/s)(m0.67/s2)
 1.58E-2      63.1     6.656      63.0    0.0388       0.0       0.0     0.427     0.003
 1.15E-2     86.38     9.142     126.0    0.0798       0.0       0.0     0.427     0.003
count: 2
;
2:27:19 PM. amb fills: 2
```

ATTACHMENT B. DILUTION MODEL OUTPUT

LAKE RIVER CHRONIC
MEDIAN CURRENT
EXISTING EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:27:55 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: ----------------------------------
      Depth     Amb-cur     Amb-dir     Amb-sal     Amb-tem     Amb-pol       Decay    Far-spd    Far-dir     Disprsn
          m         m/s         deg         psu           C       kg/kg         s-1        m/s        deg    m0.67/s2
        0.0       0.168         0.0       0.066       21.43         0.0         0.0      0.427        0.0       0.003
       0.61       0.168         0.0       0.066       21.35         0.0         0.0      0.427        0.0       0.003
      1.219       0.168         0.0       0.066       21.29         0.0         0.0      0.427        0.0       0.003
      1.829       0.168         0.0       0.066       21.28         0.0         0.0      0.427        0.0       0.003
      2.438       0.168         0.0       0.066       21.28         0.0         0.0      0.427        0.0       0.003
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     8.0     6.0    30.0    90.0     1.0    20.7   207.0     7.0     0.5    0.05    24.0     1.0
Froude number:      21.42
        Depth  Amb-cur    P-dia  Polutnt   Dilutn  CL-diln   x-posn   y-posn
Step     (ft)    (m/s)     (in)  (kg/kg)       ()       ()     (ft)     (ft)
   0      7.0    0.168    7.589      1.0      1.0      1.0      0.0      0.0;
  25    6.742    0.168    12.26     0.61     1.64      1.0   0.0368    0.446;
  50    6.435    0.168    19.55    0.372    2.687    1.256    0.194    0.973;
  75    6.169    0.168    28.18    0.242    4.129    1.678    0.471    1.426; begin overlap,
 100    5.925    0.168    37.71    0.162    6.178     2.11    0.907    1.834;
 111    5.813    0.168    42.61    0.134    7.483    2.363    1.189     2.02; bottom hit,
 113    5.792    0.168    43.57    0.129    7.764    2.418    1.249    2.055; end overlap,
 125    5.654    0.168    49.91    0.102    9.805    2.831    1.706     2.28;
 150    5.308    0.168    64.96   0.0621    16.09     4.24    3.394    2.828;
 175    4.848    0.168     83.3   0.0379    26.39    6.756     6.95    3.508;
 198    4.273    0.168    104.4    0.024    41.61     10.6     13.4    4.264; surface,
Const Eddy Diffusivity. Farfield dispersion based on wastefield width of      2.65 m
   conc   dilutn    width distnce     time
 (kg/kg)              (m)     (m)    (hrs)  (kg/kg)   (s-1)   (m/s)(m0.67/s2)
 1.33E-2   75.14    6.584    63.0   0.0382      0.0     0.0   0.427    0.003
 9.69E-3   103.2    9.073   126.0   0.0792      0.0     0.0   0.427    0.003
count: 2
;
2:27:55 PM. amb fills: 2
```

ATTACHMENT B. DILUTION MODEL OUTPUT

LAKE RIVER CHRONIC
MEDIAN CURRENT
PHASE 1 EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:28:02 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: ----------------------------------
      Depth     Amb-cur    Amb-dir    Amb-sal    Amb-tem    Amb-pol     Decay    Far-spd   Far-dir    Disprsn
          m        m/s        deg        psu          C      kg/kg       s-1        m/s       deg   m0.67/s2
        0.0      0.168        0.0      0.066      21.43        0.0       0.0      0.427       0.0      0.003
       0.61      0.168        0.0      0.066      21.35        0.0       0.0      0.427       0.0      0.003
      1.219      0.168        0.0      0.066      21.29        0.0       0.0      0.427       0.0      0.003
      1.829      0.168        0.0      0.066      21.28        0.0       0.0      0.427       0.0      0.003
      2.438      0.168        0.0      0.066      21.28        0.0       0.0      0.427       0.0      0.003
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     8.0     6.0    30.0    90.0     1.0    20.7   207.0     7.0     0.7    0.05    24.0     1.0
Froude number:     29.99
       Depth   Amb-cur     P-dia  Polutnt   Dilutn  CL-diln    x-posn    y-posn
Step    (ft)     (m/s)      (in)  (kg/kg)       ()       ()      (ft)      (ft)
   0     7.0     0.168     7.589      1.0      1.0      1.0       0.0       0.0;
  25   6.699     0.168     12.29     0.61     1.64      1.0    0.0309      0.52;
  50   6.316     0.168     19.87    0.372     2.69    1.321     0.172      1.18;
  75   5.889     0.168     30.98    0.228    4.389    1.943     0.511     1.911;
 100   5.529     0.168     43.83    0.147    6.778    2.568     1.019     2.519; begin overlap,
 115   5.323     0.168     52.52    0.114    8.787    2.995     1.451     2.863; end overlap,
 123   5.207     0.168     57.72   0.0982    10.18     3.28     1.755     3.055; bottom hit,
 125   5.176     0.168      59.1   0.0945    10.57    3.361     1.843     3.106;
 150   4.744     0.168      78.5   0.0577    17.33     4.82     3.515     3.807;
 175   4.191     0.168     101.6   0.0351    28.44    7.454     6.958      4.66; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of     2.58 m
    conc   dilutn    width distnce     time
 (kg/kg)               (m)     (m)    (hrs) (kg/kg)   (s-1)   (m/s) (m0.67/s2)
 1.91E-2    52.35    6.539    63.0   0.0393     0.0     0.0   0.427   0.003
 1.39E-2    71.55    8.965   126.0   0.0803     0.0     0.0   0.427   0.003
count: 2
;
2:28:02 PM. amb fills: 2
```

ATTACHMENT B. DILUTION MODEL OUTPUT

LAKE RIVER CHRONIC
MEDIAN CURRENT
PHASE 2A EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:28:07 PM
Case 1; ambient file C:\Plumes\LR1.001.db; Diffuser table record 1: -----------------------------------
      Depth    Amb-cur    Amb-dir    Amb-sal    Amb-tem    Amb-pol      Decay    Far-spd    Far-dir    Disprsn
          m        m/s        deg        psu          C      kg/kg        s-1        m/s        deg   m0.67/s2
        0.0      0.168        0.0      0.066      21.43        0.0        0.0      0.427        0.0      0.003
       0.61      0.168        0.0      0.066      21.35        0.0        0.0      0.427        0.0      0.003
      1.219      0.168        0.0     -0.066      21.29        0.0        0.0      0.427        0.0      0.003
      1.829      0.168        0.0      0.066      21.28        0.0        0.0      0.427        0.0      0.003
      2.438      0.168        0.0      0.066      21.28        0.0        0.0      0.427        0.0      0.003
   P-dia  P-elev V-angle H-angle   Ports AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (in)   (deg)   (deg)      ()    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     8.0     6.0    30.0    90.0     1.0    20.7   207.0     7.0     1.0    0.05    24.0     1.0
Froude number:    42.85
        Depth  Amb-cur    P-dia  Polutnt   Dilutn  CL-diln   x-posn   y-posn
Step     (ft)    (m/s)     (in)  (kg/kg)       ()       ()     (ft)     (ft)
   0      7.0    0.168    7.589      1.0      1.0      1.0      0.0      0.0;
  25    6.658    0.168    12.31     0.61     1.64      1.0   0.0248    0.592;
  50    6.197    0.168    20.04    0.372     2.69    1.358    0.145    1.388;
  75    5.627    0.168    32.08    0.226    4.414    2.102    0.466    2.367;
 100    5.029    0.168    49.03    0.139    7.177    3.025    1.089    3.386;
 125    4.513    0.168    68.78   0.0889    11.24    4.013      2.0    4.254;
 140    4.191    0.168    82.88    0.067    14.92      4.8    2.838    4.789; bottom hit,
 150    3.955    0.168    93.44   0.0549    18.19    5.499    3.619    5.175;
 153    3.882    0.168    96.73   0.0518     19.3    5.741    3.896    5.294; surface,
Const Eddy Diffusivity. Farfield dispersion based on wastefield width of      2.46 m
   conc  dilutn    width distnce     time
(kg/kg)              (m)     (m)    (hrs)  (kg/kg)    (s-1)   (m/s)(m0.67/s2)
2.76E-2   36.16    6.335    63.0   0.0397      0.0      0.0   0.427    0.003
2.02E-2    49.4    8.681   126.0   0.0807      0.0      0.0   0.427    0.003
count: 2
;
2:28:08 PM. amb fills: 2
```

ATTACHMENT B. DILUTION MODEL OUTPUT

COLUMBIA RIVER ACUTE
10^{TH} PERCENTILE CURRENT
PHASE 2A EFFLUENT FLOW RATE

/ Windows UM3. 11/21/2006 2:40:34 PM

Case 1; ambient file c:\plumes\VP plume 14.001.db; Diffuser table record 1: ------------------------------------

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2
0.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007
1.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007
2.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007
3.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007
4.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007
5.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007
6.0	0.051	90.0	0.08	20.3	0.0	0.0	0.051	90.0	0.0007

P-dia	P-elev	V-angle	H-angle	Ports	Spacing	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(in)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(ft)	(MGD)	(psu)	(C)	(kg/kg)
3.0	2.0	30.0	169.0	10.0	2.5	21.7	217.0	17.0	2.6	0.05	24.0	1.0

Froude number: 97.9

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	x-posn	y-posn	
	(ft)	(m/s)	(in)	(kg/kg)	()	(ft)	(ft)	
0	17.0	0.051	3.0	1.0	1.0	0.0	0.0;	
25	16.82	0.051	4.867	0.61	1.64	-0.31	0.0628;	
50	16.53	0.051	7.967	0.372	2.69	-0.793	0.17;	
75	16.1	0.051	13.02	0.226	4.413	-1.524	0.358;	
100	15.48	0.051	21.19	0.138	7.239	-2.583	0.687;	
118	14.88	0.051	29.97	0.0966	10.34	-3.586	1.071;	merging,
125	14.34	0.051	35.51	0.0841	11.88	-4.474	1.462;	
150	10.79	0.051	80.99	0.0513	19.48	-10.14	4.6;	
171	6.126	0.051	174.9	0.0338	29.53	-16.85	9.688;	surface,

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 6.79 m

conc	dilutn	width	distnce	time				
(kg/kg)		(m)	(m)	(hrs)	(kg/kg)	(s-1)	(m/s)	(m0.67/s2)
1.82E-2	54.79	17.33	66.0	0.327	0.0	0.0	0.051	7.00E-4
1.31E-2	75.88	24.08	132.0	0.687	0.0	0.0	0.051	7.00E-4

count: 2

;

ATTACHMENT B. DILUTION MODEL OUTPUT

COLUMBIA RIVER CHRONIC
MEDIAN CURRENT
PHASE 2A EFFLUENT FLOW RATE

```
/ Windows UM3. 11/21/2006 2:42:55 PM
Case 1; ambient file c:\plumes\VP plume 14.001.db; Diffuser table record 1: --------------------------------
      Depth     Amb-cur    Amb-dir    Amb-sal    Amb-tem    Amb-pol      Decay    Far-spd    Far-dir    Disprsn
          m         m/s        deg        psu          C      kg/kg        s-1        m/s        deg    m0.67/s2
        0.0       0.074       90.0       0.08       20.3        0.0        0.0      0.074       90.0     0.0007
        1.0       0.074       90.0       0.08       20.3        0.0        0.0      0.074       90.0     0.0007
        2.0       0.074       90.0       0.08       20.3        0.0        0.0      0.074       90.0     0.0007
        3.0       0.074       90.0       0.08       20.3        0.0        0.0      0.074       90.0     0.0007
        4.0       0.074       90.0       0.08       20.3        0.0        0.0      0.074       90.0     0.0007
        5.0       0.074       90.0       0.08       20.3        0.0        0.0      0.074       90.0     0.0007
        6.0       0.074       90.0       0.08       20.3        0.0        0.0      0.074       90.0     0.0007
   P-dia  P-elev V-angle H-angle   Ports Spacing AcuteMZ ChrncMZ P-depth Ttl-flo Eff-sal    Temp Polutnt
    (in)    (ft)   (deg)   (deg)      ()    (ft)    (ft)    (ft)    (ft)   (MGD)   (psu)     (C) (kg/kg)
     3.0     2.0    30.0   169.0    10.0     2.5    21.7   217.0    17.0    1.83    0.05    24.0     1.0
Froude number:    68.91
        Depth  Amb-cur     P-dia  Polutnt   Dilutn   x-posn   y-posn
Step     (ft)    (m/s)      (in)  (kg/kg)       ()     (ft)     (ft)
   0     17.0    0.074       3.0      1.0      1.0      0.0      0.0;
  25    16.83    0.074     4.861     0.61     1.64   -0.286   0.0603;
  50    16.58    0.074     7.937    0.372     2.69   -0.712    0.168;
  75    16.22    0.074      12.9    0.226    4.413   -1.315    0.361;
 100    15.75    0.074     20.74    0.138    7.239   -2.114    0.708;
 117    15.36    0.074     28.33   0.0986    10.14   -2.761    1.082; merging,
 125     14.9    0.074     34.05   0.0844    11.83   -3.524    1.612;
 150     12.8    0.074     77.22   0.0515    19.41   -6.802    4.622;
 175    10.43    0.074     190.8   0.0314    31.85   -10.15    9.284;
 181    9.881    0.074     236.6   0.0279    35.87   -10.85    10.58; bottom hit,
 183    9.703    0.074     254.1   0.0268    37.32   -11.08    11.02; surface,
Const Eddy Diffusivity.  Farfield dispersion based on wastefield width of      8.80 m
   conc   dilutn    width distnce     time
(kg/kg)               (m)     (m)    (hrs)  (kg/kg)    (s-1)    (m/s)(m0.67/s2)
1.77E-2    56.33    18.17    66.0     0.23      0.0      0.0    0.074  7.00E-4
1.32E-2    75.52    24.54   132.0    0.478      0.0      0.0    0.074  7.00E-4
count: 2
;
```

APPENDIX F

INFLUENT ALKALINITY TEST RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Gray & Osborne, Incorporated
Project Name : City of Ridgefield High Strength WW Analysis
Project Number : NA
Sample Matrix : Water

Service Request : K0702075
Date Collected : 03/14/07
Date Received : 03/14/07

Alkalinity as CaCO3, Total

Analysis Method : -310.1
Test Notes :

Units : mg/L
Basis : NA

Sample Name	Lab Code	MRL	Dilution Factor	Date Analyzed	Result	Result Notes
Influent Grab	K0702075-001	2	1	03/16/07	300	
Influent Comp	K0702075-002	2	1	03/16/07	249	
Hillhurst	K0702075-003	2	1	03/16/07	226	
56th Pl	K0702075-004	2	1	03/16/07	440	
Method Blank	K0702075-MB	2	1	03/16/07	ND	

Report By:CSKILLERN

Public Works Department
109 W. Division St.
P.O Box 608
Ridgefield, WA 98642

CITY OF RIDGEFIELD

Telephone: (360) 887-3897
Facsimile: (360) 887-0740

FACSIMILE

Date: Date 5-14-07

Number of pages including cover sheet: 6

To:	KEN ALEXANDER PE GRAY + OSBORNE, INC	From:	City of Ridgefield JOHN DUBACK
Phone:	360-571-3350	Phone:	360-887-3897
Fax:	360-571-4547	Fax:	360-887-0740

FYI	
Request	
Please Comment	

Urgent	
Reply ASAP	
Original to Follow	

Message to Recipient: KEN,

HERE ARE THE RESULTS FROM TESTING 4-18-07 AND 4-20-07-

John

Post-it® Fax Note 7671	Date 5/14/07 # of pages ▸ 6
To JOHN WILSON	From KRIS ROGERS
Co./Dept. G+O SEA	Co. G+O VAN
Phone #	Phone #
Fax #	Fax #

2517 E. Evergreen Blvd.
Vancouver, WA 98629

AddyLab

Phone: 360 750-0055
Fax: 360 750-0057
Email: addylab@wa-net.

Analytical Report

Client: City of Ridgefield
Sample Matrix: Wastewater-HillHurst
Date Collected: 4/20/07
Date Analyzed: 4/25,27/07
Report Date: 5/3/07

Reference #: 07AL0315
Lab #: 14470079
Analysts: CLA, TAN

Analyte	Results	Units	MRL	Method	Date Analyzed	Analyst	Batch
BOD(5-Day)	187.4	mg/L	2.0	EPA 405.1	4/25/07	CLA	3A-075
TSS	200	mg/L	1.0	EPA 160.2	4/27/07	TAN	3A-075
Alkalinity	252	mg/L	5.0	SM2320 B	4/24/07	SO(Edge)	ALK_070424
TKN	38.0	mg/L	5.0	SM4500-Norg C	4/24/07	SO(Edge)	TKN_070427

Definitions:

MRL	Method Reporting Limit
ND	Analyte Not Detected above the reporting Limit
J	An estimate that is less than the MRL but greater than or equal to the Method Detection Level
BOD	Biochemical Oxygen Demand
TSS	Total Suspended Solids
TKN	Total Kjeldahl Nitrogen
mg/L	milligram per liter

Reviewed By: DKD Date: 5.7.07

Page __ of __

2517 E. Evergreen Blvd.
Vancouver, WA 98629

AddyLab

Phone: 360 750-0055
Fax: 360 750-0057
Email: addylab@wa-net

Analytical Report

Client: City of Ridgefield
Sample Matrix: Wastewater-S. 56th Place
Date Collected: 4/20/07
Date Analyzed: 4/25,27/07
Report Date: 5/3/07

Reference #: 07AL0315
Lab #: 14470080
Analysts: CLA, TAN-

Analyte	Results	Units	MRL	Method	Date Analyzed	Analyst	Batch
BOD(5-Day)	**643.1**	mg/L	2.0	EPA 405.1	4/25/07	CLA	3A-075
TSS	**324**	mg/L	1.0	EPA 160.2	4/27/07	TAN	3A-075
Alkalinity	**326**	mg/L	5.0	SM2320 B	4/24/07	SO(Edge)	ALK_070424
TKN	**75.6**	mg/L	10	SM4500-Norg C	4/24/07	SO(Edge)	TKN_070427

Definitions:

Definitions:	MRL	Method Reporting Limit
	ND	Analyte Not Detected above the reporting Limit
	J	An estimate that is less than the MRL but greater than or equal to the Method Detection Level
	BOD	Biochemical Oxygen Demand
	TSS	Total Suspended Solids
	TKN	Total Kjeldahl Nitrogen
	mg/L	milligram per liter

Reviewed By: DKD Date: 5-7-07

2517 E. Evergreen Blvd.
Vancouver, WA 98629

AddyLab

Phone: 360 750-0055
Fax: 360 750-0057
Email: addylab@wa-net.

Analytical Report

Client: City of Ridgefield
Sample Matrix: Wastewater-Influent grab
Date Collected: 4/20/07
Date Analyzed: 4/20/07

Reference #: 07AL0308
Lab #: 14470031
Report Date: 4/25/07

Analyte	Results	Units	MRL	Method	Date Analyzed	Analyst	Batch
Alkalinity	**342**	mg/L	5.0	SM 2330 B	4/24/07	SO(Edge)	07-04687

Definitions:
- MRL Method Reporting Limit
- ND Analyte Not Detected above the reporting Limit
- J An estimate that is less than the MRL but greater than or equal to the Method Detection Level.
- BOD Biochemical Oxygen Demand
- TSS Total Suspended Solids
- mg/L milligram per liter
- * Sample exhibits toxicity.

Reviewed By: DKD Date: 5.7.07

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2517 E. Evergreen Blvd
Vancouver, WA 98629

AddyLab

Phone: 360 750-0055
Fax: 360 750-0057
Email: addylab@wa-net.

Analytical Report

Client: City of Ridgefield
Sample Matrix: Wastewater-Influent Composite
Date Collected: 4/18/07
Date Analyzed: 4/18/07

Reference #: 07AL0308
Lab #: 14470074
Report Date: 4/20/07

Analyte	Results	Units	MRL	Method	Date Analyzed	Analyst	Batch
BOD(5-Day)	**298**	mg/L	2.0	EPA 405.1	4/18/07	CLA	3A-077
TSS	**608**	mg/L	1.0	EPA 160.2	4/18/07	TAN	3A-071
Alkalinity	**263**	mg/L	5.0	SM 2330 B	4/24/07	SO(Edge)	07-04687
TKN	**86.8**	mg/L	10.0	SM 4500-Norg C	4/27/07	SO(Edge)	07-04687

Definitions:

MRL	Method Reporting Limit
ND	Analyte Not Detected above the reporting Limit
J	An estimate that is less than the MRL but greater than or equal to the Method Detection Level
BOD	Biochemical Oxygen Demand
TSS	Total Suspended Solids
mg/L	milligram per liter
*	Sample exhibits toxicity.

Reviewed By: DKD Date: 5.3.07

Page __ of __

2517 E. Evergreen Blvd.
Vancouver, WA 98629

AddyLab

Phone: 360 750-0055
Fax: 360 750-0057
Email: addylab@wa-net

Analytical Report

Client:	City of Ridgefield	**Reference #:**	07AL0308
Sample Matrix:	Wastewater-Influent grab	**Lab #:**	14470073
Date Collected:	4/18/07	**Report Date:**	4/25/07
Date Analyzed:	4/18/07		

Analyte	Results	Units	MRL	Method	Date Analyzed	Analyst	Batch
BOD(5-Day)	185	mg/L	2.0	EPA 405.1	4/18/07	CLA	3A-077
TSS	220	mg/L	1.0	EPA 160.2	4/18/07	TAN	3A-071
Alkalinity	904	mg/L	5.0	SM 2330 B	4/24/07	SO(Edge)	07-04687
TKN	59.6	mg/L	10.0	SM 4500-Norg C	4/27/07	SO(Edge)	07-04687

Definitions:

MRL	Method Reporting Limit
ND	Analyte Not Detected above the reporting Limit
J	An estimate that is less than the MRL but greater than or equal to the Method Detection Level
BOD	Biochemical Oxygen Demand
TSS	Total Suspended Solids
mg/L	milligram per liter
*	Sample exhibits toxicity.

Reviewed By: DKD Date: 5.3.07

Page __ of __

APPENDIX J

OUTPUT FROM CLARK REGIONAL WASTEWATER DISTRICT FINANCIAL MODEL

Clark Regional Wastewater District - Simplified Long-Term Financial Model - NEW REGIONAL ENTITY
INPUT PARAMETERS

ERU and Flow Summary

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
ERUs (low growth scenario)																					
Ridgefield																					
New ERUs	68	82	96	110	115	120	125	130	135	140	146	152	159	168	178	188	199	210	210	210	210
Total ERUs (end of year)	1,938	2,020	2,116	2,226	2,341	2,461	2,586	2,716	2,851	2,991	3,137	3,289	3,448	3,616	3,794	3,982	4,181	4,391	4,601	4,811	5,021
Battle Ground																					
New ERUs	50	50	75	180	250	250	300	300	300	300	300	300	300	400	400	400	500	500	500	500	500
Total ERUs (end of year)	6,679	6,729	6,804	6,984	7,234	7,484	7,784	8,084	8,384	8,684	8,984	9,284	9,584	9,984	10,384	10,784	11,284	11,784	12,284	12,784	13,284
CRWWD - SCTP Service Area																					
New ERUs (95% of total)	285	285	380	380	380	380	475	475	475	475	570	570	570	570	665	665	665	665	665	665	665
Total ERUs (end of year)	29,863	30,148	30,528	30,908	31,288	31,668	32,143	32,618	33,093	33,568	34,138	34,708	35,278	35,848	36,513	37,178	37,843	38,508	39,173	39,838	40,503
Total Regional System																					
New ERUs	403	417	551	670	745	750	900	905	910	915	1,016	1,022	1,029	1,138	1,243	1,253	1,364	1,375	1,375	1,375	1,375
Total ERUs (end of year)	38,480	38,897	39,448	40,118	40,863	41,613	42,513	43,418	44,328	45,243	46,259	47,281	48,310	49,448	50,691	51,944	53,308	54,683	56,058	57,433	58,808
Unit Flow Parameters (maximum monthly flow basis)																					
Ridgefield ERUs (gpd/ERU)	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297
Battle Ground ERUs (gpd/ERU)	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380
CRWWD - SCTP ERUs (gpd/ERU)	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254
Flow Summary (maximum monthly flow basis)																					
Ridgefield (mgd)	0.58	0.60	0.63	0.66	0.70	0.73	0.77	0.81	0.85	0.89	0.93	0.98	1.02	1.07	1.13	1.18	1.24	1.30	1.37	1.43	1.49
Battle Ground (mgd)	2.54	2.56	2.59	2.65	2.75	2.84	2.96	3.07	3.19	3.30	3.41	3.53	3.64	3.79	3.95	4.10	4.29	4.48	4.67	4.86	5.05
CRWWD - SCTP (mgd)	7.59	7.66	7.75	7.85	7.95	8.04	8.16	8.28	8.41	8.53	8.67	8.82	8.96	9.11	9.27	9.44	9.61	9.78	9.95	10.12	10.29
Total (mgd)	10.70	10.81	10.97	11.17	11.39	11.62	11.89	12.16	12.44	12.71	13.02	13.32	13.63	13.97	14.35	14.72	15.14	15.56	15.98	16.41	16.83
System Peaking Factor (max. mo./avg. ann.)	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32
Volume Summary (average annual flow basis)																					
Ridgefield (mg)	159	166	174	183	192	202	212	223	234	246	258	270	283	297	312	327	343	361	378	395	412
Battle Ground (mg)	702	707	715	734	760	786	818	849	881	912	944	976	1,007	1,049	1,091	1,133	1,186	1,238	1,291	1,343	1,396
CRWWD - SCTP (mg)	2,097	2,117	2,144	2,171	2,197	2,224	2,258	2,291	2,324	2,358	2,398	2,438	2,478	2,518	2,564	2,611	2,658	2,705	2,751	2,798	2,845
Total (mg)	2,958	2,990	3,033	3,087	3,150	3,213	3,288	3,363	3,439	3,516	3,599	3,683	3,768	3,864	3,967	4,071	4,187	4,303	4,420	4,536	4,653
Percent of total system flows																					
Ridgefield (%)	5.4%	5.5%	5.7%	5.9%	6.1%	6.3%	6.5%	6.6%	6.8%	7.0%	7.2%	7.3%	7.5%	7.7%	7.9%	8.0%	8.2%	8.4%	8.5%	8.7%	8.9%
Battle Ground (%)	23.7%	23.6%	23.6%	23.8%	24.1%	24.5%	24.9%	25.3%	25.6%	26.0%	26.2%	26.5%	26.7%	27.2%	27.5%	27.8%	28.3%	28.8%	29.2%	29.6%	30.0%
CRWWD - SCTP (%)	70.9%	70.8%	70.7%	70.3%	69.8%	69.2%	68.7%	68.1%	67.6%	67.1%	66.6%	66.2%	65.8%	65.2%	64.6%	64.1%	63.5%	62.8%	62.2%	61.7%	61.1%
Total (%)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Financial Parameters and Policies

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Financial Parameters																					
Inflation Rate (general)	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	3.00%	3.00%	3.00%	3.00%	3.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
Inflation Rate (capital project escalation)	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Inflation Rate (salaries and wages)	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Inflation Rate (benefits)	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
Interest Rate (earned on fund balances)	0.50%	0.50%	0.50%	0.50%	0.50%	1.00%	1.00%	1.00%	1.00%	1.00%	1.50%	1.50%	1.50%	1.50%	1.50%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Future Capital Projects																					
Debt Issuance Cost (% of principle)	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
Bond Interest Rate (annual)	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
Bond Duration (years)	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Financial Policies																					
Operations																					
Operating Reserve (months)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Rate Stabilization Reserve (months)	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Capital/Debt																					
Debt Service Reserve (months)	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Debt Service Coverage Ratio	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Repair and Replacement																					
R&R Reserve (minimum)	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,300	$5,600	$5,900	$6,200	$6,500
R&R Projects Cash Financed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Units: all dollar values presented in $1000s unless noted otherwise

Clark Regional Wastewater District - Simplified Long-Term Financial Model - NEW REGIONAL ENTITY
NET EQUITY CONTRIBUTION

Regional Capacity Allocation At Formation of Regional Entity

Regional Asset To Be Transferred	Approximate Construction Period	Asset Capital Cost/Value By Funding Source: Total Cost/Value	Federal/State Grants	Local Share	Asset Capital Cost/Value By Agency (allocation of local share amounts): Ridgefield	Battle Ground	CRWWD	Debt Remaining By Agency (principle outstanding January 1, 2012): Ridgefield	Battle Ground	CRWWD	Net Equity Contribution By Agency (local share allocation less debt outstanding): Ridgefield	Battle Ground	CRWWD	Total
Physical Asset														
Ridgefield Service Area														
Treatment Plant (0.7 mgd)	Various	$7,743,619	$0	$7,743,619	$7,743,619	$0	$0	$3,495,103	$0	$0	$4,248,516	$0	$0	
Battle Ground Service Area														
New Regional Pump Station/Flow Eq. Basin	2010-2011	$7,000,000	$0	$7,000,000	$0	$7,000,000	$0	$0	$7,000,000	$0	$0	$0	$0	
Original Regional Pump Station & Force Main	1992-1993	$6,252,000	$0	$6,252,000	$0	$5,626,800	$625,200	$0	$0	$0	$0	$5,626,800	$625,200	
Headworks Facility	2005	$250,000	$0	$250,000	$0	$250,000	$0	$0	$0	$0	$0	$250,000	$0	
Auxiliary Equalization Basin	2000	$250,000	$0	$250,000	$0	$250,000	$0	$0	$0	$0	$0	$250,000	$0	
Salmon Creek Wastewater Management System														
Original Plant/System Construction (2.00 mgd)	1973-1975	$4,300,000	$2,700,000	$1,600,000	$0	$0	$1,600,000	$0	$0	$0	$0	$0	$1,600,000	
Phase 1 Expansion (3.10 mgd)	1987-1988	$1,600,000	$0	$1,600,000	$0	$0	$1,600,000	$0	$0	$0	$0	$0	$1,600,000	
Phase 2 Expansion (5.63 mgd)	1990-1991	$11,000,000	$3,500,000	$7,500,000	$0	$640,500	$6,859,500	$0	$0	$182,694	$0	$640,500	$6,676,806	
Phase 3 Expansion (10.30 mgd)	1993-1999	$50,960,000	$0	$50,960,000	$0	$9,172,800	$41,787,200	$0	$0	$13,675,000	$0	$9,172,800	$28,112,200	
Phase 4 Expansion (14.95 mgd)	2002-2009	$77,000,000	$0	$77,000,000	$0	$20,388,000	$56,612,000	$0	$10,885,449	$27,318,663	$0	$9,502,551	$29,293,337	
Fund Balance														
Ridgefield		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Battle Ground		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Clark County														
O&M Fund		$500,000	$0	$500,000	$0	$100,000	$400,000	$0	$0	$0	$0	$100,000	$400,000	
Debt Service Fund		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
Capital Fund		$10,000	$0	$10,000	$0	$2,000	$8,000	$0	$0	$0	$0	$2,000	$8,000	
R&R Fund		$1,150,000	$0	$1,150,000	$0	$230,000	$920,000	$0	$0	$0	$0	$230,000	$920,000	
CRWWD														
RFC Fund		$6,600,000	$0	$6,600,000	$0	$0	$6,600,000	$0	$0	$0	$0	$0	$6,600,000	
Total		$174,615,619	$6,200,000	$168,415,619	$7,743,619	$43,660,100	$117,011,900	$3,495,103	$17,885,449	$41,176,357	$4,248,516	$25,774,651	$75,835,543	
Total per ERU					$3,996	$6,537	$3,918	$1,803	$2,678	$1,379	$2,192	$3,859	$2,539	
Total - All Agencies						$168,415,619			$62,556,909			$105,858,710		
Total Current Contracted/Permitted Capacity By Agency (mgd)											0.70	3.47	11.48	15.65
Percent Equity By Agency (total net equity contributed/total asset value)											55%	59%	65%	63%
Net Equity Contributed ("paid for") at Regional Entity Formation (total current capacity x percent equity, mgd)											0.38	2.05	7.44	9.87

Regional Capacity Allocation For Current and Future Expansion Phases

Partner Agency	*Regional Entity Formation*: Net Equity Expressed as Capacity (mgd)	Net Equity Expressed as Percentage (%)	*Phase 4*: Incremental Capacity Needed (mgd)	Incremental Capacity Allocation (%)	Total System Capacity (mgd)	Total System Allocation (%)	*Phase 5*: Incremental Capacity Needed (mgd)	Incremental Capacity Allocation (%)	Total System Capacity (mgd)	Total System Allocation (%)	*Phase 6*: Incremental Capacity Needed (mgd)	Incremental Capacity Allocation (%)	Total System Capacity (mgd)	Total System Allocation (%)
Incremental Approach - Through Phase 6 - WFP Projections														
Ridgefield	0.38	3.9%									1.11	10.7%	1.49	7.4%
Battle Ground	2.05	20.7%									3.00	29.0%	5.05	25.0%
CRWWD - SCTP Service Area	7.44	75.4%									6.22	60.2%	13.66	67.6%
Total	9.87	100.0%									10.33	100.0%	20.20	100.0%

Notes and Assumptions:
1. Model assumes one regional system of assets, capacity allocated to agencies by flow
2. Capital costs (debt service) to be allocated to each agency by incremental flows (yellow), R&R costs to be allocated to each agency by total system flow allocation (blue)
3. Permitted capacity of system elements based on Ridgefield Treatment Plant + Salmon Creek Treatment Plant during Phase 4 and 5 (green)
4. Ridgefield Treatment Plant to be decommissioned prior to Phase 6.
5. Transition date assume to be January 1, 2012.

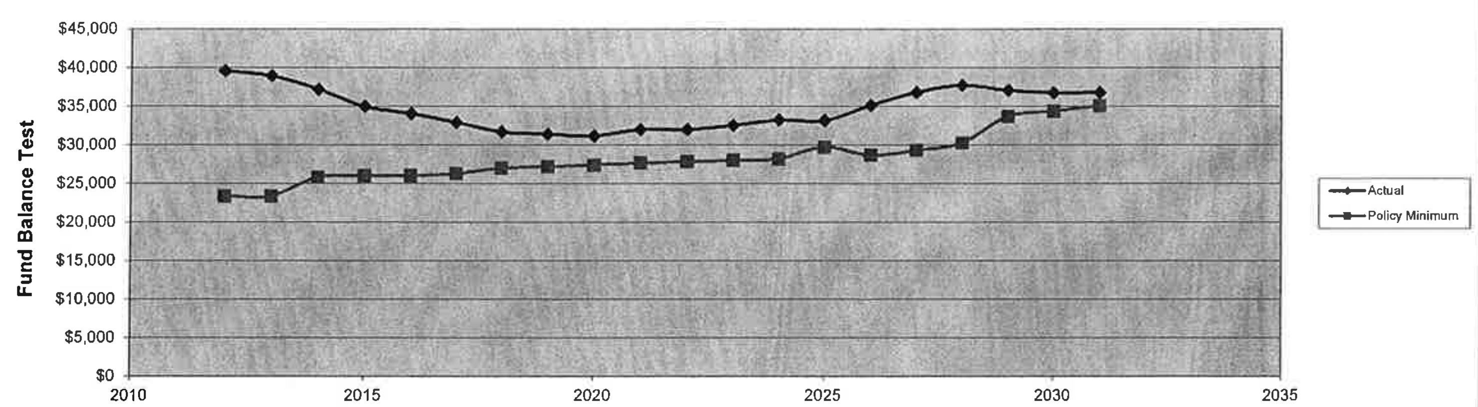
Clark Regional Wastewater District - Simplified Long-Term Financial Model - RIDGEFIELD MERGER

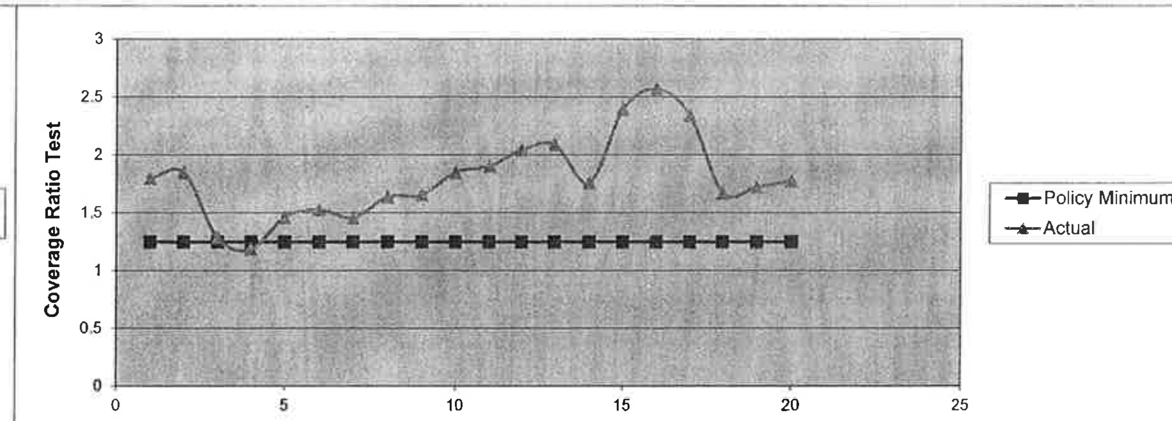
Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total (20 Year)	Percentage (20 Year)
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
ERUs																							
New ERUs (low growth assumptions)	300	300	400	400	400	400	500	500	500	500	600	600	600	600	700	700	700	700	700	700	700		
Total ERUs (end of year)	34,448	34,748	35,148	35,548	35,948	36,348	36,848	37,348	37,848	38,348	38,948	39,548	40,148	40,748	41,448	42,148	42,848	43,548	44,248	44,948	45,648		
ERUs - Ridgefield																							
New ERUs (low growth assumptions)	68	82	96	110	115	120	125	130	135	140	146	152	159	168	178	188	199	210	210	210	210		
Total ERUs (end of year)	1,938	2,020	2,116	2,226	2,341	2,461	2,586	2,716	2,851	2,991	3,137	3,289	3,448	3,616	3,794	3,982	4,181	4,391	4,601	4,811	5,021		
Rate Differential			$19.00	$18.73	$18.44	$18.14	$17.83	$17.50	$17.16	$16.81	$16.45	$16.07	$15.67	$15.25	$14.81	$14.34	$13.84	$13.31	$12.79	$12.26	$11.74		
Financial Parameters																							
Interest Rate (on fund balances)	0.50%	0.50%	0.50%	0.50%	0.50%	1.00%	1.00%	1.00%	1.00%	1.00%	1.50%	1.50%	1.50%	1.50%	1.50%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%		
Inflation Rate - General	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	3.00%	3.00%	3.00%	3.00%	3.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%		
Salaries and Wages - COLA/Step	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%		
Benefits - Annual Adjustments	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%		
Rates/Charges																							
GFC ($/ERU)	$1,898	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,575	$1,575	$1,575	$1,575	$1,575	$1,654	$1,654	$1,654	$1,654	$1,654		
RFC ($/ERU)	$4,444	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,150	$3,150	$3,150	$3,150	$3,150	$3,308	$3,308	$3,308	$3,308	$3,308		
Monthly Rate ($/ERU/month)	$34.00	$34.00	$35.00	$36.00	$37.00	$38.00	$38.00	$39.00	$40.00	$41.00	$42.00	$42.00	$43.00	$44.00	$44.00	$45.00	$46.00	$46.00	$47.00	$48.00	$49.00		
Rates/Charges - Ridgefield																							
GFC ($/ERU)	$0	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,625	$2,625	$2,625	$2,625	$2,625	$2,756	$2,756	$2,756	$2,756	$2,756		
RFC ($/ERU)	$6,950	$4,500	$4,500	$4,500	$4,500	$4,500	$4,500	$4,500	$4,500	$4,500	$4,500	$4,725	$4,725	$4,725	$4,725	$4,725	$4,961	$4,961	$4,961	$4,961	$4,961		
Monthly Rate ($/ERU/month)	$49.79	$55.00	$54.00	$54.73	$55.44	$56.14	$55.83	$56.50	$57.16	$57.81	$58.45	$58.07	$58.67	$59.25	$58.81	$59.34	$59.84	$59.31	$59.79	$60.26	$60.74		
		0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56		
Beginning Balance - All Funds	**$41,950**	**$40,350**	**$39,570**	**$38,917**	**$37,201**	**$34,967**	**$34,043**	**$32,913**	**$31,681**	**$31,392**	**$31,181**	**$31,994**	**$31,965**	**$32,512**	**$33,219**	**$33,153**	**$35,114**	**$36,791**	**$37,729**	**$37,052**	**$36,737**		
Revenues																							Percentage of Revenues
Monthly Service Charges	$14,026	$14,116	$14,678	$15,270	$15,872	$16,483	$16,689	$17,362	$18,047	$18,744	$19,479	$19,781	$20,562	$21,357	$21,700	$22,571	$23,459	$23,845	$24,758	$25,688	$26,635	$397,097	71.0%
Monthly Service Charges - RF	$1,158	$1,306	$1,340	$1,426	$1,519	$1,617	$1,690	$1,797	$1,909	$2,026	$2,149	$2,239	$2,372	$2,511	$2,614	$2,768	$2,931	$3,051	$3,226	$3,403	$3,583	$45,479	8.1%
Connection Fees																							
GFC (applies to all new ERUs)	$569	$450	$600	$600	$600	$600	$750	$750	$750	$750	$900	$945	$945	$945	$1,103	$1,103	$1,158	$1,158	$1,158	$1,158	$1,158	$17,578	3.1%
RFC (applies to 95% of new ERUs)	$1,267	$855	$1,140	$1,140	$1,140	$1,140	$1,425	$1,425	$1,425	$1,425	$1,710	$1,796	$1,796	$1,796	$2,095	$2,095	$2,199	$2,199	$2,199	$2,199	$2,199	$33,398	6.0%
Connection Fees - RF																							
GFC (applies to all new ERUs)	$0	$205	$240	$275	$288	$300	$313	$325	$338	$350	$365	$399	$417	$441	$467	$494	$548	$579	$579	$579	$579	$8,079	1.4%
RFC (applies to all new ERUs)	$473	$369	$432	$495	$518	$540	$563	$585	$608	$630	$657	$718	$751	$794	$841	$888	$987	$1,042	$1,042	$1,042	$1,042	$14,543	2.6%
Connection Charge Credits	$0	-$300	-$350	-$400	-$450	-$500	-$500	-$500	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	-$3,000	-0.5%
Investment Interest																							
Interest Revenue	$196	$202	$198	$195	$186	$350	$340	$329	$317	$314	$468	$480	$479	$488	$498	$663	$702	$736	$755	$741	$735	$9,175	1.6%
Intergovernmental Revenue																							
SCWMS - BG	$655																						
Operations		$658	$676	$695	$714	$735	$793	$816	$839	$863	$892	$966	$999	$1,033	$1,068	$1,109	$1,205	$1,252	$1,301	$1,351	$1,404	$19,370	3.5%
R&R and Capital (no Phase 5)		$127	$359	$58	$315	$115	$115	$115	$115	$230	$230	$230	$230	$345	$345	$345	$345	$460	$1,190	$1,190	$1,190	$7,648	1.4%
Solids Handling - RF	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	0.0%
Contract Cleaning - All	$40	$41	$42	$42	$43	$44	$45	$46	$47	$48	$49	$51	$52	$54	$55	$58	$60	$62	$65	$67	$70	$1,042	0.2%
Pretreatment - CC	$80	$82	$83	$85	$87	$88	$90	$92	$94	$96	$98	$101	$104	$108	$111	$115	$120	$125	$130	$135	$140	$2,083	0.4%
Other Miscellaneous Revenue	$275	$280	$286	$291	$297	$303	$309	$315	$322	$328	$338	$348	$359	$369	$380	$396	$411	$428	$445	$463	$481	$7,150	1.3%
Total Revenues	*$18,738*	*$18,390*	*$19,724*	*$20,172*	*$21,129*	*$21,816*	*$22,622*	*$23,457*	*$24,810*	*$25,804*	*$27,335*	*$28,054*	*$29,066*	*$30,239*	*$31,278*	*$32,604*	*$34,126*	*$34,936*	*$36,846*	*$38,017*	*$39,216*	*$559,642*	*100.0%*
Expenditures																							Percentage of Expenditures
Collection System Operations																							
Staff Costs - Salaries and Wages	$2,796	$2,880	$2,967	$3,056	$3,147	$3,242	$3,339	$3,439	$3,543	$3,649	$3,758	$3,871	$3,987	$4,107	$4,230	$4,357	$4,488	$4,622	$4,761	$4,904	$5,051	$77,397	13.7%
Staff Costs - Benefits	$1,171	$1,229	$1,291	$1,355	$1,423	$1,494	$1,569	$1,647	$1,730	$1,816	$1,907	$2,002	$2,103	$2,208	$2,318	$2,434	$2,556	$2,684	$2,818	$2,959	$3,107	$40,650	7.2%
Supplies	$433	$442	$451	$460	$469	$479	$488	$498	$508	$518	$534	$550	$566	$583	$601	$625	$650	$676	$703	$731	$760	$11,289	2.0%
Professional Services	$186	$190	$194	$198	$202	$206	$210	$214	$218	$223	$229	$236	$243	$250	$258	$268	$279	$290	$302	$314	$326	$4,849	0.9%
Contract Services	$152	$155	$158	$161	$164	$168	$171	$174	$178	$181	$187	$193	$198	$204	$210	$219	$228	$237	$246	$256	$266	$3,955	0.7%
Other Expenses	$983	$1,003	$1,023	$1,043	$1,064	$1,086	$1,107	$1,129	$1,152	$1,175	$1,210	$1,247	$1,284	$1,323	$1,362	$1,417	$1,473	$1,532	$1,594	$1,657	$1,724	$25,606	4.5%
Increased Maintenance Level of Service	$0	$125	$125	$125	$125	$125	$250	$250	$250	$250	$250	$375	$375	$375	$375	$375	$500	$500	$500	$500	$500	$6,250	1.1%
Increased Operations Level of Service	$0	$60	$60	$60	$60	$60	$90	$90	$90	$90	$90	$120	$120	$120	$120	$120	$150	$150	$150	$150	$150	$2,100	0.4%
ADD - District Adm/Mgmt/Eng/Fin	$378	$389	$401	$414	$427	$440	$454	$468	$483	$498	$516	$534	$552	$572	$592	$614	$637	$662	$687	$713	$740	$10,794	1.9%
ADD - RF PS/PL Operation	$0	$0	$0	$318	$325	$331	$338	$345	$351	$359	$369	$380	$392	$404	$416	$432	$450	$468	$486	$506	$526	$7,195	1.3%
ADD - District Conveyance of RF Flows	$0	$0	$0	$106	$108	$110	$113	$115	$117	$120	$123	$127	$131	$135	$139	$144	$150	$156	$162	$169	$175	$2,398	0.4%
ADD - Operation of RF Collection System	$400	$408	$416	$424	$433	$442	$450	$459	$469	$478	$492	$507	$522	$538	$554	$576	$599	$623	$648	$674	$701	$10,417	1.8%
Collection System Capital Costs																							
District Debt Service (MG/H)	$152	$150	$149	$147	$146	$28	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$621	0.1%
CHNG - District I-5 Corridor Capital Projects	$0	$0	$0	$242	$242	$242	$242	$242	$242	$242	$242	$242	$242	$242	$242	$242	$242	$352	$352	$352	$352	$4,795	0.9%
District R&R Projects (Ongoing)	$1,354	$1,250	$1,250	$1,250	$1,250	$1,250	$1,500	$1,500	$1,500	$1,500	$1,500	$2,000	$2,000	$2,000	$2,000	$2,000	$2,500	$2,500	$2,500	$2,500	$2,500	$36,250	6.4%
District CIP Projects (Ongoing)	$1,338	$1,250	$1,250	$1,250	$1,250	$1,250	$1,500	$1,500	$1,500	$1,500	$1,500	$2,000	$2,000	$2,000	$2,000	$2,000	$2,500	$2,500	$2,500	$2,500	$2,500	$36,250	6.4%
ADD - T-7 Sewer Line PWTF Debt Service	$130	$96	$95	$94	$93	$92	$92	$91	$90	$89	$88	$87	$87	$86	$85	$0	$0	$0	$0	$0	$0	$1,264	0.2%
ADD - RF PS/PL - Phase 1-2-3 Debt Service	$0	$0	$0	$1,847	$1,847	$1,847	$1,847	$2,392	$2,392	$2,392	$2,392	$2,392	$2,392	$2,392	$2,392	$2,392	$2,392	$2,587	$2,587	$2,587	$2,587	$41,653	7.4%
ADD - RF Collection System CIP	$400	$408	$416	$424	$433	$442	$450	$459	$469	$478	$492	$507	$522	$538	$554	$576	$599	$623	$648	$674	$701	$10,417	1.8%
ADD - RF Collection System R&R	$100	$102	$104	$106	$108	$110	$113	$115	$117	$120	$123	$127	$131	$135	$139	$144	$150	$156	$162	$169	$175	$2,604	0.5%
Treatment Operations																							
Clark County																							
Staff Costs - Salaries and Wages	$1,021	$1,051	$1,083	$1,115	$1,149	$1,183	$1,219	$1,255	$1,293	$1,332	$1,372	$1,413	$1,455	$1,499	$1,544	$1,590	$1,638	$1,687	$1,738	$1,790	$1,843	$28,248	5.0%
Staff Costs - Benefits	$491	$516	$541	$568	$597	$627	$658	$691	$726	$762	$800	$840	$882	$926	$972	$1,021	$1,072	$1,126	$1,182	$1,241	$1,303	$17,050	3.0%
Materials and Supplies	$328	$335	$341	$348	$355	$362	$369	$377	$384	$392	$404	$416	$428	$441	$455	$473	$492	$511	$532	$553	$575	$8,544	1.5%
Services	$1,115	$1,137	$1,160	$1,183	$1,207	$1,231	$1,256	$1,281	$1,307	$1,333	$1,373	$1,414	$1,456	$1,500	$1,545	$1,607	$1,671	$1,738	$1,807	$1,880	$1,955	$29,041	5.2%
Interfund	$244	$249	$254	$259	$265	$270	$275	$281	$286	$292	$301	$310	$319	$329	$339	$352	$366	$381	$396	$412	$428	$6,364	1.1%
Pretreatment	$80	$82	$83	$85	$87	$88	$90	$92	$94	$96	$98	$101	$104	$108	$111	$115	$120	$125	$130	$135	$140	$2,083	0.4%
City of Vancouver	$523	$534	$544	$555	$566	$578	$589	$601	$613	$625	$644	$664	$683	$704	$725	$754	$784	$816	$848	$882	$917	$13,629	2.4%
City of Battle Ground (MG/H)	$50	$51	$52	$53	$54	$55	$56	$58	$59	$60	$62	$64	$66	$67	$70	$72	$75	$78	$81	$85	$88	$1,306	0.2%
ADD - RF Plant Operation	$439	$450	$462	$474	$486	$499	$513	$526	$540	$555	$573	$592	$612	$632	$653	$678	$705	$733	$761	$791	$822	$12,057	2.1%
Treatment Capital Costs																							

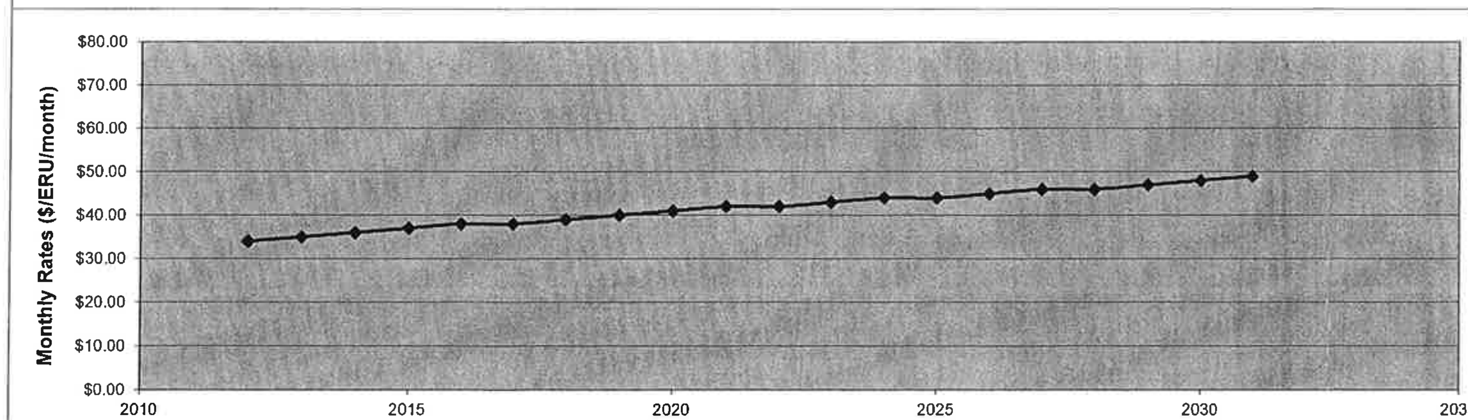
Clark County - Phase 2 - PWTF	$157	$155	$30	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$185	0.0%
Clark County - Phase 3 - Rev Bonds (REFI)	$3,276	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$22,667	4.0%
District - Phase 4 - Rev Bonds	$1,091	$1,094	$1,092	$1,093	$1,096	$1,092	$1,094	$1,094	$1,096	$1,092	$1,095	$1,092	$1,095	$1,095	$1,094	$0	$0	$0	$0	$0	$0	$15,313	2.7%
District - Phase 4 - PWTF	$1,146	$1,141	$1,135	$1,130	$1,125	$1,119	$1,114	$1,109	$1,103	$1,098	$1,093	$1,087	$1,082	$1,024	$482	$427	$425	$423	$0	$0	$0	$16,118	2.9%
District - Phase 4 - SRF	$66	$66	$66	$66	$66	$66	$66	$66	$66	$66	$66	$66	$66	$66	$66	$66	$0	$0	$0	$0	$0	$990	0.2%
ADD - RF Existing Debt	$0	$382	$384	$385	$381	$382	$383	$383	$383	$383	$382	$269	$160	$164	$157	$0	$0	$0	$0	$0	$0	$4,576	0.8%
ADD - RF Plant R&R	$100	$102	$104	$106	$108	$110	$113	$115	$117	$120	$123	$127	$131	$135	$139	$144	$150	$156	$162	$169	$175	$2,604	0.5%
Future CC Capital Projects (total costs)																							
R&R Projects (Specific)	$0	$318	$1,311	$0	$869	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,499	0.4%
R&R Projects (Ongoing)	$235	$235	$250	$250	$500	$500	$500	$500	$500	$1,000	$1,000	$1,000	$1,000	$1,500	$1,500	$1,500	$1,500	$2,000	$2,000	$2,000	$2,000	$21,235	3.8%
CHNG - Phase 5 Debt Service	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,775	$1,775	$1,775	$1,775	$1,775	$1,775	$1,775	$12,426	2.2%
ADD - Phase 6 Debt Service	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,173	$3,173	$3,173	$9,519	1.7%
Total Expenditures	*$20,337*	*$19,170*	*$20,377*	*$21,888*	*$23,363*	*$22,741*	*$23,752*	*$24,690*	*$25,099*	*$26,015*	*$26,523*	*$28,083*	*$28,519*	*$29,532*	*$31,344*	*$30,644*	*$32,449*	*$33,998*	*$37,524*	*$38,331*	*$39,171*	*$563,210*	*100.0%*
Ending Fund Balance - All Funds	**$40,350**	**$39,570**	**$38,917**	**$37,201**	**$34,967**	**$34,043**	**$32,913**	**$31,681**	**$31,392**	**$31,181**	**$31,994**	**$31,965**	**$32,512**	**$33,219**	**$33,153**	**$35,114**	**$36,791**	**$37,729**	**$37,052**	**$36,737**	**$36,783**		

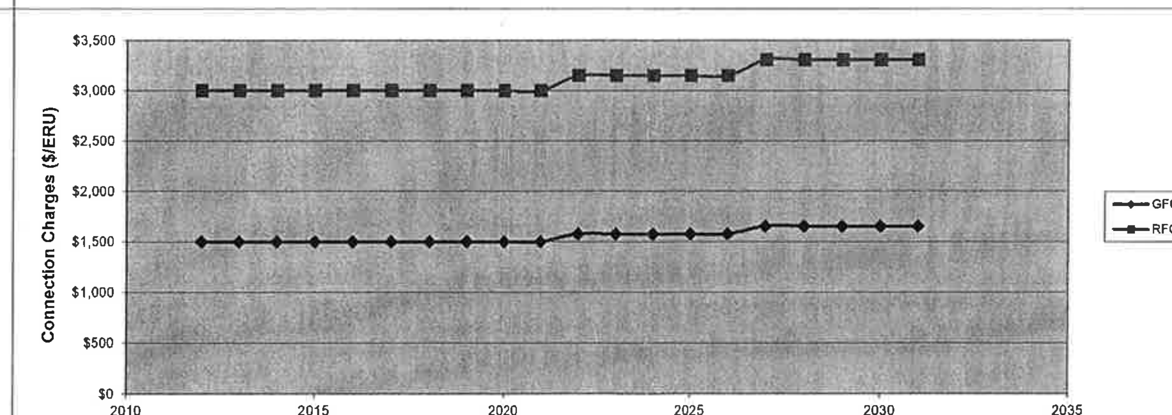
Clark Regional Wastewater District - Simplified Long-Term Financial Model - RIDGEFIELD MERGER

Year		2011 0	2012 1	2013 2	2014 3	2015 4	2016 5	2017 6	2018 7	2019 8	2020 9	2021 10	2022 11	2023 12	2024 13	2025 14	2026 15	2027 16	2028 17	2029 18	2030 19	2031 20
Minimum Fund Balance Test																						
Operating Reserve (months)	3		$2,322	$2,402	$2,591	$2,679	$2,769	$2,901	$2,998	$3,098	$3,201	$3,323	$3,489	$3,620	$3,756	$3,897	$4,061	$4,270	$4,448	$4,633	$4,825	$5,025
Rate Stabilization Reserve (months)	3		$2,822	$2,902	$3,091	$3,179	$3,269	$3,401	$3,498	$3,598	$3,701	$3,823	$3,989	$4,120	$4,256	$4,397	$4,561	$4,770	$4,948	$5,133	$5,325	$5,525
Debt Service Reserve (months)	12		$4,218	$4,084	$6,137	$6,130	$6,002	$5,971	$6,509	$6,505	$6,494	$6,492	$6,368	$6,256	$6,201	$7,426	$6,036	$5,967	$6,270	$9,020	$9,020	$9,020
R&R Reserve - Regional ($)	$4,000		$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,300	$4,600	$4,900	$5,200	$5,500
R&R Reserve - Local ($)	$10,000		$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Total Fund Balance Required			$23,361	$23,388	$25,819	$25,987	$26,040	$26,273	$27,005	$27,201	$27,396	$27,638	$27,846	$27,996	$28,213	$29,719	$28,657	$29,308	$30,267	$33,686	$34,370	$35,070
Test Met?			YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Coverage Ratio Test																						
Debt Service Coverage Ratio - Target			1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Total Revenue Less Operating Expense (incl. all CC costs)			$5,261	$5,391	$6,425	$5,912	$7,106	$7,384	$7,833	$8,786	$8,868	$9,909	$9,966	$10,453	$10,583	$11,058	$11,727	$12,411	$12,010	$13,182	$13,583	$13,984
Annual Debt Service (all District held debt)			$2,929	$2,921	$5,004	$4,996	$4,868	$4,838	$5,376	$5,372	$5,361	$5,358	$5,235	$5,123	$5,068	$6,292	$4,902	$4,834	$5,137	$7,887	$7,887	$7,887
Debt Service Coverage Ratio - Actual			1.80	1.85	1.28	1.18	1.46	1.53	1.46	1.64	1.65	1.85	1.90	2.04	2.09	1.76	2.39	2.57	2.34	1.67	1.72	1.77
Test Met?			YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES









Notes and Assumptions:

1. All Clark County R&R and Capacity projects assume 23% participation by Battle Ground, Clark County operating costs assumed 20% BG participation growing to 23% over planning period.
2. Clark County operations, debt service, capital, and R&R fund balances assumed constant over planning period (and not accounted for in District beginning or ending fund balances).
3. CC operations fund balance of $500k assumed in fund balance test calculations, additional fund balance held at District to meet policy test.
4. CC R&R fund balance of $1,000k assumed in fund balance test calculations, additional fund balance held at District to meet policy test.

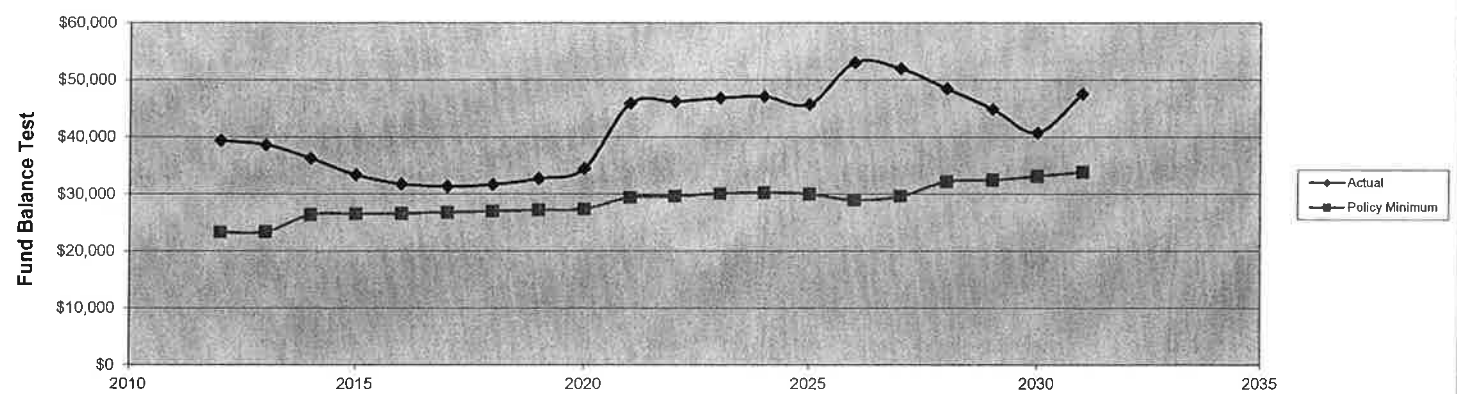
Clark Regional Wastewater District - Simplified Long-Term Financial Model - RIDGEFIELD MERGER

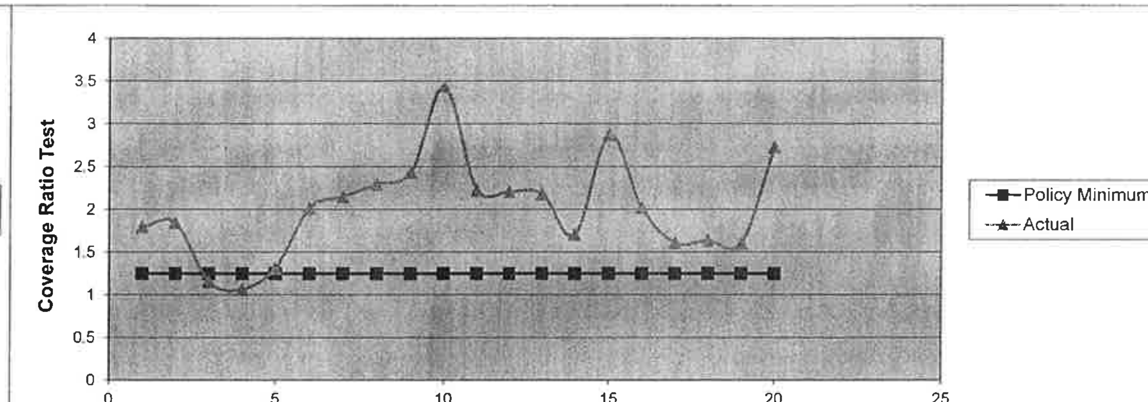
Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Total (20 Year)	Percentage (20 Year)
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
ERUs																							
New ERUs (Low Mod with Investment)	300	300	400	400	400	400	900	900	900	900	1,400	1000	1000	1000	1100	2500	1100	1100	1100	1100	1500		
Total ERUs (end of year)	34,448	34,748	35,148	35,548	35,948	36,348	37,248	38,148	39,048	39,948	41,348	42,348	43,348	44,348	45,448	47,948	49,048	50,148	51,248	52,348	53,848		
ERUs - Ridgefield																							
New ERUs (Low Mod with Investment)	68	82	96	110	115	120	350	350	350	400	1,625	475	525	550	550	750	550	550	550	550	1750		
Total ERUs (end of year)	1,938	2,020	2,116	2,226	2,341	2,461	2,811	3,161	3,511	3,911	5,536	6,011	6,536	7,086	7,636	8,386	8,936	9,486	10,036	10,586	12,336		
Rate Differential			$19.00	$18.73	$18.44	$18.14	$17.26	$16.39	$15.51	$14.51	$10.45	$9.26	$7.95	$6.58	$5.20	$3.33	$1.95	$0.57	$0.00	$0.00	$0.00		
Financial Parameters																							
Interest Rate (on fund balances)	0.50%	0.50%	0.50%	0.50%	0.50%	1.00%	1.00%	1.00%	1.00%	1.00%	1.50%	1.50%	1.50%	1.50%	1.50%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%		
Inflation Rate - General	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	3.00%	3.00%	3.00%	3.00%	3.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%		
Salaries and Wages - COLA/Step	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%		
Benefits - Annual Adjustments	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%		
Rates/Charges																							
GFC ($/ERU)	$1,898	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,575	$1,575	$1,575	$1,575	$1,575	$1,654	$1,654	$1,654	$1,654	$1,654		
RFC ($/ERU)	$4,444	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,150	$3,150	$3,150	$3,150	$3,150	$3,308	$3,308	$3,308	$3,308	$3,308		
Monthly Rate ($/ERU/month)	$34.00	$34.00	$35.00	$36.00	$37.00	$38.00	$38.00	$39.00	$39.00	$40.00	$40.00	$39.55	$39.10	$38.65	$38.20	$37.75	$37.30	$36.85	$36.40	$35.95	$35.50		
Rates/Charges - Ridgefield																							
GFC ($/ERU)	$0	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,625	$2,625	$2,625	$2,625	$2,625	$2,756	$2,756	$2,756	$2,756	$2,756		
RFC ($/ERU)	$6,950	$4,500	$4,500	$4,500	$4,500	$4,500	$4,500	$4,500	$4,500	$4,500	$4,500	$4,725	$4,725	$4,725	$4,725	$4,725	$4,961	$4,961	$4,961	$4,961	$4,961		
Monthly Rate ($/ERU/month)	$49.79	$55.00	$54.00	$54.73	$55.44	$56.14	$55.26	$55.39	$54.51	$54.51	$50.45	$48.81	$47.05	$45.23	$43.40	$41.08	$39.25	$37.43	$36.40	$35.95	$35.50		
Beginning Balance - All Funds	$41,950	$40,250	$39,368	$38,610	$36,241	$33,350	$31,754	$31,345	$31,656	$32,698	$34,460	$45,884	$46,183	$46,804	$47,094	$45,733	$53,077	$51,963	$48,471	$44,868	$40,745		
Revenues																							Percentage of Revenues
Monthly Service Charges	$14,026	$14,116	$14,678	$15,270	$15,872	$16,483	$16,780	$17,643	$18,064	$18,959	$19,511	$19,861	$20,104	$20,337	$20,581	$21,154	$21,708	$21,932	$22,145	$22,346	$22,620	$380,164	58.5%
Monthly Service Charges - RF	$1,158	$1,306	$1,340	$1,426	$1,519	$1,617	$1,748	$1,985	$2,182	$2,428	$2,860	$3,382	$3,542	$3,696	$3,834	$3,949	$4,079	$4,137	$4,264	$4,448	$4,882	$58,623	9.0%
Connection Fees																							
GFC (applies to all new ERUs)	$569	$450	$600	$600	$600	$600	$1,350	$1,350	$1,350	$1,350	$2,100	$1,575	$1,575	$1,575	$1,733	$3,938	$1,819	$1,819	$1,819	$1,819	$2,481	$30,502	4.7%
RFC (applies to 95% of new ERUs)	$1,267	$855	$1,140	$1,140	$1,140	$1,140	$2,565	$2,565	$2,565	$2,565	$3,990	$2,993	$2,993	$2,993	$3,292	$7,481	$3,456	$3,456	$3,456	$3,456	$4,713	$57,954	8.9%
Connection Fees - RF																							
GFC (applies to all new ERUs)	$0	$205	$240	$275	$288	$300	$875	$875	$875	$1,000	$4,063	$1,247	$1,378	$1,444	$1,444	$1,969	$1,516	$1,516	$1,516	$1,516	$4,823	$27,363	4.2%
RFC (applies to all new ERUs)	$473	$369	$432	$495	$518	$540	$1,575	$1,575	$1,575	$1,800	$7,313	$2,244	$2,481	$2,599	$2,599	$3,544	$2,729	$2,729	$2,729	$2,729	$8,682	$49,254	7.6%
Connection Charge Credits	$0	-$300	-$350	-$400	-$450	-$500	-$500	-$500	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	-$3,000	-0.5%
Investment Interest																							
Interest Revenue	$196	$201	$197	$193	$181	$333	$318	$313	$317	$327	$517	$688	$693	$702	$706	$915	$1,062	$1,039	$969	$897	$815	$11,384	1.8%
Intergovernmental Revenue																							
SCWMS - BG	$655																						
Operations		$658	$676	$695	$714	$735	$793	$816	$839	$863	$892	$966	$999	$1,033	$1,068	$1,109	$1,205	$1,252	$1,301	$1,351	$1,404	$19,370	3.0%
R&R and Capital (no Phase 5, 7)		$127	$359	$58	$315	$115	$115	$115	$115	$230	$230	$230	$230	$345	$1,075	$345	$345	$903	$903	$903	$903	$7,961	1.2%
Solids Handling - RF	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	0.0%
Contract Cleaning - All	$40	$41	$42	$42	$43	$44	$45	$46	$47	$48	$49	$51	$52	$54	$55	$58	$60	$62	$65	$67	$70	$1,042	0.2%
Pretreatment - CC	$80	$82	$83	$85	$87	$88	$90	$92	$94	$96	$98	$101	$104	$108	$111	$115	$120	$125	$130	$135	$140	$2,083	0.3%
Other Miscellaneous Revenue	$275	$280	$286	$291	$297	$303	$309	$315	$322	$328	$338	$348	$359	$369	$380	$396	$411	$428	$445	$463	$481	$7,150	1.1%
Total Revenues	*$18,738*	*$18,390*	*$19,723*	*$20,170*	*$21,124*	*$21,800*	*$26,063*	*$27,190*	*$28,344*	*$29,993*	*$41,961*	*$33,687*	*$34,510*	*$35,254*	*$36,877*	*$44,972*	*$38,510*	*$39,398*	*$39,741*	*$40,131*	*$52,015*	*$649,851*	*100.0%*
Expenditures																							Percentage of Expenditures
Collection System Operations																							
Staff Costs - Salaries and Wages	$2,796	$2,880	$2,967	$3,056	$3,147	$3,242	$3,339	$3,439	$3,543	$3,649	$3,758	$3,871	$3,987	$4,107	$4,230	$4,357	$4,488	$4,622	$4,761	$4,904	$5,051	$77,397	12.0%
Staff Costs - Benefits	$1,171	$1,229	$1,291	$1,355	$1,423	$1,494	$1,569	$1,647	$1,730	$1,816	$1,907	$2,002	$2,103	$2,208	$2,318	$2,434	$2,556	$2,684	$2,818	$2,959	$3,107	$40,650	6.3%
Supplies	$433	$442	$451	$460	$469	$479	$488	$498	$508	$518	$534	$550	$566	$583	$601	$625	$650	$676	$703	$731	$760	$11,289	1.8%
Professional Services	$186	$190	$194	$198	$202	$206	$210	$214	$218	$223	$229	$236	$243	$250	$258	$268	$279	$290	$302	$314	$326	$4,849	0.8%
Contract Services	$152	$155	$158	$161	$164	$168	$171	$174	$178	$181	$187	$193	$198	$204	$210	$219	$228	$237	$246	$256	$266	$3,955	0.6%
Other Expenses	$983	$1,003	$1,023	$1,043	$1,064	$1,086	$1,107	$1,129	$1,152	$1,175	$1,210	$1,247	$1,284	$1,323	$1,362	$1,417	$1,473	$1,532	$1,594	$1,657	$1,724	$25,606	4.0%
Increased Maintenance Level of Service	$0	$125	$125	$125	$125	$125	$250	$250	$250	$250	$250	$375	$375	$375	$375	$375	$500	$500	$500	$500	$500	$6,250	1.0%
Increased Operations Level of Service	$0	$60	$60	$60	$60	$60	$90	$90	$90	$90	$90	$120	$120	$120	$120	$120	$150	$150	$150	$150	$150	$2,100	0.3%
ADD - District Adm/Mgmt/Eng/Fin	$378	$389	$401	$414	$427	$440	$454	$468	$483	$498	$516	$534	$552	$572	$592	$614	$637	$662	$687	$713	$740	$10,794	1.7%
ADD - RF PS/PL Operation	$0	$0	$0	$318	$325	$331	$338	$345	$351	$359	$369	$380	$392	$404	$416	$432	$450	$468	$486	$506	$526	$7,195	1.1%
ADD - District Conveyance of RF Flows	$0	$0	$0	$106	$108	$110	$113	$115	$117	$120	$123	$127	$131	$135	$139	$144	$150	$156	$162	$169	$175	$2,398	0.4%
ADD - Operation of RF Collection System	$400	$408	$416	$424	$433	$442	$450	$459	$469	$478	$492	$507	$522	$538	$554	$576	$599	$623	$648	$674	$701	$10,417	1.6%
Collection System Capital Costs																							
District Debt Service (MG/H)	$152	$150	$149	$147	$146	$28	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$621	0.1%
CHNG - District I-5 Corridor Capital Projects	$0	$0	$0	$242	$242	$242	$242	$242	$242	$242	$242	$242	$352	$352	$352	$352	$352	$352	$352	$352	$352	$5,344	0.8%
District R&R Projects (Ongoing)	$1,354	$1,250	$1,250	$1,250	$1,250	$1,250	$1,500	$1,500	$1,500	$1,500	$1,500	$2,000	$2,000	$2,000	$2,000	$2,000	$2,500	$2,500	$2,500	$2,500	$2,500	$36,250	5.6%
District CIP Projects (Ongoing)	$1,338	$1,250	$1,250	$1,250	$1,250	$1,250	$3,000	$3,000	$3,000	$3,000	$3,000	$3,500	$3,200	$3,200	$3,200	$3,200	$3,800	$3,800	$3,800	$3,800	$3,800	$56,550	8.8%
ADD - T-7 Sewer Line PWTF Debt Service	$130	$96	$95	$94	$93	$92	$92	$91	$90	$89	$88	$87	$87	$86	$85	$0	$0	$0	$0	$0	$0	$1,264	0.2%
ADD - RF PS/PL - Phase 1-2-3 Debt Service	$0	$0	$0	$2,392	$2,392	$2,392	$2,392	$2,392	$2,392	$2,392	$2,392	$2,392	$2,587	$2,587	$2,587	$2,587	$2,587	$2,587	$2,587	$2,587	$2,587	$44,807	7.0%
ADD - RF Collection System CIP	$500	$510	$520	$531	$541	$552	$1,126	$1,149	$1,172	$1,195	$1,231	$2,536	$2,612	$2,690	$2,771	$2,882	$2,997	$3,117	$3,242	$3,371	$3,506	$38,250	6.0%
ADD - RF Collection System R&R	$100	$102	$104	$106	$108	$110	$113	$115	$117	$120	$123	$127	$131	$135	$139	$144	$150	$156	$162	$169	$175	$2,604	0.4%
Treatment Operations																							
Clark County																							
Staff Costs - Salaries and Wages	$1,021	$1,051	$1,083	$1,115	$1,149	$1,183	$1,219	$1,255	$1,293	$1,332	$1,372	$1,413	$1,455	$1,499	$1,544	$1,590	$1,638	$1,687	$1,738	$1,790	$1,843	$28,248	4.4%
Staff Costs - Benefits	$491	$516	$541	$568	$597	$627	$658	$691	$726	$762	$800	$840	$882	$926	$972	$1,021	$1,072	$1,126	$1,182	$1,241	$1,303	$17,050	2.7%
Materials and Supplies	$328	$335	$341	$348	$355	$362	$369	$377	$384	$392	$404	$416	$428	$441	$455	$473	$492	$511	$532	$553	$575	$8,544	1.3%
Services	$1,115	$1,137	$1,160	$1,183	$1,207	$1,231	$1,256	$1,281	$1,307	$1,333	$1,373	$1,414	$1,456	$1,500	$1,545	$1,607	$1,671	$1,738	$1,807	$1,880	$1,955	$29,041	4.5%
Interfund	$244	$249	$254	$259	$265	$270	$275	$281	$286	$292	$301	$310	$319	$329	$339	$352	$366	$381	$396	$412	$428	$6,364	1.0%
Pretreatment	$80	$82	$83	$85	$87	$88	$90	$92	$94	$96	$98	$101	$104	$108	$111	$115	$120	$125	$130	$135	$140	$2,083	0.3%
City of Vancouver	$523	$534	$544	$555	$566	$578	$589	$601	$613	$625	$644	$664	$683	$704	$725	$754	$784	$816	$848	$882	$917	$13,629	2.1%
City of Battle Ground (MG/H)	$50	$51	$52	$53	$54	$55	$56	$58	$59	$60	$62	$64	$66	$67	$70	$72	$75	$78	$81	$85	$88	$1,306	0.2%
ADD - RF Plant Operation	$439	$450	$462	$474	$486	$499	$513	$526	$540	$555	$573	$592	$612	$632	$653	$678	$705	$733	$761	$791	$822	$12,057	1.9%
Treatment Capital Costs																							
Clark County - Phase 2 - PWTF	$157	$155	$30	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$185	0.0%

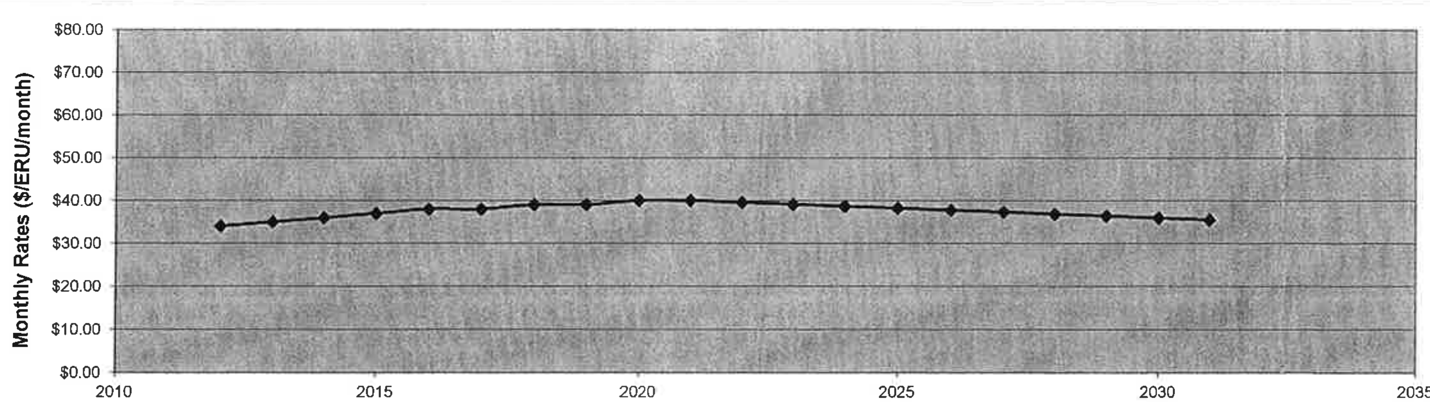
Clark County - Phase 3 - Rev Bonds (REFI)	$3,276	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$1,133	$22,667	3.5%
District - Phase 4 - Rev Bonds	$1,091	$1,094	$1,092	$1,093	$1,096	$1,092	$1,094	$1,094	$1,096	$1,092	$1,095	$1,092	$1,095	$1,095	$1,094	$0	$0	$0	$0	$0	$0	$15,313	2.4%
District - Phase 4 - PWTF	$1,146	$1,141	$1,135	$1,130	$1,125	$1,119	$1,114	$1,109	$1,103	$1,098	$1,093	$1,087	$1,082	$1,024	$482	$427	$425	$423	$0	$0	$0	$16,118	2.5%
District - Phase 4 - SRF	$66	$66	$66	$66	$66	$66	$66	$66	$66	$66	$66	$66	$66	$66	$66	$66	$0	$0	$0	$0	$0	$990	0.2%
ADD - RF Existing Debt	$0	$382	$384	$385	$381	$382	$383	$383	$383	$383	$382	$269	$160	$164	$157	$0	$0	$0	$0	$0	$0	$4,576	0.7%
ADD - RF Plant R&R	$100	$102	$104	$106	$108	$110	$113	$115	$117	$120	$123	$127	$131	$135	$139	$144	$150	$156	$162	$169	$175	$2,604	0.4%
Future CC Capital Projects (total costs)																							
R&R Projects (Specific)	$0	$318	$1,311	$0	$869	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,499	0.4%
R&R Projects (Ongoing)	$235	$235	$250	$250	$500	$500	$500	$500	$500	$1,000	$1,000	$1,000	$1,000	$1,500	$1,500	$1,500	$1,500	$2,000	$2,000	$2,000	$2,000	$21,235	3.3%
CHNG - Phase 5 Debt Service	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,775	$1,775	$1,775	$1,775	$1,775	$1,775	$1,775	$1,775	$1,775	$1,775	$1,775	$19,527	3.0%
ADD - Phase 6 Debt Service	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,173	$3,173	$3,173	$3,173	$3,173	$3,173	$3,173	$22,210	3.5%
ADD - Phase 7 Debt Service	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,926	$1,926	$1,926	$1,926	$7,705	1.2%
Total Expenditures	*$20,437*	*$19,272*	*$20,481*	*$22,539*	*$24,016*	*$23,396*	*$26,472*	*$26,879*	*$27,302*	*$28,232*	*$30,536*	*$33,387*	*$33,889*	*$34,964*	*$38,238*	*$37,627*	*$39,624*	*$42,890*	*$43,343*	*$44,254*	*$45,202*	*$642,543*	*100.0%*
Ending Fund Balance - All Funds	**$40,250**	**$39,368**	**$38,610**	**$36,241**	**$33,350**	**$31,754**	**$31,345**	**$31,656**	**$32,698**	**$34,460**	**$45,884**	**$46,183**	**$46,804**	**$47,094**	**$45,733**	**$53,077**	**$51,963**	**$48,471**	**$44,868**	**$40,745**	**$47,558**		

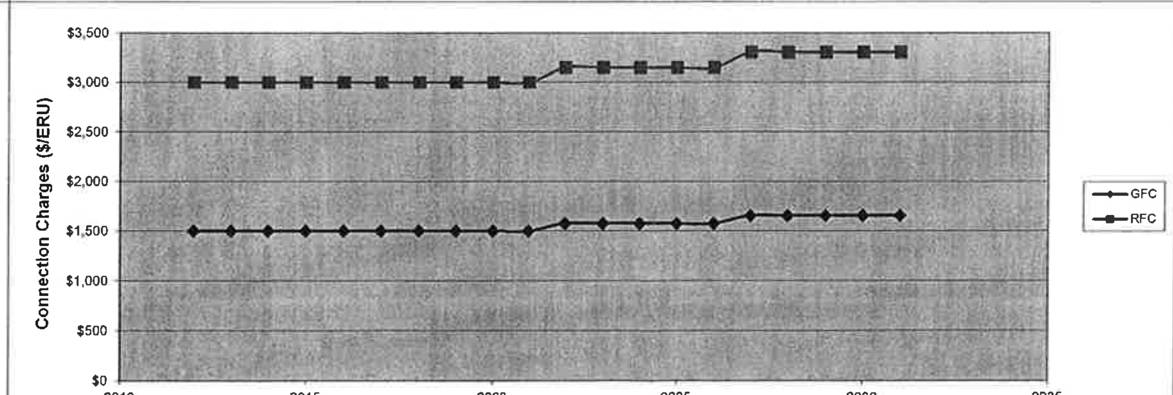
Clark Regional Wastewater District - Simplified Long-Term Financial Model - RIDGEFIELD MERGER

Year	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Minimum Fund Balance Test																					
Operating Reserve (months)	3	$2,322	$2,402	$2,591	$2,679	$2,769	$2,901	$2,998	$3,098	$3,201	$3,323	$3,489	$3,620	$3,756	$3,897	$4,061	$4,270	$4,448	$4,633	$4,825	$5,025
Rate Stabilization Reserve (months)	3	$2,822	$2,902	$3,091	$3,179	$3,269	$3,401	$3,498	$3,598	$3,701	$3,823	$3,989	$4,120	$4,256	$4,397	$4,561	$4,770	$4,948	$5,133	$5,325	$5,525
Debt Service Reserve (months)	12	$4,218	$4,084	$6,682	$6,674	$6,546	$6,516	$6,509	$6,505	$6,494	$8,267	$8,143	$8,336	$8,282	$7,731	$6,341	$6,272	$8,197	$7,773	$7,773	$7,773
R&R Reserve - Regional ($)	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,300	$4,600	$4,900	$5,200	$5,500
R&R Reserve - Local ($)	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Total Fund Balance Required		$23,361	$23,388	$26,364	$26,531	$26,585	$26,818	$27,005	$27,201	$27,396	$29,413	$29,621	$30,076	$30,293	$30,024	$28,962	$29,613	$32,193	$32,439	$33,123	$33,823
Test Met?		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Coverage Ratio Test																					
Debt Service Coverage Ratio - Target		1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Total Revenue Less Operating Expense (incl. all CC costs)		$5,261	$5,390	$6,423	$5,907	$7,090	$10,825	$11,565	$12,320	$13,057	$24,535	$15,599	$15,897	$15,597	$16,657	$24,095	$16,795	$16,472	$16,076	$15,698	$26,783
Annual Debt Service (all District held debt)		$2,929	$2,921	$5,549	$5,541	$5,413	$5,382	$5,376	$5,372	$5,361	$7,134	$7,010	$7,203	$7,148	$9,770	$8,380	$8,312	$10,236	$9,813	$9,813	$9,813
Debt Service Coverage Ratio - Actual		1.80	1.85	1.16	1.07	1.31	2.01	2.15	2.29	2.44	3.44	2.23	2.21	2.18	1.70	2.88	2.02	1.61	1.64	1.60	2.73
Test Met?		YES	YES	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES









Notes and Assumptions:

1. All Clark County R&R and Capacity projects assume 23% participation by Battle Ground, Clark County operating costs assumed 20% BG participation growing to 23% over planning period.
2. Clark County operations, debt service, capital, and R&R fund balances assumed constant over planning period (and not accounted for in District beginning or ending fund balances).
3. CC operations fund balance of $500k assumed in fund balance test calculations, additional fund balance held at District to meet policy test.
4. CC R&R fund balance of $1,000k assumed in fund balance test calculations, additional fund balance held at District to meet policy test.

Clark Regional Wastewater District - Simplified Long-Term Financial Model - Rate Differential Analysis

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Total	Percentage
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
ERUs - Ridgefield																											
New ERUs (low growth assumptions)	68	82	96	110	115	120	125	130	135	140	146	152	159	168	178	188	199	210	210	210	210	210	210	210	210	3,991	
Total ERUs (low growth assumptions)	1,938	2,020	2,116	2,226	2,341	2,461	2,586	2,716	2,851	2,991	3,137	3,289	3,448	3,616	3,794	3,982	4,181	4,391	4,601	4,811	5,021	5,231	5,441	5,651	5,861		
Incremental ERUs Due to Junction Area Capacity (above low growth assumptions)																											
New ERUs	0	0	0	0	0	30	30	30	30	40	40	40	40	50	50	50	50	60	60	60	60	70	70	70	70	1,000	
Total ERUs	1,938	2,020	2,116	2,226	2,341	2,491	2,646	2,806	2,971	3,151	3,337	3,529	3,728	3,946	4,174	4,412	4,661	4,931	5,201	5,471	5,741	6,021	6,301	6,581	6,861		
Differential Rates/Charges - Ridgefield																											
Connection Charge Differential ($/ERU)	$0	$0	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,750	$2,888	$2,888	$2,888	$2,888	$2,888	$3,032	$3,032	$3,032	$3,032	$3,032	$3,032	$3,032	$3,032	$3,032		
Monthly Rate Differential ($/ERU/month)	$0.00	$0.00	$18.00	$18.00	$18.00	$18.00	$17.00	$17.00	$17.00	$17.00	$16.00	$16.00	$16.00	$16.00	$12.00	$12.00	$10.00	$10.00	$8.00	$8.00	$6.00	$6.00	$4.00	$4.00	$0.00		
Beginning Balance - All Funds	**$0**	**$0**	**-$300**	**$61**	**$432**	**$792**	**$95**	**-$587**	**-$1,222**	**-$1,310**	**-$1,322**	**-$1,319**	**-$1,237**	**-$1,097**	**-$863**	**-$751**	**-$577**	**-$409**	**-$146**	**$27**	**$227**	**$318**	**$459**	**$472**	**$498**		
Revenues																											Percentage of Revenues
Monthly Rate Differential ($)	$0	$0	$447	$469	$493	$522	$524	$556	$589	$624	$623	$659	$697	$737	$585	$618	$544	$576	$486	$512	$404	$423	$296	$309	$0	$11,693	51.2%
Connection Charge Differential ($/ERU)	$0	$0	$264	$303	$316	$413	$426	$440	$454	$495	$512	$554	$575	$629	$658	$687	$755	$819	$819	$819	$819	$849	$849	$849	$849	$14,151	61.9%
Connection Charge Credits	$0	-$300	-$350	-$400	-$450	-$500	-$500	-$500	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	-$3,000	-13.1%
Total Revenues	*$0*	*-$300*	*$361*	*$371*	*$359*	*$434*	*$450*	*$496*	*$1,043*	*$1,119*	*$1,134*	*$1,214*	*$1,271*	*$1,366*	*$1,243*	*$1,305*	*$1,299*	*$1,394*	*$1,305*	*$1,331*	*$1,222*	*$1,272*	*$1,145*	*$1,158*	*$849*	*$22,844*	*100.0%*
Expenditures																											Percentage of Expenditures
Discovery Corridor Wastewater Transmission System																											
Phase 1 project cost ($18.5M)																											
Annual debt service (@ 2% blended rate)	$0	$0	$0	$0	$0	$1,131	$1,131	$1,131	$1,131	$1,131	$1,131	$1,131	$1,131	$1,131	$1,131	$1,131	$1,131	$1,131	$1,131	$1,131	$1,131	$1,131	$1,131	$1,131	$1,131	$22,628	100.0%
Total Expenditures	*$0*	*$0*	*$0*	*$0*	*$0*	*$1,131*	*$1,131*	*$1,131*	*$1,131*	*$1,131*	*$1,131*	*$1,131*	*$1,131*	*$1,131*	*$1,131*	*$1,131*	*$1,131*	*$1,131*	*$1,131*	*$1,131*	*$1,131*	*$1,131*	*$1,131*	*$1,131*	*$1,131*	*$22,628*	*100.0%*
Ending Fund Balance - All Funds	**$0**	**-$300**	**$61**	**$432**	**$792**	**$95**	**-$587**	**-$1,222**	**-$1,310**	**-$1,322**	**-$1,319**	**-$1,237**	**-$1,097**	**-$863**	**-$751**	**-$577**	**-$409**	**-$146**	**$27**	**$227**	**$318**	**$459**	**$472**	**$498**	**$216**		

APPENDIX K

DISCOVERY CLEAN WATER ALLIANCE INTERLOCAL FORMATION AGREEMENT

Discovery Clean Water Alliance Interlocal Formation Agreement

September 27, 2012

FINAL FOR APPROVAL – 9/10/12

TABLE OF CONTENTS

Discovery Clean Water Alliance Interlocal Formation Agreement

I. RECITALS: Purpose of Alliance. The purpose of the Discovery Clean Water Alliance is to provide cooperative municipal utility services to its Members in order to assist those Members with a cost-effective mechanism for supporting regional economic development in an environmentally-sound manner, to help manage Member service costs in a financially-transparent manner, to provide reliable and predictable service, and to provide a framework that encourages the participation of all Clark County municipal utilities that protects both regional and jurisdictional autonomy.

II. DEFINITIONS

II.A. "Additional Members" mean any municipal corporations, other than Original Members, that provide wastewater services and later join the Alliance pursuant to Section IV.G.

II.B. "Administrative Lead" means any Member or other entity serving in that capacity, consistent with Sections V.A and V.B. If the Alliance determines to undertake administrative responsibilities itself, using its own staff, then as used in this Agreement the term "Administrative Lead" shall mean the chief executive officer of the Alliance.

II.C. "Agreement" means this Discovery Clean Water Alliance Interlocal Formation Agreement.

II.D. "Alliance" means the Discovery Clean Water Alliance.

II.E. "Alliance Operations Date" means the date on which the Board has determined that (1) Regional Assets have been transferred to or for the benefit of the Alliance, (2) outstanding wastewater obligations have been retired, defeased, or transferred as necessary, (3) the Alliance is undertaking responsibility for providing service under this Agreement, and (4) the Members receiving service from the Alliance become responsible for paying Regional Service Charges. The Alliance Operations Date is expected to be January 1, 2015, unless the Board designates a different date.

II.F. "Allocated Capacity" means the MMF of wastewater that a Member may discharge into the Regional Assets, as described in Exhibit B and as supplemented or adjusted in a Capital Plan.

II.G. "Average Annual Flow" or "AAF" means the total flow of wastewater in millions of gallons during any 12 month consecutive period, or any shorter period approved by the Board, divided by the number of days in that period, expressed in MGD.

II.H. "Battle Ground" means the City of Battle Ground, Washington.

II.I. "Board" means the Board of Directors of the Alliance.

II.J. "Bonds" means bonds, notes or other evidences of indebtedness issued by the Alliance or by another entity (*e.g.*, by a Member) on behalf of the Alliance.

II.K. "Capital Plan" means one or more long-range capital improvement plans for the addition, replacement, or improvement of Regional Assets, and including an identification of Regional Assets and the allocation of transmission and treatment capacity, as they may be supplemented or adjusted from the initial Regional Assets and allocations described in Exhibit B.

II.L. "Capital Budget" or "Capital Budgets(s)" means one or more capital budgets adopted consistent with Section VI.A.

II.M. "Clark County" means Clark County, Washington.

II.N. "CRWWD" means Clark Regional Wastewater District.

II.O. "Director" means an individual who serves on the Board of the Alliance.

II.P. "Dual Majority Vote" means a Board vote requiring the affirmative vote of both (1) the Directors representing more than 50% of the Members, and (2) the Directors representing the Members comprising more than 50% of the Treatment Facilities Allocated Capacity for the year in which the vote is taken, as set forth in the then-current Capital Plan.

II.Q. "Dual Super-Majority Vote" means, except as provided in Section IV.F.3, a Board vote requiring the affirmative vote of both (1) the Directors representing more than 60% of the Members, and (2) the Directors representing the Members comprising more than 60% of the Treatment Facilities Allocated Capacity for the year in which the vote is taken, as set forth in the then-current Capital Plan.

II.R. "Financial Policies" mean the financial policies attached as Exhibit A and incorporated herein by reference, including such amended or replacement Financial Policies adopted consistent with this Agreement.

II.S. "Member" (collectively, "Members") means one or more governmental members of the Alliance, and includes Original Members and Additional Members.

II.T. "MGD" means million gallons per day, referring to a rate of flow.

II.U. "Maximum Monthly Flow" or "MMF" means a measure of flow expressed in MGDs and representing the highest average monthly flow, taking into account the total flow of wastewater discharged into the Regional Assets, measured in millions of gallons for any calendar month divided by the total number of days in that month.

II.V. "Operating Budget" means the periodic operating budget prepared consistent with Section VI.A.

II.W. "Operator(s)" means any Member or other entity serving in that capacity, consistent with Sections V.A and V.C. If the Alliance determines to undertake Operator responsibilities itself, using its own staff, then as used in this Agreement the term "Operator" shall mean the chief executive officer of the Alliance.

II.X. "Original Members" means the governmental entities initially executing this Agreement and forming the Alliance, *i.e.,* Clark County, the Clark Regional Wastewater District, the City of Battle Ground and the City of Ridgefield.

II.Y. "Pre-Alliance Agreements" means, collectively: (1) the Joint Contract Among Clark County, the City of Battle Ground and Hazel Dell Sewer District for Sewage Treatment, Disposal and Transport Services, dated March 28, 1995; (2) the Contract Between Hazel Dell Sewer District and the City of Battle Ground for Sewage Treatment Capacity and Payment, dated March 28, 1995; and (3) the Interlocal Agreement Concerning Phase IV Sewer Treatment Plant Improvements Between Clark County, the Hazel Dell Sewer District and the City of Battle Ground, dated August 9, 2005.

II.Z. "Regional Assets" means the assets listed in Exhibit B, attached and incorporated herein by reference, and such additional assets as the Board may later determine to be Regional Assets under Section VII.B.

II.AA. "Regional Service Charges" means charges for service imposed by the Alliance under Section VI.B.

II.BB. "Ridgefield" means the City of Ridgefield, Washington.

II.CC. "Significant Decisions" mean the decisions of the Board listed as such in Section IV.F.

II.DD. "Transmission Infrastructure" means transmission lines, force mains, interceptors, pump stations and other facilities required to transfer wastewater from a Member's collection system to a Treatment Facility.

II.EE. "Treasurer" means the person or entity appointed pursuant to RCW 39.106.050(13) and Section VI.E.

II.FF. "Treatment Facility" or "Treatment Facilities" means treatment plants, outfalls and other facilities required to treat wastewater.

III. FORMATION

III.A. **Creation of Alliance.** The Discovery Clean Water Alliance is formed under the Joint Municipal Utility Services Authority Act, Chapter 39.106 RCW.

III.B. **Purpose and Powers.** The purpose of the Alliance is to jointly provide regional wastewater transmission and treatment for Alliance's Members and other contracting municipal wastewater utilities. The Alliance may exercise all powers authorized by Chapter 39.106 RCW, subject to the terms of this Agreement. The Alliance will provide all necessary wastewater Treatment Facilities and services for its Members, together with all necessary Transmission Infrastructure facilities and services for its Members who opt for those services. The Alliance may provide additional utility services as the Members may determine appropriate.

III.C. **Name of Entity.** The name of the joint municipal utility authority formed under this Agreement is the Discovery Clean Water Alliance (the "Alliance").

III.D. **Membership**. The membership of the Alliance is comprised of Clark County, the Clark Regional Wastewater District, the City of Battle Ground and the City of Ridgefield (collectively, the "Original Members"), together with any other municipal corporations providing wastewater services that later join pursuant to Section IV.G ("Additional Members").

III.E. **Termination of Existing Agreements.** As of the Alliance Operations Date, the Pre-Alliance Agreements shall be terminated. All existing capacity rights of the Original Members under the terms of the Pre-Alliance Agreements are and will be transferred to each of the Original Members under this Agreement, subject to later adjustments under a future Capital Plan.

IV. ORGANIZATION STRUCTURE AND BOARD POWERS

IV.A. **Board Composition.** The Board of Directors of the Alliance consists of one Director and any alternate Directors appointed by each member. Directors and alternates must be elected officials of the appointing Member. More than one alternate may be appointed to serve on the Board when a Member's designated Director is unable to participate in a meeting, but only one Director from each Member may actively participate in a Board meeting at any time. The Members may appoint and remove their appointee Directors in such manner as they individually determine.

IV.B. **Board Powers**. The Board shall exercise all policy, oversight and governance powers of the Alliance, and carry out responsibilities specified in this Agreement. The Board shall adopt appropriate rules, including Board rules and operating procedures.

IV.C. **Board Officers and Legal Counsel**. Board officers will consist of a Chair, Vice-Chair and Secretary, and such other officers as the Board may deem appropriate. Legal counsel to the Alliance, if any, shall report directly to the Board.

IV.D. Board Committees and Advisory Boards. The Board will create such committees and advisory boards as it deems appropriate, including committees to consider finance issues, maintenance and operations matters, and capital planning and infrastructure. Committees and advisory boards may include either Directors or non-Directors, or both.

IV.E. Board Meetings. Notice of Board meetings must conform to the requirements of the Open Public Meetings Act (Chapter 42.30 RCW). Additional requirements regarding notice, preparation and distribution of agendas, minutes and conduct of meetings may be established by resolution or in rules adopted by the Board.

IV.F. Board Voting. Significant Decisions of the Board require either a Dual Majority Vote or a Dual Super-Majority Vote (*i.e.,* a "House & Senate" system).

IV.F.1. "Significant Decisions" requiring a Dual Majority Vote are:

IV.F.1.a. The borrowing of money and the issuance of Bonds by the Alliance or by another entity (*e.g.,* by a Member) on behalf of the Alliance;

IV.F.1.b. A change in the identity of the Administrative Lead and/or Operator(s), whether a change to a different governmental entity or to the Alliance itself, except as otherwise provided in Section V.A;

IV.F.1.c. A change in the ownership of material Regional Assets, *i.e.*, the sale, lease, mortgage or other encumbrance, transfer, or disposal of any part of the Regional Assets that are used, useful or material in the operation of those Regional Assets and the provision of services, but excluding Regional Assets or portions thereof that have become unserviceable, inadequate, obsolete or unfit to be used in the operation of the Regional Assets, or are no longer necessary, material to or useful to the operation of the Regional Assets;

IV.F.1.d. The adoption of an Operating Budget;

IV.F.1.e. The adoption of a Capital Budget; and

IV.F.1.f. The exercise of eminent domain by the Alliance.

IV.F.2. "Significant Decisions" requiring a Dual Super-Majority Vote are:

IV.F.2.a. Amendments to this Agreement;

IV.F.2.b. Amendments to the Financial Policies;

IV.F.2.c. The adoption of a Capital Plan and the allocation of costs pursuant to any such Capital Plan, except that upon the request of any Member, the Dual Super-Majority Vote with respect to the portion of the Capital Budget for any discrete Regional Asset will be taken with only the Members served or to be served by that Regional Asset voting based on Allocated Capacity in that Regional Asset, and only their votes being considered in calculating the required 60%-or-more of allocated flow under the Dual Super-Majority Vote;

IV.F.2.d. The material allocation or reallocation of treatment or transmission capacity (except that any reallocation that reduces an Original Member's capacity to less than the Allocated Capacity shown in Exhibit B shall require the agreement of that Original Member unless that Original Member is in default as described in Section VI.B.2);

IV.F.2.e. The determination of the appropriate payment obligations of a withdrawing Member under Section IV.H;

IV.F.2.f. Admissions of new Members (except as provided in Section IV.G); and

IV.F.2.g. Termination of this Agreement (see Section IX).

IV.F.3. If any Member is dissatisfied with a decision of the Board on a decision requiring a Dual Super-Majority vote, that Member may file with the Board Chair within 10 business days of the decision a request to refer the decision to mediation. The mediator shall be selected by the Board and approved by that Member. The mediator shall complete the mediation process within 30 days of the filing of the request, unless the Board and that Member agree to a longer period. If the Member is not satisfied with the outcome of the mediation process, that Member may file with the Board Chair within 10 business days of completion of the mediation process a request for mandatory final binding arbitration. The arbitrator shall be selected by the Board and approved by that Member. The arbitration hearing shall be completed within 45 days of the filing of the request for arbitration, unless the Board and that Member agree to a longer period. The arbitrator may reverse the Board's decision only if the arbitrator determines that Board's action was unlawful, arbitrary or capricious. Costs of mediation and arbitration will be divided equally between the Alliance and the Member requesting that mediation and/or arbitration.

IV.F.4. Except as provided in Sections IV.F.2.d and VII.C, decisions that are not listed as Significant Decisions are made by majority vote of the Directors present and voting.

IV.F.5. A Member may not exercise its voting rights so long as it is in default under Section VI.B.2.

IV.G. Additional Members. The inclusion of each Additional Member requires a Dual Super-Majority Vote. Each Additional Member will be expected to "buy in" to the Alliance by paying for its allocable share of Regional Assets and/or by contributing Regional Assets, in such amounts as will be determined by the Board. However, if a city other than an Original Member assumes service to a portion of a Member water-sewer district that is served by the Regional Assets, and the portion assumed represents (cumulatively) more than five percent of that water-sewer district's then-current service as measured by Average Annual Flow, the assuming city automatically may become a Member upon its application to do so. A later reduction of Average Annual Flow to less than five percent will not affect that entity's membership status.

IV.H. Withdrawal of a Member. In order to prevent remaining Members to be left with "stranded costs," if any Member withdraws it is responsible for the full cost of its withdrawal to the Alliance, including without limitation the payment or provision for payment of its allocable share of capital costs incurred (and Bonds issued) in anticipation of its needs while a Member, consistent with then-current Capital Plans and Capital Budgets. The Board, acting in its reasonable judgment, has the sole power to determine the appropriate payment obligations of a withdrawing Member. The Director representing a Member proposing to leave the Alliance may not vote on the determination of that leaving Member's payment obligations to the Alliance.

IV.I. Effects of Service Area Adjustments. Upon a service area adjustment, if customers are shifted from one Member to another, the Members' respective capacities, voting rights (based on Allocated Capacity), and obligations shall automatically adjust accordingly.

IV.J. Public Records. The Alliance will comply with the requirements of the State Public Records Law, Chapter 42.56 RCW.

V. ADMINISTRATION AND OPERATIONS

V.A. Administration and Operations: Allocation of Responsibilities. Alliance staff (if any) and/or a service provider by contract with the Alliance, shall administer and manage the Alliance and the Regional Assets. (A service provider shall be referred to in this Agreement as "Administrative Lead"). Alliance staff (if any) and/or one or more service providers by contract with the Alliance shall operate the Regional Assets (the service providers shall be referred to individually or collectively in this Agreement as "Operator" or "Operators"). CRWWD shall serve as the initial Administrative Lead for at least five years after the Alliance Operations Date. Clark County shall serve as Operator of the Salmon Creek Wastewater Management System and the Battle Ground Force Main System and Ridgefield shall serve as Operator of the Ridgefield Treatment System (all as described in Exhibit B) for at least five years after the Alliance Operations Date. The initial designation of CRWWD as Administrative Lead and the initial designation of Clark

County and Ridgefield as Operators may be adjusted upon the mutual agreement of the Board and the Member serving as Administrative Lead or as an Operator. The Board periodically, and at least every five years after the Alliance Operations Date shall review, and may adjust, Administrative Lead and Operator arrangements. Changes in Administrative Lead or Operator responsibilities shall take effect no sooner than the calendar year beginning at least 12 months after the decision to make the relevant change. In connection with the transfer of Administrative Lead or Operator responsibilities, the Alliance will use its best reasonable effort to provide that either the Alliance or the Member undertaking or contracting for the services provided by the Administrative Lead or Operator will hire each of the employees of the previous Administrative Lead or Operator who had previously performed the relevant services and who requests continued employment in that or a similar capacity.

V.B. Administrative Lead's Responsibilities. Under the Board's direction, and consistent with Board policies, the Administrative Lead will administer and manage the overall affairs of the Alliance, other than operation of the Regional Assets. The Administrative Lead shall have full power and authority to control the hiring and designating of staff and consultants to carry out its administrative and management functions. The Administrative Lead will prepare and oversee preparation of Operating Budgets, Capital Plans, Capital Budgets, and proposed Regional Service Charges (based on the Financial Policies) for the Board's review and approval. The Administrative Lead will administer and manage capital planning and capital improvements, including but not limited to expansion and/or upgrade of existing Regional Assets and acquisition, construction and/or upgrade of new Regional Assets, except that for improvements to existing Regional Assets where the cost of improvements is below a specified amount determined by the Board, an Operator may be charged with responsibility for managing those improvement projects. The Administrative Lead will report regularly to the Board on the administration and management of the Alliance. Neither the Board, nor an individual Board member or a governmental Member other than the Member serving as Administrative Lead, shall direct the Administrative Lead to appoint or remove its staff or consultants, nor shall the Board, an individual Board member or a governmental Member (other than the Administrative Lead) give orders to any employee or consultant working for the Administrative Lead. This restriction does not prohibit the Board, in open session, from fully and freely discussing, with representatives or staff of the Administrative lead, anything pertaining to appointments and removals of staff or consultants. The Administrative Lead will coordinate actively with the Operators.

V.C. Operator's Responsibilities for Day-to-Day Operations. Except as otherwise provided in this Agreement, and consistent with Board policies, the Operators will operate Regional Assets assigned to them. An Operator shall have full power and authority to control the operation of the Regional Assets for which it is responsible, including but not limited to hiring and designating of staff and consultants, making decisions on the use or application of processes, equipment and facilities and controlling other operating decisions. As part of its operational functions, an Operator will also manage capital improvements to existing Regional Assets it is operating where the cost of those improvements is below a specified amount determined by the Board. Neither the Board, nor an individual Board member or a governmental Member other than the Member serving as Operator, shall direct an Operator to appoint or remove its staff or consultants , nor shall the Board, an individual Board member or a governmental Member (other than the Operator) give orders to any employee or consultant working for the operator. This restriction does not prohibit the Board, in open session, from fully and freely discussing, with representatives or staff of the Operator, anything pertaining to appointments and removals of staff or consultants. The Operators will coordinate actively with the Administrative Lead and report regularly to the Board on the operations for which it is responsible.

V.D. Applicable Personnel Laws. An Operator and/or an Administrative Lead shall apply personnel laws to its own employees in carrying out its responsibilities under this Agreement. To the extent that the Alliance directly employs personnel, the personnel laws pertaining to code cities under Chapter 35A.41 shall apply, and if any Member is a code city with a population of more than 20,000, then the provisions of RCW 35A.41.010 shall apply.

V.E. Public Works and Procurement Laws. An Operator and/or an Administrative Lead other than the Alliance shall apply the public works and procurement laws applicable to that Operator's and/or Administrative Lead's form of government. If the Alliance is the Administrative Lead and/or the Operator of Regional Assets, in either or both of those capacities the Alliance shall apply the public works and procurement laws applicable to code cities under RCW 35A.40.210 and RCW 35.23.352. Consistent with RCW 35A.40.210, for purchases RCW 35.22.620 shall apply if any Member has a population of 20,000 or more, and otherwise the provisions of RCW 35.23.352 shall apply.

V.F. Eminent Domain Laws. The Alliance will apply and exercise the powers of eminent domain under the laws applicable to code cities pursuant to Chapter 8.12 RCW. Notwithstanding the foregoing, if a Member that is an Operator or an Administrative Lead exercises eminent domain with respect to a Regional Asset or proposed Regional Asset, that Operator shall apply the eminent domain laws applicable to that Operator's form of government.

V.G. Surplus Property. The Alliance will apply and exercise the powers respecting surplus property under the laws applicable to code cities pursuant to RCW 35A.11.010. Notwithstanding the foregoing, if a Member that is an Operator surpluses property with respect to a Regional Asset, that Operator shall apply the surplus property laws applicable to that Operator's form of government.

V.H. Regulatory Compliance. The Alliance must operate and maintain Regional Assets consistent with state and federal laws and regulations.

V.I. **Indemnification**. The Alliance will indemnify the Members, their officers and employees for damages caused by the willful misconduct or negligence of the Alliance, its officers, employees and agents.

V.J. **Ethics**. The Alliance, its officers and employees (if any) shall be subject to the provisions of Chapter 42.23 RCW.

VI. FINANCE, BUDGET AND REGIONAL SERVICE RATES

VI.A. **Operating Budgets, Capital Plans and Capital Budgets**. An annual or biennial Operating Budget and periodic Capital Budgets will be prepared by Alliance staff or consultants (or, if there is a separate Administrative Lead, then by the staff of or consultants selected by that entity). Similarly, prior to Board action, comprehensive Capital Plans, including a renewal and replacement fund mechanism, will be periodically prepared by Alliance staff (or, if there is an Administrative Lead, by the staff of that entity in cooperation with staff of any Operator).

VI.B. **Regional Service Charges for Regional Services.**

VI.B.1. The determination of Regional Service Charges paid by Members shall be consistent with the Financial Policies attached as Exhibit A. Unless determined otherwise by the Board of Directors, a basic principle of the Financial Policies is that each Member's responsibility for Regional Asset operating costs will be based on actual use of regional services during the previous year or years, as measured by Average Annual Flow, and that each Member's responsibility for capital costs will be based on agreed-upon Allocated Capacity as set forth in Exhibit B, as it may be amended from time to time. (By way of illustration, if Clark County does not contribute any flow to the Regional Facilities and does not plan to do so, it will not be responsible for either operating costs or capital costs.) Administrative costs of the Alliance not related directly to the day-to-day operations or capital costs will be determined by Treatment Facilities Allocated Capacity. A Member shall not be responsible for paying Regional Service Charges with respect to Regional Assets that are not used for service to that Member or in which that Member has no Allocated Capacity. Annual or biennial adjustments to Regional Service Charges based on changes in capital and operating requirements, revenues, and other factors, will be proposed by consultants and staff of the Administrative Lead, provided to the appropriate committee or committees for review and comment, and then provided to the Board for its consideration and action.

VI.B.2. The Alliance shall provide each Member with periodic invoices showing the Regional Service Charges payable by that Member for the billing period and the due date. Invoices shall be provided monthly or on other such periodic schedule as determined by the Board, but no more frequently than monthly nor less frequently than once every six months. The Board will determine a due date for all invoices. Payment of any and all invoices shall be due and payable on or before the due date, and shall be made by electronic, ACH, wire transfer or such other means as are agreed to by the Alliance and the Member. If a treasurer, trustee, fiscal agent or escrow agent is appointed in connection with the issuance of Bonds, the Alliance may require, and specify on the invoice, that certain amounts be provided directly to that entity, and the Member shall pay those amounts in the manner and to the entity so specified. If full payment of any invoice is not received on or before the due date, such payment shall be considered past due and a late payment charge shall accrue for each day that the invoice remains unpaid. The late payment charge shall equal the product of the unpaid amount and an interest rate established by the Board, plus an additional penalty established by the Board. Late payment charges shall continue to accumulate until the unpaid amount of the invoice and all late payment charges are paid in full. Further, if an invoice or any portion thereof remains unpaid for more than 60 days after the due date, the relevant Member shall be deemed in default, and the Alliance may pursue any legally available remedy at law or equity for the unpaid amount, including without limitation specific performance and collection of the late payment charge. The Alliance's right to enforce payments in this regard may be assigned to a treasurer, trustee, credit enhancement provider or other entity. If a Member is in default as described in this subsection VI.B.2, that Member shall have no right to vote on any matter before the Board until the default is fully remedied and the other Members are fully reimbursed for payments made in lieu of the defaulting Member.

VI.B.3. If any Member disputes all or any portion of an invoice, it shall notify the Alliance immediately upon receipt. If the Alliance does not concur, the Member shall remit payment of the invoice in full, accompanied by written notice to the Alliance indicating the portions of the invoice that the Member disputes and the reasons for the dispute. The Member and the Alliance shall make a good faith effort to resolve such dispute. If the Member fails to remit payment of the invoice in full pending resolution of the dispute, the Alliance may reduce or suspend the relevant services until the invoice and any late payment charges are paid. Further, the prevailing party in an action relating to the collection of that invoice shall be entitled to reasonable attorney fees and costs. If a Member substantially prevails in challenging Regional Service Charges that have been imposed, it will be repaid any overpayment together with interest computed at the interest rates earned by the State's local government investment pool. Whether a Member "substantially prevails" must be determined through the dispute resolution process, including a determination by a court or arbitrator.

VI.B.4. Upon an event of default as described in subsection VI.B.2 (*i.e.*, if a Member fails to pay an invoice within 60 days after the due date), the other Members that are also served by the Regional Assets providing the service for which Regional Service Charges are unpaid, shall promptly pay the Alliance (in addition to

Regional Service Charges otherwise due) the defaulting Member's Regional Service Charges in proportion to those other Members' Allocated Capacity (amongst themselves) of Regional Service Charges for service provided by those relevant Regional Assets. A Member shall not be responsible for paying a share of a defaulting Member's Regional Service Charges if and to the extent that the non-defaulting Member is not served by a Regional Asset that is used for service to the defaulting Member. The payment of a proportionate share of the existing defaulted Regional Service Charges by Members shall not relieve the defaulting Member of its liability for those payments. The Alliance shall have a right of recovery from the defaulting Member on behalf of the Members assuming the defaulting Member's obligations. The Alliance may commence such suits, actions or proceedings at law or in equity, including but not limited to suits for specific performance, as may be necessary or appropriate to enforce the obligations of this Agreement against any defaulting Member. The Alliance's right to enforce payments in this regard may be assigned to a treasurer, trustee, credit enhancement provider or other entity. Amounts recovered by the Alliance as payment of amounts due may be passed through to the Members assuming obligations in proportion to the share that each assumed, either in cash or in credit against future Regional Service Charges, as the Board shall determine. The prevailing party in any such suit, action or proceeding shall be entitled to recover its reasonable attorney fees and costs. To the extent that a Member is in default and its Regional Service Charges are paid by other Members, until the default is fully remedied and the other Members are fully reimbursed for payments made in lieu of the defaulting Member, those other Members shall have a right to the allocated capacity of the defaulting member in proportion to the payments they have made. Nothing in this Section VI.B.4 shall prevent a Member from entering into additional arrangements under which it agrees to provide assistance to another Member with respect to payment obligation under this Agreement.

VI.C. Contract Rates and "Spot Rates." Rates paid by non-Members under a contract with the Alliance will be determined in accordance with the relevant contract. Rates paid by non-Members without a contract will be determined by the Board.

VI.D. Finance and Borrowing. Borrowing for costs of Regional Assets, or for operating costs of the Alliance may be carried out either by the issuance of Bonds by the Alliance itself, or by or through any Member (on behalf of the Alliance or on behalf of that or another Member). The specific approach for any Alliance financing will be determined by the Board, based on the Board's determination of the best approach for producing the lowest interest rates, and other factors the Board deems relevant. The terms of Bonds, including such amounts, maturity dates, interest rates, covenants, debt service reserve requirements, rate stabilization mechanisms, and other terms and conditions, shall be approved by the Board. Any Member may determine to provide for the payment of its share of capital costs with available cash or by financing those costs independently of the Alliance. For the purpose of assisting the Alliance in financing and providing service through Regional Assets, any Member may, with or without payment or other consideration, loan or transfer funds, or provide credit support, to the Alliance or to another Member.

VI.D.1. For as long as any Bonds are outstanding that are payable from net Alliance revenue (or any portion thereof) are outstanding, the Alliance irrevocably pledges to establish, maintain and collect all Regional Service Charges in amounts sufficient to pay when due the principal of and interest on the Bonds (and, if the Bonds are issued by a Member or entity other than the Alliance, in addition to the foregoing pledge, to pledge to make timely payments to that issuer for the payment of principal of and interest on the Bonds), together with amounts sufficient to satisfy all debt service reserve requirements, debt service coverage requirements, and other covenants with respect to the Bonds.

VI.D.2. Each Member hereby irrevocably covenants that, consistent with the Financial Policies, it shall establish, maintain and collect rates, fees or other charges for wastewater and other services, facilities and commodities related to the services it receives from the Alliance and its own wastewater utility, and maintain reserves it deems appropriate, at levels adequate to provide revenues sufficient to enable the Member to: (a) make the payments required to be made under this Agreement; and (b) pay or provide for payment of all other charges and obligations payable from or constituting a charge or lien upon such revenues. Each Member hereby acknowledges that this covenant may be relied upon by Bond owners, consistent with this Agreement. Each Member shall pay the Regional Service Charges imposed on it whether or not the Regional Assets to be financed through the issuance of Bonds are completed, operable or operating, and notwithstanding the suspension, interruption, interference, reduction or curtailment in the operation of any Regional Assets for any reason whatsoever, in whole or in part. Regional Service Charges shall not be subject to any reduction, whether by offset or otherwise (except consistent with Section VI.B), and shall not be conditioned upon the performance or nonperformance of any Member, or of any entity under this or any other agreement or instrument. If, in connection with the issuance of obligations, any Member establishes a new lien position on revenues relating to its wastewater utility, that Member shall (x) covenant in its bond authorizing document(s) that the amounts to be paid to Alliance as Regional Service Charges shall be treated as part of that Member's internal operation and maintenance costs payable prior to debt service on those obligations; and (y) provide in its bond authorizing document(s) that the Member may, without being required to deposit money into its own bond fund, lease, convey, transfer, assign assets to the Alliance, or otherwise make assets available to the Alliance, where those assets will serve as Regional Assets to provide service to the Members. If any Member has existing outstanding revenue obligations relating to its wastewater utility, it shall include substantially similar "springing covenants" in the documents relating to any new parity obligations.

VI.D.3. To meet the requirements of United States Securities and Exchange Commission ("SEC") Rule 15c2-12(b)(5) (the "Rule") as applicable to participating underwriter for any Bonds and any obligation of each Member as an "Obligated Person" under the Rule, the Alliance and each Member agree to make an appropriate written undertaking, respectively, for the benefit of holders of the Bonds consistent with the requirements of the Rule.

VI.E. **Treasurer**. The Treasurer shall be appointed from time to time by resolution of the Board, consistent with the provisions of RCW 39.106.050(13).

VI.F. **Applicable Lien Laws**. If the Alliance provides direct retail services (*i.e.*, not through or on behalf of a Member), the Alliance will apply and exercise the powers of a water-sewer district under RCW 57.08.081 or other applicable water-sewer district law.

VII. ASSETS AND LIABILITIES

VII.A. **Ownership of Regional Assets**. Initial Regional Assets are listed in Exhibit B. The initial assumption, subject to adjustment or exception in a Capital Plan, is that Member assets that materially serve more than one Member will become Regional Assets. Regional Assets will be transferred to and owned by the Alliance on behalf of and for the benefit of its Members. In order to provide regional services, the Alliance also may, by contract, operate assets owned by any Member or other entity, in conjunction with Regional Assets. In the event that Regional Assets are no longer necessary, material to or useful to the Alliance, those assets will be sold, retired and/or distributed as the Board deems appropriate.

VII.B. **Acquisition of Regional Assets**. The Alliance will receive Regional Assets from its Members. Other Regional Assets may be contributed by Members or new Members who will receive, in exchange, a credit against the capital component of rates. Regional Assets may also be constructed or otherwise acquired by the Alliance. The Board may determine that facilities or other assets constitute Regional Assets, may add them to the list on Exhibit B, and the addition of assets to that list shall not constitute an amendment of this Agreement.

VII.C. **Distribution of Assets Upon Dissolution.** Regional Assets not subject to disposition pursuant to a contract among Members or a contract with another person or entity, shall, unless the Members unanimously determine otherwise, be distributed based on the original ownership of the Asset by a Member prior to transfer to the Alliance, and then, if the asset was not previously owned by a Member, based on the physical location of an asset within a Member jurisdiction other than Clark County. Notwithstanding the foregoing, upon dissolution the Salmon Creek Wastewater Management System (*i.e.*, the Regional Assets owned by Clark County at the time of formation) shall not be transferred to Clark County unless Clark County chooses to receive that asset. Instead, the Salmon Creek Wastewater Management System shall become jointly owned by Members on the basis of tenants-in-common, with ownership percentages based on allocated capacity shares as of date of dissolution.

VII.D. **Liabilities**. The Board may cause the Alliance assume certain liabilities in connection with the receipt of Regional Assets, and may also create or assume liabilities consistent with Section VI.D.

VIII. DISPUTE RESOLUTION

VIII.A. Except as provided in Sections IV.F.3 and VI.B.3, whenever any dispute arises between the Members or between the Members and the Alliance (referred to collectively in this Article as the "parties") under this Agreement which is not resolved by routine meetings or communications, the parties agree to seek resolution of such dispute by the process described in this Article. This provision shall not prevent the parties from engaging in any alternative dispute resolution process of their choosing upon mutual agreement.

VIII.B. The parties shall seek in good faith to resolve any such dispute or concern by meeting, as feasible. The meeting shall include the Chair of the Board and the representative(s) of the Member(s) involved in the disputed matter, such representative(s) to be designated by the Member(s) involved. If the Chair is a Director from a Member involved in the disputed matter, an alternate Director from a Member determined by the Board to be the most neutral Member with respect to the disputed matter, shall participate in the meeting in lieu of the Chair.

VIII.C. If the parties do not come to an agreement on the dispute or concern, any party may demand mediation through a process to be mutually agreed to in good faith between the parties within 30 days, which may include binding or nonbinding decisions or recommendations. The mediator(s) shall be individuals skilled in the legal and business aspects of the subject matter of this Agreement. The parties shall share equally the costs of mediation and assume their own costs.

VIII.D. If the parties are unable to reach a mutually agreeable solution as a result of mediation under change to Section VIII.C, the conflict resolution procedures in this Article will be exhausted and the parties may pursue any and all available remedies under applicable law. Nothing in this section shall prevent the parties from agreeing to arbitration, including binding arbitration, if they choose to do so.

IX. TERM AND TERMINATION. Term of agreement is perpetual, and may be terminated by Dual Super-Majority Vote. Termination of the Alliance is subject to rights of owners or holders of outstanding Bonds and other obligations made or issued by or on behalf of the Alliance.

X. MISCELLANEOUS

X.A. Applicable Law and Venue. This Agreement shall be governed by and construed in accordance with the laws of the State of Washington. Venue shall be in the Superior Court for the State of Washington in Clark County.

X.B. No Third Party Beneficiaries. There are no third-party beneficiaries to this Agreement except for the rights of owners of Bonds as provided in Section VI.D. No person or entity other than a party to this Agreement shall have any rights hereunder or any authority to enforce its provisions, and any such rights or enforcement must be consistent with and subject to the terms of this Agreement.

X.C. Severability. The invalidity of any clause, sentence, paragraph, subdivision, section, or portion thereof, shall not affect the validity of the remaining provisions of this Agreement.

X.D. Entire Agreement. This Agreement constitutes the entire and exclusive agreement between the parties relating to the specific matters covered in this Agreement. All prior or contemporaneous verbal or written agreements, understandings, representations or practices relative to the foregoing are superseded, revoked and rendered ineffective for any purpose. This Agreement may be altered, amended or revoked only in writing and only subject to Section IV.F. No verbal agreement or implied covenant may be held to vary the terms of this Agreement, any statute, law or custom to the contrary notwithstanding.

X.E. Filing. As provided by RCW 39.106.030, this Agreement shall be filed prior to its entry in force with the Secretary of State.

X.F. Execution. This Agreement may be executed in one or more counterparts.

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CITY OF BATTLE GROUND By:__________ City Manager Date: 9/26/12 *Attest:* By: Tamara Grunter City Clerk *Approved as to Form:* By:__________ Battle Ground City Attorney	**CLARK REGIONAL WASTEWATER DISTRICT** By: John M. Peters General Manager Date: 9-25-12 *Attest:* By: Kim Thon Clerk to the Board *Approved as to Form:* By:__________ CRWWD Legal Counsel
CLARK COUNTY By: Bill Barron County Administrator Date: 10/3/12 *Attest:* By: Tina Redline Deputy County Clerk of Board *Approved as to Form:* By:__________ Clark County Attorney	**CITY OF RIDGEFIELD** By:__________ City Manager Date: 9-27-12 *Attest:* By:__________ City Clerk *Approved as to Form:* By: Chris R. ______ Ridgefield City Attorney

EXHIBIT A

FINANCIAL POLICIES

RESERVES: Reserve balances are funds that are set aside for a specific project, task, covenant requirement, and/or emergency. These balances are maintained in order to meet short-term cash flow requirements, while at the same time minimizing the risk associated with meeting financial obligations and continued operational needs under adverse conditions.

Policy	Overview	Policy Metric	Cost Allocation Basis
Operating Reserve	The purpose of the Operating Reserve is to maintain financial viability of the utility despite short-term variability in revenues and expenses.	Maintain minimum reserve of 90 days operating costs.	Proportional to share of use of capital assets as measured by Average Annual Flow.
Regional Service Charge Stabilization Reserve	Used to mitigate major year-to-year fluctuations in revenues and expenses. Use of the Regional Service Charge Stabilization Reserve should only occur by direct Alliance Board action based upon unplanned revenue shortfalls or expenditures. Funding of the Regional Service Charge Stabilization Reserve will be budgeted as an expenditure and when used by the Board, will be considered an expenditure for the purpose of debt coverage. Use of the Regional Service Charge Stabilization Reserve funds will, when allowed by the Board, be considered a revenue for purposes of debt coverage.	Maintain minimum reserve of 90 days operating costs.	Proportional to share of use of capital assets as measured by Average Annual Flow.
Debt Service Reserve	Reserves provide protection from financial shortfalls in future debt service requirements that may occur due to changes in market conditions (i.e. lower than anticipated investment returns or slower connection growth), and meet funding and reserve requirements to necessary to acquire low-cost financing in the bond markets, and reserve funds for future capital construction costs.	Maintain one year's debt service on all outstanding debt and loans issued/borrowed by the Alliance for regional capital program and projects.	*Debt Service Reserve on new capital assets:* proportional to Allocated Capacity in those new capital assets. *Debt Service Reserve on existing capital assets:* proportional to Allocated Capacity in those assets being restored and/or replaced.
Restoration and Replacement (R&R) Reserve	The investment level in existing assets to maintain system performance.	Maintain minimum reserve of 2% of original asset value at the time asset(s) placed in service. Additional funding from Regional Service Rates, if necessary, may be collected to meet R&R capital needs for 20 years.	Proportional to Allocated Capacity of the assets being restored and/or replaced.

DEBT: Market debt, non-market debt and loans are all potential funding sources to buy, build or rebuild/replace capital assets by the Alliance. All debt issuances require that debt service coverage ratios be met and compliance with continuing disclosure requirements.

Policy	Overview	Policy Metric	Cost Allocation Basis
Debt Service	Principal and interest repayment on new debt or loans assumed by the Alliance for purchase, construction or restoration/replacement of a capital asset is an obligation to the Members. This repayment is passed on to Members as a component of their Regional Service Charges billed by and paid to the Alliance.	When the Alliance assumes new debt or loans for purchase, construction or restoration/replacement of a capital asset, each Member who elects to: (1) purchase a share of capacity in that new capital asset, or (2) owns capacity in that restored/replaced capital asset, is responsible for their relative share of that debt service or loan repayment, respectively.	*Debt on new capital assets:* proportional to Allocated Capacity in those new capital assets. *Debt on restored/replaced capital assets:* proportional to Allocated Capacity in those assets being restored and/or replaced.
Debt Service Coverage Ratio	Describes how much of the annual debt payment is covered by projected Regional Service Charge revenues.	Regional Service Charges shall be maintained at a level necessary to provide annual revenues that satisfy: (1) a debt service coverage ratio of no less than 1.25 times annual debt service on Alliance-issued market debt, and (2) a debt service coverage ratio of no less than 1.00 times debt service and loan payments on all other Alliance non-market debt and loans (e.g. USDA, CERB, PWTF, etc.). Annual net revenues divided by annual debt service.	Debt service coverage ratio tests will be funded by the component of Regional Service Charges to Members who benefit from the corresponding debt issuances for which the tests must meet.
Continuing Disclosure	Provide for the benefit of bondholders annual financial information and notice of material events.	*Arbitrage*: Alliance should engage an arbitrage consultant to assist the Alliance in meeting IRS arbitrage compliance and reporting requirements when applicable. *IRS Bond Post-Issuance Compliance*: Alliance should maintain and comply with the IRS checklist of bond post-issuance compliance requirements. *Annual Reporting NRMSIR*: Alliance will comply with bond covenants regarding the annual undertaking of reporting to the Nationally Recognized Municipal Securities Information Repository (NRMSIR) by electronically filing with the Electronic Municipal Market Access system (EMMA) or its successor.	NA
Debt Policy	Alliance has a debt policy, which is adopted and will be updated periodically.	Compliance with provisions outlined per debt policy.	NA

REVENUE SUFFICIENCY: The Alliance has ongoing revenue requirements from its Members to pay operating expenses, buy or build capital assets, service debt and maintain reserves. Revenue sufficiency insures that charges will be set at a level to remain a self-sufficient utility.

Policy	Overview	Policy Metric	Cost Allocation Basis
Charge Adoptions	Alliance will establish charges to Members sufficient on an annual basis to meet all utility cash requirements including operating expenses, debt service, charge-funded capital costs and additions to reserves.	Charge modeling will be updated every 2-4 years, with multi-year charge adoptions. Changes in charge levels should be gradual and uniform to the extent costs can be forecast.	Charges will be assessed to Members proportional to Average Annual Flow (operating expenses, operating reserves, regional service charge stabilization reserves), Allocated Capacity (debt service, debt service reserves, R&R reserves on restored/ replaced capital assets), or by some other proportion / method as directed by the Board.
Revenue Pledge (Members)	Provide surety to all Members that each Member will fulfill financial obligations to the Alliance.	Each retail agency pledges to maintain a combination of retail rates and charges sufficient to meet all policy tests and retail and wholesale obligations for collection system, transmission system, treatment system and reserves (operating, capital and debt service costs).	NA

FINANCIAL PLANNING, REGULATORY COMPLIANCE AND INVESTMENTS: Policies which support financial planning, regulatory compliance and investing help promote the financial integrity and stability of the Alliance, and help provide guidance and consistency in decision-making for the Alliances' management and Board.

Policy	Overview	Policy Metric	Cost Allocation Basis
Financial Planning	Adoption of an annual/biennial Alliance budget provides Member agencies assurance of conveyance and treatment costs key to their annual/biennial Member budget, for Regional Service Charges due to the Alliance.	Alliance will prepare an annual/biennial budget that provides a basic understanding of the planned spending for the coming year/biennium. A long-term financial plan for a 10-20 year horizon will be updated every 2-4 years. Single enterprise fund.	NA
Regulatory Compliance	Alliance is to maintain a uniform system of accounts, and maintain accounting practices that follow Generally Accepted Accounting Principles (GAAP). Alliance will comply with the State Auditor's Office (SAO) Budgeting Accounting Reporting Systems (BARS).	Alliance will prepare an annual CAFR (modified accrual basis of accounting) and will be audited by the SAO.	NA
Investment Policy	Alliance has an investment policy which is adopted and will be updated periodically.	Compliance with provisions outlined per investment policy.	NA

SUSTAINABILITY OF INFRASTRUCTURE: In conjunction with establishing or planning its capital program, Alliance will develop a corresponding capital-financing plan that supports execution of that program, and is capable of sustaining long-term capital requirements. The capital program will incorporate system expansion, upgrades and improvements, and system repair and replacement. The intention is to establish an integrated funding strategy.

Policy	Overview	Policy Metric	Cost Allocation Basis
Capital Facilities Planning	Alliance will maintain a capital projects schedule of at least six years in duration, and consistent with the comprehensive long-range plans, using a 20-year planning horizon.	The six-year capital project schedule will be adopted by the Alliance Board, including project description, scheduled year of construction, total estimated costs (including additional operating) and funding source.	NA
Capital Facilities Funding	Capital funding from Members is included in Regional Service Charges, to preserve the Alliance's existing infrastructure. Contributions should fund current construction and engineering costs. Funding level should target replacement cost depreciation expense. Debt funding will be used when it is judged to be appropriate based on the long-term capital needs and the Alliance's ability to repay the indebtedness in light of all sources and uses of cash. The term of the debt should not exceed the reasonable useful life of the asset being acquired or constructed.	A six-year capital funding plan, adopted by the Alliance Board, will be in place that anticipates capital cost requirements and determines the appropriate funding mechanism for those capital needs, either cash funding or debt/loan issuance.	NA

EXHIBIT B

LIST OF INITIAL REGIONAL ASSETS AND INITIAL ALLOCATED CAPACITIES

System Name	No.	Regional Asset Name	Regional Asset Description	Initial Allocated Capacities(values expressed in MGD of MMF) Existing Allocated Capacity BG	CRWWD	RF	Total
Salmon Creek Wastewater Management System (SCWMS)	1	Interceptor System Salmon Creek Interceptor	4.6 mile long gravity pipeline located on the south side of the Salmon Creek drainage. The interceptor collects and conveys wastewater from partner agencies to regional pump stations. Pipeline was constructed in segments from the mid to late 1970's (21-42-inch diameter pipe routed from Betts Bridge to 36 Ave).	10.10	28.08	0.00	38.18
	2	Klineline Interceptor	1.8 mile long gravity pipeline located parallel to the Salmon Creek Interceptor. Pipeline was constructed in segments from 2002 to 2006 (48-inch diameter pipe routed from Salmon Creek Ave & NE 127 St to 117 St PS).				
	3	Pump Station (PS) System 36 Avenue PS	Raw sewage PS located at 14014 NW 36 Ave in Vancouver, WA. The station pumps wastewater from the Salmon Creek interceptor to SCTP. Pump station was constructed in mid 1970's and remodeled in 1994 and 2005.	4.47	13.57	0.00	18.04
	4	117 Street PS (aka Klineline PS)	Raw sewage PS located at 1110 NE 117 St in Vancouver, WA. The station pumps wastewater from Salmon Creek and Klineline interceptors to SCTP. Pump station was constructed in 2008.				
	5	Force Mains (FM) System 36 Ave PS FM	24-inch diameter FM routed from 36 Ave PS to SCTP. The FM runs approximately 1.4 miles along the south side of the Salmon Creek and discharges to SCTP. Pipeline was constructed in mid 1970's.	6.30	20.06	0.00	26.36
	6	117 Street PS FM	30-inch diameter FM routed from 117 St PS to SCTP. The FM runs approximately 4.9 miles along public rights-of-way to the SCTP. Pipeline was constructed in segments from 2004 to 2008.				
	7	Salmon Creek Treatment Plant (SCTP) & Outfall	Secondary treatment plant originally constructed in the mid 1970s, with four major expansion phases. The plant is located at 15100 NW McCann Rd, in Vancouver, WA. The plant outfall is a 30-inch diameter pipeline routed west of the plant 1.3 miles, terminating in the Columbia River between mile 95 and 96. The discharge location is latitude 45° 43' 58" N, longitude 122° 45' 23" W.	3.47	11.48	0.00	14.95
Ridgefield Treatment System	8	Ridgefield Treatment Plant & Outfall	Secondary treatment plant originally constructed in 1959 with several upgrades since then. The plant is located on West Cook St in Ridgefield. The plant outfall is an 8-inch diameter pipeline routed west of the plant 0.2 miles, terminating in Lake River. The discharge location is latitude 45° 49' 18" N, longitude 122° 45' 09" W.	0.00	0.00	0.70	0.70
Battle Ground Force Main System	9	Battle Ground FM (Including odor control system for FM)	9 mile long 16-inch diameter FM with bioxide chemical injection facility routed southwesterly from McClure PS to Klineline interceptor at Salmon Creek Ave. Pipeline was constructed in 1993.	3.44	0.96	0.00	4.40

APPENDIX L

CITY OF RIDGEFIELD AND CRWWD COLLECTION SYSTEM TRANSFER AND FRANCHISE AGREEMENT

CITY OF RIDGEFIELD AND CLARK REGIONAL WASTEWATER DISTRICT COLLECTION SYSTEM TRANSFER AND FRANCHISE AGREEMENT

THIS AGREEMENT is made and entered into by and between CLARK REGIONAL WASTEWATER DISTRICT, Clark County, Washington ("District") and the CITY OF RIDGEFIELD, Washington ("City"), each a Washington municipal corporation.

RECITALS

A. The City and the District both own and operate wastewater collection systems.

B. The land served by the City's wastewater collection system is not located within the District or the District's service area. RCW 57.08.005(5) authorizes the District to maintain and operate wastewater facilities within and without the District. RCW 57.08.044 authorizes the District to enter into a contract with the City for the operation of any facilities or services, within or without the District, and desirable to carry out the purposes of the District.

C. RCW 35.67.300 authorizes the City to contract with the District for the construction and operation of wastewater facilities for the joint use and benefit of the City and the District.

D. Chapter 39.34 RCW authorizes the City and the District to enter into an agreement for joint or cooperative collection and transportation of wastewater. Chapter 39.33 RCW authorizes the City and the District to transfer the wastewater collection system on terms and conditions agreed to by both.

E. After review and analysis of wastewater management options, the City Council and the District Board of Commissioners have determined that District ownership and operation of the City's wastewater collection system is in the best interests of City citizens and District customers, and will ensure consistent and dependable service, stable rates for all customers and promotion of economic development in the City and the region.

F. To provide additional wastewater capacity for City growth and economic development, the District and the City are jointly pursuing the Discovery Corridor Wastewater Transmission System project ("DCWTS Project"), which will connect the City's wastewater collection system to the District's wastewater collection system and Clark County's Salmon Creek Wastewater Management System, including the Salmon Creek Wastewater Treatment Plant. The District and the City acknowledge that the schedule for implementation of the project is subject to approvals and permits of other agencies. The respective rights and duties of the District and the City for the DCTWS

Project that are not addressed in this Agreement have been agreed upon by the District and the City by separate motion, agreement or memorandum of understanding.

AGREEMENT

In consideration of the following terms and conditions, the District and the City agree as follows:

1. Transfer of Collection System. In this Agreement, the term "Collection System" shall mean (1) the real property and Collection System infrastructure described below ("Property"), (2) all additions to and improvements of the Property by either the City or the District, and (3) all real property and infrastructure in land annexed to or served by the City after the Date of Mutual Acceptance. Subject to the terms and conditions of this Agreement, the City agrees to transfer, convey, assign and deliver to the District, and the District agrees to accept from the City, the Collection System, real property rights, personal property, contract rights and intangibles, as more specifically described below.

1.1 Real Property Rights. Rights and interests in real property on which the Collection System is located, including real property on which pump stations are located ("Real Property"). Such rights and interests, and the type of instrument or document to be provided by the City, is described and/or depicted on the "Description of Real Property" attached hereto, labeled as **Exhibit A**.

1.2 Collection System Infrastructure. All improvements now existing or being designed or constructed that comprise or will comprise, or are used or will be used, by the Collection System, including pump stations and the DCWTS Project, which are described on the "Description of Collection System Infrastructure" attached hereto, labeled as **Exhibit B**, and which are not described on **Exhibit B** but are a part of the Collection System infrastructure ("Collection System infrastructure"). For information and disclosure purposes only, **Exhibit B** also describes any significant and notable conditions of the Collection System.

1.3 Personal Property.

1.3.1 All as-built plans and drawings, specifications, maps, surveys and comprehensive plans that show the construction and/or location of any existing, in-progress or proposed parts of the Collection System.

1.3.2 All records relating to the operation of the Collection System and its equipment, including but not limited to customer lists, billing records, operating statements, manuals, operating instructions and all other written and/or recorded data.

1.4 Warranties, Guarantees, Contract Rights and Intangibles.

1.4.1 To the extent transferable by the City, all warranties or guarantees connected with the construction of all or part of the Collection System.

1.4.2 All permits, approvals, agreements, contracts and other rights and duties relating to the ownership or operation of the Collection System, including but not limited to rights and obligations under developer extension agreements, land use and development agreements, railroad permits and Public Works Board agreements ("Contract Rights and Intangibles"). These Contract Rights and Intangibles are identified and described on the "List of Contract Rights and Intangibles" attached hereto, labeled as **Exhibit C**. If any Contract Right or Intangible is not identified and described on **Exhibit C**, the District shall not be subject to or responsible for such Contract Right or Intangible; provided, that the City may add Contract Rights and Intangibles to **Exhibit C**, by amendment attached to **Exhibit C** and submitted to the District, prior to Closing. After Closing, the District shall control and be responsible for the terms and conditions of Contract Rights and Intangibles that relate to sewer improvements; provided, that if a property owner, developer or permit holder refuses to accept or acknowledge the District's control and responsibility, the City shall enforce and carry out the terms and conditions of such Contract Rights or Intangibles, if requested by the District.

1.5 Cash Reserves. All of the cash reserves attributable to the Collection System ("Cash Reserves"), payable in a lump sum.

1.5.1 After the Date of Mutual Acceptance (see Section 5) and before Closing, and during any Transition Period (see Section 12.2), the City shall use the Cash Reserves only for operating and capital expenses in the City's adopted budget for the Collection System.

1.5.2 After the Date of Mutual Acceptance and before Closing, and as requested by the District but no more frequently than monthly, the City shall advise the District of the amount of Cash Reserves.

1.5.3 No later than sixty (60) days prior to Closing, the City shall provide to the District a statement that identifies the Cash Reserves and the cash reserves attributable to other funds and departments within the City's Sewer Utility ("Other Sewer Utility Cash Reserves"), explains the calculation of Cash Reserves and estimates the Cash Reserves on the Closing Date.

1.5.4 At Closing, the City shall provide to the District a statement that identifies of the Cash Reserves and the Other Sewer Utility Cash Reserves as of the Closing Date.

1.5.5 Between sixty (60) and seventy (70) days after Closing, the City shall transfer to the District the Cash Reserves on the sixtieth (60^{th}) day after Closing, together with an accounting of any additions to or reductions of the Cash Reserves after

Closing.

1.5.6 The District shall deposit the Cash Reserves into a separate District account or fund. The District shall use the Cash Reserves, plus any applicable interest, for the initial capital improvements set forth in the "2014-2019 Six Year Capital Program, Ridgefield Service Area" attached hereto, labeled as **Exhibit D**, or for other capital improvements requested by the District and approved by the City Council. The District shall not use the Cash Reserves for debt service. The Cash Reserves shall be in addition to other funds for the capital improvements required by this Agreement from other sources. Upon request of the City, the District shall provide to the City a statement of expenditures from the Cash Reserves.

2. Collection System Infrastructure—Lack of Easements. The Parties acknowledge that a significant portion of the Collection System infrastructure is located on private property and is not included in easements or plat dedications. The Parties shall use their collective best efforts, both before and after Closing, to obtain easements for such portion of the Collection System infrastructure. After District possession of the Property, the District shall maintain and operate such portion of the Collection System infrastructure, even though the Parties have been unable to obtain easements. If a property owner objects to District maintenance and operation of such portion of the Collection System infrastructure and no easement has been obtained from such property owner, and the District determines that access to and maintenance and operation of such portion of the Collection System infrastructure is necessary, the District may condemn the easement. For three (3) years after Closing, the Parties shall share equally in the cost and expense of any such easement acquisition, quiet title action or condemnation, including reasonable attorneys' fees.

3. Condition of Property. The District acknowledges that the City is transferring the Collection System "as is, where is and with all faults" without representation, warranty or covenant, except as specifically set forth in this Agreement. The City has not made and shall not be deemed to have made any representation, warranty or covenant or shall not have any liability whatsoever as to the title, value, habitability, use, condition, design, operation, or fitness for use of the Collection system, or any other representation, warranty or covenant whatsoever, express or implied, with respect to the Collection System, except as specifically set forth in this Agreement or in the warranties or guarantees provided to the City pursuant to Section 1.4 of this Agreement. The City shall not be liable for any latent, hidden, or patent defect in the Collection System.

4. Liabilities and Transfer Price.

4.1 No Assumption of Liabilities. The District shall not assume any liabilities related to the Collection System, except as set forth in Section 1.4. Any liabilities and obligations of the City that are not assumed by the District shall continue to be liabilities and obligations of the City.

4.2 Transfer Price. The District shall not pay any monetary consideration for the Collection System, except as provided in Section 14. The District and the City shall each pay for their own costs and expenses to prepare this Agreement and to carry out the transfer of the Collection System.

5. Effective Date (Mutual Acceptance) and Term. For purposes of this Agreement, Mutual Acceptance of this Agreement shall occur on the date that the last person of both Parties has executed this Agreement ("Date of Mutual Acceptance"). The effective date of this Agreement shall be the Date of Mutual Acceptance. The term of this Agreement shall be perpetual, as long as the District owns and operates the Collection System.

6. Real Property Transfer Conditions and Documents.

6.1 Title Report. If requested by the District, the City shall deliver to the District a title report for any Real Property that is transferred to the District.

6.2 Conveyance and Condition of Title. Real Property shall be conveyed by the City to the District free and clear of all liens, liabilities and encumbrances, pursuant to documents that are in a form approved by the District. The District may waive in writing any liens, liabilities and encumbrances.

7. Contingencies. All obligations of the District under this Agreement are subject to the fulfillment on or before Closing of each of the contingencies set forth below. If any of the contingencies are not met in full or fail to occur before Closing, for any reason whatsoever, the District may, in its sole discretion, either waive such contingencies and proceed with Closing or terminate this Agreement without liability or further obligation.

7.1 Representations. The representations and warranties of the City contained in this Agreement shall be true and correct in all respects material to the validity and enforceability of this Agreement and the City's ability to transfer the Property, on and as of Closing as though they were made on the Closing Date or, in the case of representations and warranties made as of a specified date earlier than the Closing Date, on and as of such earlier date.

7.2 Inspections. The District shall have completed, to the District's satisfaction, any and all inspections and reviews of the Property, as the District desires. A representative of the City shall have taken the District on a tour of the Collection System and shown the District the physical location of each component of the Collection System. The City shall make all of its records described in Sections 1.2 through 1.4 of this Agreement and relating to the Collection System available at reasonable times for the District to review and inspect.

7.3 City Records and Customer List. The City shall have delivered to the District all records that are requested by the District and that relate to the Collection System, including but not limited to the records described in Sections 1.2 through 1.4 of this Agreement. The City shall have delivered to the District a complete list of and all City information relating to current Collection System customers.

7.4 Performance. The City shall have performed and complied with, in all material respects, all agreements and conditions required by this Agreement to be performed or complied with by the City before Closing.

7.5 No Adverse Change. On Closing Date, there has been no substantial adverse change in the financial or physical condition of the Collection System or the Property from the Date of Mutual Acceptance.

7.6 Consents for Transfer. The City shall have obtained any and all consents, assignments and approvals required to convey the City's entire interest in the Property.

7.7 Labor Contract. The City represents and warrants that it has satisfied any collective bargaining duties and obligations related to this Agreement and to City employees operating the Collection System as of the Closing Date. The City shall defend, indemnify and hold harmless the District, its officers, officials, employees and volunteers from any and all claims, injuries, damages, losses or suits, including attorney fees, arising out of, resulting from or related to the bargaining relationship between the District and the union, or its successor, which represents City employees operating the Collection System as of the Closing Date. Unless agreed otherwise by the Parties, any agreement or understanding between the City and the union that represents City employees operating the Collection System shall not require the District to hire such City employees. Consistent with Section 12.3, the District may, but is not required to, hire any City employee operating the Collection System as of the Closing Date.

7.8 Right-of-Way Franchise. The City shall have approved by ordinance, and the District shall have accepted, a franchise for construction, ownership, maintenance, operation, repair and replacement of sewer facilities in City streets and rights-of-way, substantially in the form of the Non-Exclusive Franchise attached hereto, labeled as **Exhibit E**.

8. Closing and Possession.

8.1 Approval and Acceptance of Transfer Documents. The City Manager and the District General Manager shall approve and execute all Real Property transfer documents on or before December 15, 2013.

8.2 Closing of Transfer. The transfer contemplated herein shall be closed on December 31, 2013. For purposes of this Agreement, the terms "Closing" and "Closing

Date" shall mean December 31, 2013.

8.3 Possession. The District shall be entitled to possess the Property and commence operation of the Collection System at 11:59 p.m. on December 31, 2013.

9. Representations and Warranties of the City. The City represents and warrants to the District as follows:

9.1 Organization and Authority. The City has the right, power and authority to enter into this Agreement, to execute all documents and instruments contemplated by this Agreement, to consummate this transaction and to perform all other obligations to be performed by the City under this Agreement. The execution, delivery and performance of this Agreement and all agreements, documents and instruments contemplated by this Agreement have been duly authorized by all necessary action on the part of the City. Prior to Closing, and consistent with Section 8.1 of this Agreement, the City shall provide to the District certified copies of ordinances and resolutions authorizing this transfer and the execution, acknowledgment, delivery and performance of this Agreement and all agreements, documents and instruments contemplated by this Agreement.

9.2 Title to Assets. Except as otherwise disclosed to the District in writing, as of the Date of Mutual Acceptance, the City has good and marketable title to all of the Property included in this transaction. None of the Property is subject to any mortgage, pledge, lien, conditional sale, title redemption agreement, lease, encumbrance or other claim or charge that will not be discharged at Closing.

9.3 Litigation and Legal Compliance. There are no judgments against the City relating to its interest in or operation of the Collection System. There are no pending actions, suits, claims or proceedings against the City relating to its interest in or operation of the Collection System, or challenging the transfer of the Collection System to the District or the validity of this Agreement, and to the City's Knowledge, there are no such threatened actions, suits, claims or proceedings. Whenever used in this Agreement, "City's Knowledge" shall mean the knowledge of any City Councilmember, the City Manager or the City Public Works Director.

9.4 No Violation. Neither the execution and delivery of this Agreement, the consummation of the transaction contemplated hereby, nor the performance by the City of, and compliance by the City with, this Agreement will violate federal, state, county or city laws, regulations, approvals or permits, or City funding agreements relating to the Collection System.

9.5 Information. All customer lists and Collection System information given by the City to the District are true, correct and complete in all material respects.

9.6 Hazardous Materials. To the City's Knowledge, there are no Hazardous Materials on, under or about the Property. To the knowledge of the City, no Hazardous Materials have at any time been used, generated, manufactured, stored, released, or disposed of on, under or about the Property. To the knowledge of the City, the Property is not in violation of any Hazardous Materials Laws. There are no past, current or, to the City's Knowledge, threatened Hazardous Materials Claims. No underground storage tank is now located on or, to the City's Knowledge, has ever been located on or under the Property. The City indemnifies and holds the District harmless from any claim, cost, damage or expense, including attorneys fees, monitoring costs, response costs, and penalties, with respect to any breach or alleged breach of any of this warranty known to the City prior to Closing. For the purposes of this paragraph, "Hazardous Materials" includes, but is not limited to, any substance or material defined or designated as hazardous or toxic waste, hazardous or toxic material, a hazardous, toxic or radioactive substance, or other similar term, by any federal, state or local environmental statute, regulation or ordinance presently in effect (collectively, "Hazardous Material Laws"); provided, however, for the purposes of this paragraph, "Hazardous Materials" does not include asbestos/concrete pipe and appurtenances, liquid chlorine, paint or solvents, whether or not such materials are so defined or designated. The District acknowledges that it is aware of such materials and hereby assumes all responsibility therefor. For the purposes of this paragraph, Hazardous Materials Claims means any enforcement, cleanup, removal, remedial or other governmental or regulatory notices, actions, agreements or orders threatened, instituted or completed pursuant to any Hazardous Materials Laws, together with any and all claims made or threatened by any third party against the City or the Property relating to damage, contribution, cost recovery compensation, loss or injury resulting from the presence, release or discharge of any Hazardous Materials.

9.7 Representations and Warranties True at Closing. The representations and warranties made by the City in this Agreement shall be correct as of the Date of Closing with the same force and effect as though such representations and warranties had been made as of the Date of Closing.

10. Representations and Warranties of District.

10.1 Organization and Authority. The District has the right, power and authority to enter into this Agreement, to execute all documents and instruments contemplated by this Agreement, to consummate this transaction and to perform all other obligations to be performed by the District under this Agreement. The execution, delivery and performance of this Agreement and all agreements, documents and instruments contemplated hereby have been duly authorized by all necessary action on the part of the District. Prior to Closing, and consistent with Section 8.1 of this Agreement, the District shall provide to the City certified copies of resolutions authorizing this transfer and the execution, acknowledgment, delivery and performance of this Agreement and all agreements, documents and instruments contemplated by this Agreement.

10.2 No Violation. Neither the execution and delivery of this Agreement, the consummation of the transaction contemplated hereby, nor the performance by the District of, and compliance by the District with, this Agreement will violate federal, state, county or District laws, regulations, approvals or permits.

10.3 Litigation and Legal Compliance. There are no pending actions, suits, claims or proceedings against the District relating to its operation of the Collection System, or challenging the transfer of the Collection System to the District or this Agreement, and to the District's knowledge, there are no such threatened actions, suits, claims or proceedings. Whenever used in this Agreement, the "District's Knowledge" shall mean the knowledge of any District Commissioner or the District General Manager.

10.4 Representations and Warranties True at Closing. The representations and warranties made by District in this Agreement shall be correct as of the Date of Closing with the same force and effect as though such representations and warranties had been made as of the Date of Closing.

11. Conduct of Business Pending Closing—Final Bills. Pending the Closing of the transfer contemplated by this Agreement, the City covenants as follows and the Parties agree as follows:

11.1 Agreement Changes. The City shall not make or agree to any changes in the City's agreements or leases relating to the Collection System or the Property without the prior written approval of the District.

11.2 New Contracts. The City shall not enter into any agreement or commitment that is not terminable at will, except for customer service agreements entered into in the ordinary course of business.

11.3 Operation and Maintenance. The City shall operate, maintain and repair the Collection System at the City's sole expense so that the Property remains in the same condition it was in on the Date of Mutual Acceptance, except for ordinary wear and tear. Without the prior written consent of the District, the City shall not make any improvements to the Collection System or undertake construction on any part thereof, except for minor emergency repairs or repairs or maintenance conducted in the ordinary course of business and operation of the Collection System. The District shall have the right to inspect, and have a representative present during, any improvement or construction (including, if practicable, emergency repairs) performed on the Collection System between the Date of Mutual Acceptance and the Closing Date.

11.4 Notice of Transfer. The City and the District shall share the responsibility and cost for giving notice of the transfer contemplated by this Agreement to the Collection System's customers.

11.5 Final Bills. Within sixty (60) days of the Closing Date, the City shall send final bills to the Collection System residential and commercial customers for services through December 31, 2013 ("Final Bills"), which shall include any outstanding balances. Final Bills shall be considered accounts receivable of the City, and the City shall keep all payments for the Final Bills. The City shall be responsible for collection of the Final Bills.

11.6 Newly Discovered Customers and Charges. If the District discovers new Collection System Customers after Closing, the District shall be responsible for collecting connection charges, which shall be considered due and owing at the time of discovery. If after Closing the District discovers undercharges or overcharges by the City for Collection System Customers, the City shall be responsible for such undercharges or overcharges prior to Closing, and the District shall be responsible for such undercharges or overcharges after Closing.

11.7 Damage to Collection System Infrastructure or Personal Property. If any of the Collection System infrastructure is damaged between the Date of Mutual Acceptance and the Closing Date (other than normal wear and tear), the City shall repair or replace the same at the City's sole cost and expense.

11.8 Discovery Corridor Wastewater Transmission System Project. To provide additional wastewater capacity for City growth and economic development, the District and the City are jointly pursuing the DCWTS Project, which will connect the City's wastewater collection system to the District's wastewater collection system and Clark County's Salmon Creek Wastewater Management System, including the Salmon Creek Wastewater Treatment Plant. Prior to Closing, the City and the District shall use their best efforts to obtain all approvals and permits for the DCWTS Project. Receipt of all approvals and permits for the DCWTS Project is not a condition of Closing. If any approvals and permits for the DCWTS Project are not obtained prior to Closing, the City shall cooperate with the District to obtain such approvals and permits. After Closing, the District shall be responsible for the design, construction, inspection, operation, maintenance, repair, replacement and financing of the DCWTS Project, unless agreed otherwise by the Parties.

12. Operation and Maintenance of Collection System.

12.1 District Operation and Maintenance. Except as provided in Section 12.2, after Closing the District shall operate, maintain, repair, replace and improve the Collection System as a separate component of the District's wastewater system, in accordance with the Levels of Service, Repair Procedures and Capital Improvement Policies adopted by the District under Section 16.

12.2 Transition Period. At least sixty (60) days before the Closing Date, the Parties may enter into a separate agreement that is effective on Closing and that authorizes the City to maintain and operate the Collection System after Closing ("Transition Period"). The agreement must state the duration of the Transition Period and require the City to operate and maintain the Collection system in accordance with the standards and requirements of Section 11.3, and may include such additional terms and conditions that the Parties deem appropriate.

12.3 Use of District Employees. District employees shall operate and maintain the Collection System after Closing or after the end of a Transition Period, whichever occurs last.

12.4 City Development Information. The City shall provide to the District all information deemed necessary by the District to impose connection charges, service charges and other charges as a result of development or re-development of land within the City area that is served by the Collection System.

12.5 Laterals. The Parties acknowledge that laterals connected to the Collection System infrastructure are owned by the owners of property served by the laterals and shall not transfer to the District. The District shall have the right to adopt policies regarding ownership, maintenance and operation of such laterals.

12.6 Industrial Wastewater Laws and Regulations—Pre-Treatment. When required to do so by the Environmental Protection Agency or the Department of Ecology, or applicable laws, regulations, permits or agreements, the Parties shall adopt an industrial wastewater pre-treatment ordinance or resolution, as appropriate, meeting all requirements, and shall execute all necessary agreements. The responsibilities and rights of the Parties with regard to industrial wastewater pre-treatment shall be consistent with, and shall take into account, any existing responsibilities and rights between the Parties and Clark County or its successors.

13. Service Charges and Customer Billings.

13.1 Service Charge. The District service charge to the Collection System customers shall consist of a base charge ("Base Charge") and a system integration charge ("System Integration Charge") (collectively, the "Service Charge"), both of which shall be established in accordance with this Section.

13.1.1 Base Charge. At closing, the Base Charge shall be $36.00 per month per equivalent residential unit as defined by District resolution. The Base Charge shall be equal to the base sewer service charge for District customers. The District may revise the Base Charge at any time, subject to the notification and maximum increase requirements of Section 13.5.

13.1.2 System Integration Charge. The System Integration Charge shall be $19.00 per month per equivalent residential unit as defined by District resolution. The System Integration Charge represents the District's additional costs of operation, maintenance, repair, replacement and improvement of the Collection System.

13.2 Reduction of System Integration Charge. Effective January 1 of each year, commencing on January 1, 2015, the District shall reduce the System Integration Charge by $.0025 per month per equivalent residential unit for every new equivalent residential unit that has paid connection charges for connection to the Collection System (including payment in whole or in part with credits). An explanation, with examples, of the annual reduction of the System Integration Charge is set forth on the "System Integration Charge Reduction" attached hereto, labeled as **Exhibit F**.

13.2.1 The equivalent residential units that have paid connection charges from July 1 of the previous year to June 30 of the current year shall be used as the basis of the reduction in System Integration Charge for the following year; provided, that for the reduction on January 1, 2015, the equivalent residential units that have paid connection charges from the Closing Date to June 30, 2014 shall be used as the basis of the reduction in System Integration Charge.

13.2.2 The reduction in the System Integration Charge shall be calculated by the District and provided to the City on or about September 30 of the current year. The value shall be rounded to the nearest ten cent increment.

13.2.3 The District shall adopt a budget on or before December 31 of the current year consistent with the reduction in System Integration Charge to be effective the first date of the following year.

13.3 Customer Classes. The Parties acknowledge that they use different customer classifications to determine service charges. The District shall establish customer classifications for the Service Charge. No later than sixty (60) days prior to Closing, the District shall provide to the City a table of customer classifications for the Service Charge. If requested by the District after Closing, and for Service Charge billing purposes, the City shall provide water meter readings for District commercial customers served by the Collection System.

13.4 City Review of Changes. Within thirty (30) days of a request, the District shall provide to the City the facts and data used by the District to reduce the System Integration Charge and revise the Base Charge.

13.5 Notice of Service Charge Revision. The District shall notify the City at least sixty (60) days before any change in the Service Charge. The City must approve an increase in the Service Charge where (1) the increase is more than ten percent (10%) or (2) the increase, combined with previous increases in the calendar year, will cause the Service Charge to increase more than ten percent (10%) in the calendar year. Any increase in the Service Charge due to (1) unanticipated costs and expenses resulting from disasters caused by all hazards, whether natural, technological or human caused, (2) changes in applicable laws or regulations, or (3) orders or decisions of courts, governmental agencies, or administrative decision makers, shall not be included in the calculation of Service Charge increases that are subject to City approval. The City Council shall vote on such increase within thirty (30) days of receipt of the notice.

13.6 City Customers become District Customers. After Closing, the former City customers shall become District customers, and shall be known as Collection System customers under this Agreement. The District shall bill the Collection System customers in the same manner and under the same procedures as other District customers, to the greatest extent possible.

14. District Payments.

14.1 Collection System Operating Fee. As compensation for the Collection System, and in consideration of the rights granted to the District under the Franchise of **Exhibit E** and the City's non-assumption and non-competition agreements stated below, the District shall pay to the City a percentage of the Service Charges that are collected from the Collection System customers ("Operating Fee"). The percentage of such Service Charges shall be ten percent (10%) for the first five (5) calendar years after Closing, and eight percent (8%) thereafter, unless modified in accordance with Section 14.3 below. The District shall pay the Operating Fee to the City in monthly installments. When determining the amount of a monthly installment, the District shall apply Collection System customer payments first to penalties, interest and other similar charges and last to the Service Charge.

14.1.1 Non-competition. The City agrees not to exercise its statutory authority to establish a competing wastewater collection system.

14.1.2 Non-assumption. The City agrees not to exercise and to forbear its statutory authority pursuant to chapter 35.13A RCW to attempt to assume jurisdiction over the District or any District responsibilities, property, facilities, equipment or customers located within or without the City's corporate limits, in the event the District annexes land within the City's corporate limits.

14.2 Operating Fee Recovery. The District shall have the right to recover the Operating Fee from the Collection System customers, and may identify the Operating Fee as a separate billing item on bills to such customers.

14.3 City Revisions to Operating Fee. The City may propose an increase or decrease in the Operating Fee, effective on January 1 of 2015 or any year thereafter. The City shall give notice of the proposed change to the District on or before October 1 of the year before the change will become effective. Any one-time increase or decrease in the Operating Fee shall not exceed two percent (2%) of the Service Charges that were collected from the Collection System customers in the year prior to the year of the notice. The maximum Operating Fee shall be twelve percent (12%) of the Service Charges that are collected from the Collection System customers.

14.4 Transition Services. The District shall pay for any Collection System transition services actually provided by City employees at rates and amounts agreed to by the Parties. The City shall issue monthly invoices for the services, which the District shall pay within thirty (30) days.

15. Connection Charges.

15.1 Connection Charge Amount. At Closing, the District's connection charge for connection to the Collection System shall be $7,550.00. After Closing, the District may revise the connection charge at any time consistent with state law, the District's comprehensive plan and the District policies pursuant to Section 16, and taking into account the City area as a separate component of the District's system.

15.2 Notification of Changes; Approval of Changes. The District shall notify the City at least sixty (60) days before any change in the connection charge. The City and the District must approve jointly any connection charge increase or increases of more than a total of ten percent (10%) in a calendar year.

15.3 City Review of District Revisions. Within thirty (30) days of a request, the District shall provide to the City the facts and data used by the District to establish revisions to the connection charge.

16. Levels of Service, Repair Procedures and Capital Improvements.

16.1 Levels of Service. The District shall adopt a Levels of Service document, which shall include but not be limited to levels of service, standards and fiscal policies for operation and maintenance of the Collection System ("Levels of Service Document"). The Levels of Service Document shall be consistent with the policies adopted by the District and the City of Vancouver to the greatest extent possible, and shall take into account the separate nature of the Collection System and the City's comprehensive plan. The District shall notify the City at least sixty (60) days before adopting or amending the Levels of Service Document.

16.2 Repair Procedures. The City Public Works Director or designee and the District engineer or designee shall adopt procedures and rules for District repair fo pavement in City right-of-way.

16.3 Capital Improvement Policies. Except for the initial capital improvements set forth on **Exhibit D**, and to the greatest extent possible, the District shall apply its existing policies for construction and installation of capital improvements to the Collection System. To the greatest extent possible, such policies shall be applied consistent with the City's land use and capital project investment priorities and comprehensive plan. The District shall notify the City at least sixty (60) days before adopting or amending the capital improvement policies.

16.4 Capital Projects. The names, numbers and estimated cost and schedule for the initial capital improvements in the City area, for the six years of 2014 through 2019, are set forth on **Exhibit D**. The total expenditure for the initial capital improvements shall be $3,260,000.

16.5 Capital Budgets. On or before October 1, the District shall notify the City of the District's proposed budget for capital improvements in the City area in the next calendar year. On or before December 1, the City must approve capital improvements in the proposed budget with an estimated cost of $1,000,000 or more and scheduled for design and/or construction in the next calendar year.

17. District and City Plans, Approvals and Permits. As soon as reasonably possible, the City and the District shall amend their capital and comprehensive plans, ordinances and resolutions that relate to the ownership, operation and maintenance of the Collection System. As soon as possible following Closing, the City shall provide to the District a General Sewer Plan that is approved by the Department of Ecology and supports a one million gallon per day City Wastewater Treatment Plant.

18. Oversight Committee. After Closing, an Oversight Committee, consisting of not less than one staff person and one elected official from each Party, shall meet at least once every six months to monitor and discuss implementation of and compliance with this Agreement.

19. Dispute resolution. The Parties shall first attempt to resolve a dispute by discussions among a City representative or representatives selected by the City Manager and a District representative or representatives selected by District General Manager. If the discussions are not successful, the Parties shall engage in mediation within forty-five (45) days of termination of discussions, according to a process and before a mediator agreed upon by the Parties. The Parties shall not resolve a dispute by mandatory arbitration. The Parties reserve their rights to pursue any available Court remedies at any time after the conclusion of the mediation.

20. Re-transfer of Collection System.

20.1 Notice. If the City desires to regain full ownership and operational control of the Collection System, the City shall notify the District at least one year in advance of the proposed date for re-transfer, which date shall be the first of a month.

20.2 Re-transfer Agreement. The Parties shall negotiate in good faith and enter into a re-transfer agreement at least sixty (60) days prior to the re-transfer date.

20.3 Conditions of Re-transfer. The re-transfer shall be conditioned on reimbursement by the City to the District of an amount to be calculated by adding (i) actual District expenditures on all additions to and modifications and replacements of the Collection System (as defined in Section 1) and (ii) District payments for debt assumed or issued by the District to finance the Collection System; and subtracting from that sum (iii) all depreciation of the Collection System improvements and (iv) all connection charges paid to the District by property owners connecting to the Collection System (the "paid" connection charges shall include system development charge credits applied to the connection charges). The City shall pay the reimbursement only if the amount calculated by this formula is positive. The City shall either assume all outstanding debt payments related to the Collection Improvements or eliminate the debt prior to Closing of the re-transfer. The re-transfer shall be subject to any contractual obligations of the District that the District cannot unilaterally terminate, such as a collective bargaining agreement, if any.

21. Real Property Rights for Unknown System Components. If a portion of the Collection System is discovered after Closing, and the City's and the District's right to own, maintain and use such portion is not evidenced by a real property instrument, the City shall acquire the legal right to own, maintain and use such portion by negotiation or condemnation, at the City's cost and expense. After the acquisition, the City shall transfer such legal right to the District free and clear of all liens, liabilities and encumbrances, in a form of document approved by the District.

22. Challenges to System Transfer or Collection System Compensation. If after Closing an action or lawsuit is filed against the City, the District or both, challenging the transfer, ownership, operation or maintenance of the Collection System pursuant to this Agreement, or the District's payment of compensation for the Collection System or the Franchise, the Parties shall defend such action or lawsuit, sharing equally all costs and expenses of such defense. If the action or lawsuit is filed against only one Party, the Party to the action or lawsuit shall support and concur in the Other Party's request to join in the action or lawsuit. If any court of competent jurisdiction determines that the transfer, ownership, operation or maintenance of the Collection System pursuant to this Agreement is invalid, either Party may terminate this Agreement. Upon termination, the District shall return the Property to the City by appropriate documents in forms agreed to by the parties. If the District has made additions to or modifications and replacements of the Collection System improvements, the City shall reimburse the District for District capital expenditures in accordance with the formula of Section 20.3.

23. Records review. Upon three (3) business days notice, or upon notice agreed upon by the Parties, a Party shall have the right to inspect and copy, without charge, all

records of the other Party relating to this Agreement or its subjects.

24. Indemnification. To the maximum extent permitted by law, each Party shall defend, indemnify and hold harmless the other Party, and all of its officers, officials, employees and volunteers, from any and all claims, injuries, damages, losses or suits, including attorney fees, arising out of or resulting from any negligent acts, errors, omissions of the indemnifying Party and its officers, officials, employees and volunteers in performing obligations under this Agreement. However, if any such injuries and damages to persons or property are caused by or result from the concurrent negligence of the District or its officers, officials, employees and volunteers, and the City or its officers, officials, employees and volunteers, each Party's obligation hereunder applies only to the extent of the negligence of such Party or its officers, officials, employees or volunteers.

The foregoing indemnity is specifically and expressly intended to constitute a waiver of each Party's immunity under industrial insurance, Title 51 RCW, as respects the other Party only, and only to the extent necessary to provide the indemnified Party with a full and complete indemnity of claims made by the indemnitor's employees. This waiver has been mutually negotiated.

25. Notices. All notices and other communications under this Agreement shall be in writing by email, facsimile, regular U.S. mail or certified mail, return receipt requested.

If to the City, the notice shall be sent to:

City of Ridgefield
P.O. Box 608
Ridgefield, WA 98642
Attention: City Manager

or to such other person or place as the City shall furnish to the District in writing, with a copy to:

Janean Parker
Kenyon Disend, PLLC
11 Front Street South
Issaquah, WA 98027

If to the District, the notice shall be sent to:

Clark Regional Wastewater District
P.O. Box 8979
Vancouver, WA 98668-8979
Attention: General Manager

or to such other person or place as the District shall furnish to the City in writing, with a copy to:

Rod P. Kaseguma
Inslee, Best, Doezie & Ryder, P.S.
777 – 108th Avenue NE, Suite 1900
Bellevue, WA 98004

Notices shall be deemed given upon delivery or, if mailed, upon the earlier of actual receipt or three (3) business days after the date of mailing.

26. Waiver. Waiver of any default shall not be deemed to be a waiver of any subsequent default. Waiver of a breach of any provision of this Agreement shall not be deemed to be a waiver of any other or subsequent breach and shall not be construed to be a modification of the terms of this Agreement, unless stated to be such through written approval of the non-breaching Party and attachment of such written approval to this Agreement.

27. Severability. If any section or part of this Agreement is held by a court of competent jurisdiction to be invalid or unenforceable, such action shall not affect the validity or enforceability of any other section or part of this Agreement.

28. Entire Agreement; Amendment. This Agreement contains the entire written agreement of the Parties and supersedes all prior discussions. This Agreement may be amended only in writing, signed by both Parties.

29. Successors and Assigns. All of the provisions, conditions, regulations and requirements of this Agreement shall be binding upon the successors and assigns of the Parties.

30. No Third Party Rights. This Agreement is solely for the benefit of the Parties and gives no right to any other party or person.

31. No Joint Venture. No joint venture or partnership is formed as a result of this Agreement. No employees or agents of one Party or any of its contractors or subcontractors shall be deemed, or represent themselves to be, employees of the other Party.

32. Jurisdiction and Venue. This Agreement shall be interpreted in accordance with the laws of the State of Washington. The Superior Court of Clark County, Washington, shall have exclusive jurisdiction and venue over any legal action arising under this Agreement.

33. Prevailing Party Costs. If either Party incurs attorney fees, costs or other legal

expenses to enforce the provisions of this Agreement against the other Party, all such fees, costs and expenses shall be recoverable by the prevailing Party.

34. Counterparts. This Agreement may be signed in counterparts and, if so signed, shall be deemed one integrated agreement.

35. Payments and Billings after Closing. The Parties acknowledge that the City, the District, the City of Battle Ground and Clark County have entered into an interlocal agreement to jointly provide regional wastewater transmission and treatment for themselves through the Discovery Clean Water Alliance, a joint municipal utility services authority pursuant to Chapter 39.106 RCW. Under the interlocal agreement, the Alliance will own and operate the City's treatment plant and outfall and provide wastewater treatment services to the City customers on and after January 1, 2015, unless a different date is selected by the Board of Directors of the Alliance. The Parties further acknowledge that after the Closing Date, the owner of the Collection System shall pay for the cost of treating the wastewater flow from the Collection System and shall charge such cost to the Collection System customers.

36. Further Documents. The City Manager and the District General Manager, or their designees, are authorized to execute or furnish such documents as may be necessary to implement and consummate this Agreement and the actions, duties or responsibilities of this Agreement.

37. Survival. Sections 7.7 and 24 of this Agreement, relating to indemnification, shall survive the term of this Agreement.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their authorized representatives.

CITY OF RIDGEFIELD	CLARK REGIONAL WASTEWATER DISTRICT
______________________	______________________
City Manager	General Manager
Date: ________________	Date: ________________
Attested to:	Attested to:
______________________	______________________
City Clerk	Clerk to Board of Commissioners

Approved as to form:

____

____________________, City Attorney

Approved as to form:

____

Rod P. Kaseguma, District Attorney

EXHIBIT E

CITY OF RIDGEFIELD AND CLARK REGIONAL WASTEWATER DISTRICT NON-EXCLUSIVE FRANCHISE TO CONSTRUCT, OWN, MAINTAIN, OPERATE, REPLACE AND REPAIR A WASTEWATER SYSTEM WITHIN PUBLIC STREETS AND RIGHTS-OF-WAY OF THE CITY

Section 1. Definitions.

Where used in this franchise ("Franchise") these terms have the following meanings:

A. "City" means the City of Ridgefield, a Washington municipal corporation, and its respective successors and assigns.

B. "District" means the Clark Regional Wastewater District, a Washington municipal corporation, and its respective successors and assigns.

C. "Facilities" means meters, pipes, mains, services, valves, vaults, risers, manholes, generators, electrical control panels, power meters, telephone connections, pump stations, meter stations, lift stations, lines, and all other necessary or convenient facilities and appurtenances thereto for the purpose of operating wastewater utility systems, whether the same be located over or under ground.

D. "Franchise Area" means every and all of the public roads, streets, avenues, alleys, highways and rights-of-way of the City as now or hereafter laid out, platted, dedicated or improved, but shall not include private roads, streets, avenues and alleys.

E. "Ordinance" means Ordinance No. ________, which approves the terms and conditions of this Franchise.

G. "Party" or "Parties" means the City or the District individually, or collectively as addressed in this Franchise.

H. "Transfer Agreement" means the City of Ridgefield and Clark Regional Wastewater District Collection System Transfer and Franchise Agreement approved by City Ordinance and District resolution.

Section 2. Franchise.

A. The City does hereby grant to the District the right, privilege, authority and franchise to construct, own, install, lay, support, attach, maintain, repair, renew, replace, remove, enlarge, operate and use Facilities in, upon, over, under, along, through and across the Franchise Area for purposes of the District's wastewater utility functions as defined in Title 57 RCW beginning on the Effective Date of this Franchise; provided that the City's grant of the right to use the Franchise Area as provided herein shall not be construed to require the District to provide such Facilities to the City.

B. Nothing contained in this Franchise is to be construed as granting permission to the District to go upon any other public place other than those types of public places specifically designated as the Franchise Area in this Franchise. Permission to go upon any other property owned or controlled by the City must be sought on a case-by-case basis from the City.

C. At all times during the term of this Franchise, the District shall fully comply with all applicable federal, state, county and city laws and regulations.

Section 3. Non-interference of Facilities.

A. The District's Facilities shall be located, relocated and maintained within the Franchise Area so as not to unreasonably interfere with the free and safe passage of pedestrian and vehicular traffic and ingress or egress to or from the abutting property in accordance with the laws of the State of Washington. Nothing herein shall preclude the District from effecting temporary road closures as reasonably necessary during construction or maintenance of its Facilities; provided that the District receives prior City approval, which shall not be unreasonably withheld; and provided further that the District shall have the right to effect temporary road closures in the event of emergencies to maintain, repair and replace its Facilities without prior City approval, but the District shall obtain City approval of such road closures as soon as reasonably possible.

B. Whenever it is necessary for the District, in the exercise of its rights under this Franchise, to make any excavation in the Franchise Area, the District shall, upon completion of such excavation, restore the surface of the Franchise Area to City standards and at least to the same condition existing prior to any such excavation, installation, construction, relocation, maintenance or repair. Survey monuments shall not be removed or destroyed without the District first obtaining the required Department of Natural Resources (DNR) permit in accordance with RCW 58.09.130 and WAC 332-120-030, and as such statute and regulation may be modified and amended. All survey monuments, which have been distributed or displaced by such work, shall be restored pursuant to all federal, state and local standards and specifications. The District agrees to promptly complete all restoration work and to promptly repair any damage caused by such work at its sole expense.

C. If it is determined that the District has failed to restore the right-of-way in accordance with this Section, the City shall provide the District with written notice, which shall include a description of actions the City believes necessary to restore the right-of-way. If the right-of-way is not restored in accordance with the City's notice within fifteen (15) days of that notice, or such longer period as may be specified in the notice, the City, or its authorized agent, may restore the right-of-way and the District shall be responsible for all reasonable costs and expenses incurred by the City in restoring the right-of-way in accordance with this Section. The rights granted to the City under this Section shall be in addition to those otherwise provided by this Franchise.

Section 4. Planning Coordination.

The Parties acknowledge that wastewater facilities within the City's streets and rights-of-way, such as the District's Facilities, usually are installed underground and significantly deeper than other utilities, and therefore are more expensive to relocate than other utilities. Therefore, the Parties shall work together to reduce the need for relocation of the District's Facilities within the Franchise Area to the greatest extent possible. To accomplish this goal, the Parties shall each assign a representative whose responsibility shall be to coordinate planning for City projects as described in Section 5(A) below, including those that involve undergrounding. At a minimum, such coordination shall include:

A. For the purpose of planning, the Parties shall provide each other with a copy of their respective current adopted Capital Improvement Plan annually and upon request by the other party.

B. By February 1st of each year, the District shall provide the City with a schedule of the District's planned capital improvements which may affect the rights-of-way for that year.

C. By February 1st of each year, the City shall provide the District with a schedule of the City's planned projects as described in Section 5(A) below which may affect the rights-of-way for that year including but not limited to street overlays and repairs, storm drainage improvements and construction, and all other rights-of-way activities that could affect District capital improvements and infrastructure.

D. The District shall meet with the City, and other franchisees and users of the right-of-way, as necessary, to schedule and coordinate construction activities.

E. All construction locations, activities, and schedules shall be coordinated to minimize public inconvenience, disruption or damages.

F. The Parties agree to cooperate in the planning and implementation of emergency operations response procedures.

G. Without charge to either Party, both Parties agree to provide each other with as-built plans, maps and records that show the vertical and horizontal location of its facilities within rights-of-way, measured from the center line of the rights-of-way. Maps shall be provided in the digital electronic format used by the City or the District unless the Parties agree on another format.

Section 5. Relocation of Facilities.

A. As soon as the City learns or determines that the grading or widening of the Franchise Area or the construction and installation of storm drainage lines, lighting, signalization, sidewalk improvements, pedestrian amenities, or other public street improvements (for purposes other than those described in section 5(D) below) are required, and the proposed project requires relocation of the District's then existing Facilities within the Franchise Area ("District Facilities"), the City shall provide notice of the proposed project to the District (see RCW 35.21.905, or as amended).

B. Both Parties shall meet to discuss the proposed project at a mutually agreeable time and place. Both Parties may propose alternatives to the relocation of District Facilities, each of which shall be given full and fair consideration. The timing of this discussion and evaluation, and any relocation of District Facilities, shall take into account the type and extent of the proposed project, the type and extent of the relocation, and the period of time for and complexity of obtaining necessary permits and approvals for the proposed project and the relocation. The City shall make reasonable efforts to provide the District with as much time as possible to review the proposed project, consider alternatives, and accomplish any necessary relocation. The District shall make reasonable efforts to complete any necessary relocation within the timeframe requested by the City and in accordance with state bid law requirements and applicable regulations, permits and approvals.

C. The District shall pay for the cost of relocation of District Facilities; provided, that the City shall pay for the cost of relocation of District Facilities if the relocation occurs within five (5) years of initial construction of the District Facilities.

D. Whenever any person or entity, other than the City, requires the relocation of District Facilities to accommodate the work of such person or entity within the Franchise Area, or whenever the City requires the relocation of District Facilities within the Franchise Area for the benefit of any person or entity other than the City, then the District shall have the right as a condition of such relocation to require such person or entity to:

(1) Make payment to the District at a time and upon terms acceptable to the District for any and all costs and expense incurred by the District in the relocation of District Facilities; and

(2) Protect, defend, indemnify and save the District harmless from any and all claims and demands made against it on account of injury or damage to the person or property of another arising out of or in conjunction with the relocation of District Facilities, to the extent such injury or damage is caused by the negligence or willful misconduct of the person or entity requesting the relocation of District Facilities or other negligence or willful misconduct of the agents, servants or employees of the person or entity requesting the relocation of District Facilities.

E. This Section 5 shall govern all relocations of District Facilities required in accordance with this Franchise. Any cost or expense in connection with the location or relocation of any District Facilities existing under benefit of easement or other right not in the Franchise Area shall be borne by the City, provided the City obtains the District's prior consent to such location or relocation.

F. For the purpose of this Section 5, a project or improvement is considered to be caused by the City (as described in 5(A) above) if it is permitted by the City and both of the following conditions exist:

(1) The City is lead agency for the project or improvement; and

(2) The City is responsible for over 50% of the overall costs of the improvement or project, which 50%, if applicable, includes any grant money received by the City from another entity for the project.

Section 6. Indemnification.

A. The District shall indemnify, defend and hold the City, its agents, officers, employees, volunteers and assigns harmless from and against any and all claims, demands, liability, loss, cost, damage or expense of any nature whatsoever, including all costs and attorney's fees, made against them on account of injury, sickness, death or damage to persons or property which is caused by or arises out of, in whole or in part, the willful, tortious or negligent acts, failures and/or omissions of the District or its agents, servants, employees, contractors, subcontractors or assigns in the construction, operation or maintenance of its Facilities or in exercising the rights granted the District in this Franchise; provided that such indemnification shall not extend to injury or damage to the extent caused by the negligence or willful misconduct of the City, its agents, officers, employees, volunteers or assigns.

B. The City shall indemnify, defend and hold the District, its agents, officers, employees, volunteers and assigns harmless from and against any and all claims, demands, liability, loss, cost, damage or expense of any nature whatsoever, including all costs and attorney's fees, made against them on account of injury, sickness, death or damage to persons or property which is caused by or arises out of, in whole or in part, the willful, tortious or negligent acts, failures and/or omissions of the City or its agents, servants, employees, contractors, subcontractors or assigns in the City's performance, administration and operation of this Franchise or in exercising the rights granted City in this Franchise; provided that such indemnification shall not extend to injury or damage to the extent caused by the negligence or willful misconduct of the District, its agents, officers, employees, volunteers or assigns.

C. In the event any such claim or demand be presented to or filed with the District or the City arising out of or relating to the acts or omissions in whole or in part of the other party, the party shall promptly notify the other party thereof, and the notified party shall have the right, at its election and at its sole cost and expense, to settle and compromise such claim or demand.

D. Should a court of competent jurisdiction determine that this Franchise is subject to RCW 4.24.115, then, in the event of liability for damages arising out of bodily injury to persons or damages to property caused by or resulting from the concurrent negligence of the City and the District, their officers, employees and agents, the District's liability hereunder shall be only to the extent of the District's negligence. It is further specifically and expressly understood that the indemnification provided herein constitutes the parties' waiver of immunity under Industrial Insurance, Title 51 RCW, solely for the purposes of this indemnification.

Section 7. Default.

If the District fails to comply with any of the provisions of this Franchise, unless otherwise provided for herein, the City may serve upon the District a written order to so comply within thirty (30) days from the date such order is received by the District. If the District is not in compliance with this Franchise after expiration of said thirty (30) day period, the City may act to remedy the violation and may charge the costs and expenses of such action to the District. The City may act without the thirty (30) day notice in case of an emergency. The City may in addition, by ordinance adopted no sooner than five (5) days after notice of the City Council hearing (at which the District will have an opportunity to be heard) on the impending ordinance, declare an immediate forfeiture of this Franchise; provided that if any material failure to comply with this Franchise by the District cannot be corrected with due diligence within the thirty (30) day period, the District's obligation to comply and to proceed with due diligence being subject to unavoidable delays and events beyond its control, in which case the time within which the District may so comply shall be extended for such time as may be reasonably necessary and so long as the District commences promptly and diligently to effect such compliance, provided a good faith dispute does not exist concerning such compliance.

In addition to other remedies provided herein, if the District is not in compliance with requirements of the Franchise, and if a good faith dispute does not exist concerning such compliance, the City may place a moratorium on issuance of pending District right-of-way use permits until compliance is achieved.

Section 8. Non-exclusive Franchise.

This Franchise is not and shall not be deemed to be an exclusive Franchise. This Franchise shall not in any manner prohibit the City from granting other and further franchises over, upon, and along the Franchise Area, which do not interfere with District's rights under this Franchise. This Franchise shall not prohibit or prevent the City from using the Franchise Area or affect the jurisdiction of the City over the same or any part thereof.

Section 9. Franchise Term.

This Franchise shall have a term of ten (10) years from its Effective Date, and shall automatically renew on the anniversary date of the Effective Date for two-year terms, unless one Party gives the other Party notice of intent to terminate the Franchise at least one (1) year in advance of the expiration of the initial ten-year term or any two-year extension.

Section 10. Franchise Fee.

As compensation to the City for its costs of creating and administering this Franchise, the District shall pay to the City a franchise fee ("Franchise Fee") as provided for in Section 12 of the Transfer Agreement.

Section 11. Compliance with Codes and Regulations.

A. The rights, privileges and authority herein granted are subject to and governed by this Franchise and all other applicable City ordinances and codes, as they now exist or may hereafter be amended, provided the City shall not unreasonably affect or modify any portion of this Franchise without the District's written approval. Nothing in this Franchise limits the City's lawful power to exercise its police power to protect the safety and welfare of the general public. Any location, relocation, erection or excavation by the District shall be performed by the District in accordance with applicable federal, state, county and city rules, standards and regulations, and any required permits, licenses or regulatory fees.

B. In the event that any territory served by District is annexed to the City after the effective date of this Franchise, this Franchise shall be deemed to be the new agreement required to be granted to a franchisee in annexed territory by RCW 35A.14.900 for whatever period of time is then required under that statute. Such territory shall then be governed by the terms and conditions contained herein upon the effective date of such annexation. The first Franchise Fee for any annexed area shall be calculated pro rata from the effective date of the annexation to the end of the next calendar quarter and paid to the City at the same time as the fee for the Franchise Area is paid for that quarter.

Section 12. Location of Facilities and Equipment.

With the exception of components that are traditionally installed above ground such as vault lids, risers, manhole covers, pump stations, lift stations, generators, electrical control panels, power meters, telephone connections and utility markers, all Facilities and equipment to be installed within the Franchise Area shall be installed underground; provided that such Facilities may be installed above ground if so authorized by the City, which authorization shall not be unreasonably withheld, conditioned or delayed, consistent with the provisions of the City's Code and applicable development pre-approved plans.

Section 13. Record of Installations and Service.

With respect to excavations by the Parties within the Franchise Area, each Party shall comply with its respective obligations pursuant to chapter 19.122 RCW, and as such statute may be modified and amended, and any other applicable state law.

Upon written request of the City, the District shall provide the City with the most recent update available of any plan of potential improvements to its Facilities within the Franchise Area; provided that any such plan so submitted shall only be for informational purposes within the Franchise Area, and such plan shall be construed as a proposal to undertake any specific improvements within the Franchise Area.

Upon written request of the District, the City shall provide the District with the most recent update available of any plan of potential improvements to its improvements located within the Franchise Area; provided that any such plan so submitted shall only be for informational purposes within the Franchise Area, and such plan shall be construed as a proposal to undertake any specific improvements within the Franchise Area.

As-built drawings of the precise location of any Facilities placed by the District in any street, alley, avenue, highway, easement, etc., shall be made available to the City within ten (10) working days of request.

Section 14. Shared Use of Excavations.

A. The Parties shall exercise best efforts to coordinate construction work either may undertake within the Franchise Area so as to promote the orderly and expeditious performance and completion of such work as a whole. Such efforts shall include, at a minimum, reasonable and diligent efforts to keep the other Party and other utilities within the Franchise Area informed of its intent to undertake such construction work. The Parties shall further exercise best efforts to minimize any delay or hindrance to any construction work undertaken by themselves or other utilities within the Franchise Area.

B. If at any time, or from time to time, either the District, the City, or another franchisee, shall cause excavations to be made within the Franchise Area, the Party causing such excavation to be made shall afford the others, upon receipt of a written request to do so, an opportunity to use such excavation, provided that:

(1) No statutes, laws, regulations or ordinances prohibit or restrict the proximity of other utilities or facilities to District Facilities installed or to be installed within the area to be excavated;

(2) Such joint use shall not unreasonably delay the work of the Party causing the excavation to be made; and

(3) Such joint use shall be arranged and accomplished on terms and conditions satisfactory to both Parties. The Parties shall each cooperate with other utilities in the Franchise Area to minimize hindrance or delay in construction.

The City reserves the right not to allow open trenching for five (5) years following a street overlay or improvement project. The District shall be given written notice at least one hundred eighty (180) days prior to the commencement of the project. Required trenching due to an emergency will not be subject to five (5) year street trenching moratoria.

Section 15. Insurance.

The District shall maintain in full force and effect throughout the term of this Franchise, a minimum of Two Million Dollars ($2,000,000.00) liability insurance for property damage and bodily injury.

The City shall be named as an additional insured on any policy of liability insurance obtained by District for the purpose of complying with the requirements of this Section.

In satisfying the insurance requirement set forth in this section, the District may self-insure against such risks in such amounts as are consistent with good utility practice. The District shall provide the City with sufficient written evidence, the sufficiency of which shall be determined at the reasonable discretion of the City, upon request, that such insurance (or self-insurance) is being so maintained by District. Such written evidence shall include, to the extent available from District's insurance carrier, a written certificate of insurance with respect to any insurance maintained by District in compliance with this Section.

Section 16. Vacation of Franchise Area.

If the City determines to vacate any right-of-way which is part of the Franchise Area where District Facilities are located or maintained, any ordinance vacating such right-of-way shall provide and condition such vacation on the District obtaining at no cost to the District a permanent easement at least fifteen (15) feet wide in such vacated right-of-way for the construction, ownership, operation, maintenance, repair and replacement of its facilities located and to be located in such vacated right-of-way.

Section 17. Assignment.

All of the provisions, conditions, and requirements herein contained shall be binding upon the District, and no right, privilege, license or authorization granted to the District hereunder may be assigned or otherwise transferred without the prior written authorization and approval of the City, which the City may not unreasonably withhold, condition or delay; provided that a merger or consolidation of the District with or into another Title 57 water-sewer district shall not be considered an assignment for the purposes of this provision and shall not be subject to the City's approval. Notwithstanding the foregoing, the District may assign this Franchise to an affiliate, parent or subsidiary or as part of any corporate financing, reorganization or refinancing which does not require assignment to any but an affiliate, parent or subsidiary without the consent of, but upon notice to, the City.

Section 18. Notice.

Unless applicable law requires a different method of giving notice, any and all notices, demands or other communications required or desired to be given hereunder by any Party (collectively, "notices") shall be in writing and shall be validly given or made to another Party if delivered either personally or by Federal Express or other overnight delivery service of recognized standing, or if deposited in the United States

Mail, certified, registered, or express mail with postage prepaid, or if sent by facsimile transmission with electronic confirmation. If such notice is personally delivered, it shall be conclusively deemed given at the time of such delivery. If such notice is delivered by Federal Express or other overnight delivery service of recognized standing, it shall be deemed given one (1) business day after the deposit thereof with such delivery service. If such notice is mailed as provided herein, such shall be deemed given three (3) business days after the deposit thereof in the United States Mail. If such notice is sent by facsimile transmission, it shall be deemed given at the time of the sender's receipt of electronic confirmation. Each such notice shall be deemed given only if properly addressed to the Party to whom such notice is to be given as follows:

To City:	City Manager City of Ridgefield P.O. Box 608 Ridgefield, WA 98642 Phone: (360) 887-3557 Fax: (360) 887-0861
To District :	General Manager Clark Regional Wastewater District PO Box 8979 Vancouver, WA 98668 Phone: (360) 750-5876 Fax: (360) 750-7570
With copy to:	Clark Regional Wastewater District General Counsel Inslee, Best, Doezie & Ryder, P.S. Symetra Financial Center 777 - 108th Avenue N.E., Suite 1900 Bellevue, WA 98004

Any Party may change its address for the purpose of receiving notices as herein provided by a written notice given in the manner aforesaid to the other Party.

Section 19. Severability.

If any term, provision, condition or portion of this Franchise shall be held to be invalid, such invalidity shall not affect the validity of the remaining portions of this Franchise, which shall continue in full force and effect.

Section 20. Non-Waiver.

The failure of either Party to enforce any breach or violation by the other Party or any provision of this Franchise shall not be deemed to be a waiver or a continuing waiver by the non-breaching Party of any subsequent breach or violation of the same or any other provision of this Franchise.

Section 21. Alternate Dispute Resolution.

If the Parties are unable to resolve disputes arising from the terms of this Franchise, prior to resorting to a court of competent jurisdiction, the Parties shall submit the dispute to mediation or other non-binding alternate dispute resolution process agreed to by the Parties. Unless otherwise agreed upon between the Parties or determined herein, the cost of that process shall be shared equally by the Parties.

Section 22. Governing Law/Venue.

This Franchise shall be governed by the laws of the State of Washington. Any suit to enforce or relating to this Agreement shall only be filed in Clark County Superior Court, Clark County, Washington.

Section 23. Entire Agreement.

This Franchise constitutes the entire understanding and agreement between the parties as to the subject matter herein and no other agreements or understandings, written or otherwise, shall be binding upon the parties upon execution and acceptance hereof.

Section 24. Amendment.

This Franchise may be amended only by written instrument, signed by both Parties, which specifically states that it is an amendment to this Franchise, and is approved and executed in accordance with the laws of the State of Washington. Without limiting the generality of the foregoing, this Franchise (including, without limitation, Section 6 above) shall govern and supersede and shall not be changed, modified, deleted, added to, supplemented or otherwise amended by any permit, approval, license, agreement or other document required by or obtained from the City in conjunction with the exercise (or failure to exercise) by the District of any and all rights, benefits, privileges, obligations, or duties in and under this Franchise, unless such permit, approval, license, agreement or document specifically:

(1) References this Franchise; and

(2) States that it supersedes this Franchise to the extent it contains terms and conditions which change, modify, delete, add to, supplement or otherwise amend the terms and conditions of this Franchise.

In the event of any conflict or inconsistency between the provisions of this Franchise and the provisions of any such permit, approval, license, agreement or other document that does not comply with subsections (1) and (2) referenced immediately above, the provisions of this Franchise shall control.

Section 25. Directions to City Clerk.

Upon passage of the Ordinance that grants this Franchise, the City Clerk is authorized and directed to forward a certified copy of the Ordinance to the District. The District shall have thirty (30) days from the receipt of the certified copy of the Ordinance to accept in writing the terms of the Ordinance and this Franchise.

Section 26. District Acceptance of Franchise.

The District shall have no rights under this Franchise nor shall District be bound by the terms and conditions of this Franchise unless District shall, within thirty (30) days after the effective date of the Ordinance that grants this Franchise, file with the City its written acceptance of the Ordinance and this Franchise.

Section 27. Effective Date of Ordinance.

This Franchise, and the Ordinance that grants this Franchise, being an exercise of a power specifically delegated to the City Council, is not subject to referendum, and shall take effect five (5) days after passage and publication of an approved summary thereof consisting of the title.

Section 28. Effective Date of Franchise.

The terms and conditions of this Franchise shall not be binding on the City and the District unless the District Board of Commissioners within thirty (30) days of the effective date of the Ordinance adopts a resolution accepting this Franchise, and the date of the adoption of such resolution by the District Board of Commissioners shall be the effective date ("Effective Date") of this Franchise.

[**NOTE:** *This Exhibit E will become the substantive portion of a City Ordinance granting this Franchise to the District. The City Ordinance will be in the typical format for City ordinances, and will include recitals that are relevant to the Collection System Transfer and the Franchise*]

Memorandum of Understanding (MOU)
Regarding Ridgefield Wastewater Collection System Transfer

This MOU is entered into this 10th day of May, 2012 between the City of Ridgefield ("City") and the Clark Regional Wastewater District ("District"), referred to collectively as the Parties ("Parties"), both municipal corporations of the State of Washington.

Whereas,the City and the District both own and operate wastewater collection systems; and

Whereas,pursuant to interlocal agreement and as requested by the City, the District currently provides on-call operation and maintenance services for the City's wastewater collection system, referred to herein as the System ("System"); and

Whereas, the City and the District, together with Clark County and the City of Battle Ground, are studying and developing a regional business plan for the formation of a regional wastewater alliance to provide regional treatment and transmission services ("regional study"); and

Whereas, the City has completed an extensive analysis of wastewater management options to determine the preferred means for providing cost effective service, providing long-term rate stability and assuring capacity to serve existing and future customers, which analysis includes alternatives from the regional study; and

Whereas, the City's current city limits and urban growth area have the potential to attract significant new residential, commercial and industrial users; and

Whereas, although the City has a significant economic development potential, the City has limited capital resources and customer base revenue to construct necessary wastewater infrastructure for future residential, commercial and industrial development; and

Whereas, after interconnection of the collection systems, the District's larger ratepayer base and existing wastewater treatment capacity allocations have the ability to lower System expansion and operation costs to City customers; and

Whereas, the potential for benefit to the District's customers exists through growth in the overall utility customer base and utilization of wastewater treatment capacity already constructed; and

Whereas, the City Council and District Board of Commissioners, after reviewing a comprehensive analysis of wastewater management options, has determined it is in the best interests of the City citizens and the District customers for the City to work with the District to determine the means by which the District could own and operate the System on behalf of the City and to continue to pursue the formation of a regional wastewater alliance as anticipated in the regional study; and

Whereas,consistent with the regional study and the analysis of wastewater management options, the District and the City desire to investigate and analyze a transfer of the City's System to the District to ensure consistent and dependable service, maintain stable rates for all customers and promote economic development in the City and the region; now, therefore

The Parties agree as follows:

1. The Parties have completed a preliminary investigation of a transfer of the City's System to the District. The Parties shall complete the investigation, understanding that the final regional study configuration may impact the terms of a potential System transfer.
2. The Parties shall in good faith further define conditions by which a transfer of the System could occur, using the following Guiding Principles:
   a. Transfer of the System would be accomplished by a transfer agreement, following completion of the investigation. The transfer agreement would become effective on a date stated in the transfer agreement, and would establish the date of transfer of the System.
   b. The real and personal property of the System shall be transferred free and clear of all liens, encumbrances and liabilities, except those agreed upon by the Parties in the transfer agreement.
   c. When the System is transferred to the District, the City customers shall become District customers and the District shall be responsible for direct billing of the customers.
   d. After the System is transferred and after any Collection Transition Period ("CTP"), the District shall pay to the City compensation for the System, in an amount and on a schedule to be determined, through a combination of:
      i. Right-of-way franchise fees;
      ii. Fees for the District's protection against City assumption per Chapter 35.13A RCW (if the District later annexes into the City);
      iii. Fees for the City's promise to abstain from developing a competing wastewater collection system; and
      iv. Other fees and charges agreed to by the Parties.
   e. The District shall include the System compensation described in paragraph 2d in its System service charge to customers in the City. The compensation shall not exceed the amount of the current city utility tax and City indirect costs allocated to the System function paid by the City customers. The compensation may be adjusted from time to time by mutual agreement of the Parties and consistent with the legal basis for the compensation.
   f. The Parties may consider a CTP in which the District owns the System but the City operates and maintains the System with City employees for a period of time. During such CTP, the District shall pay the City's full cost of System operation, which includes actual operation and maintenance costs, debt service attributable

to the System, indirect City charges to the System and City utility taxes imposed on the System.

g. If a new regional wastewater alliance is formed, and while the City operates the City wastewater treatment plant and related facilities ("Plant") prior to transfer of ownership of the Plant to the regional wastewater alliance, the Parties will operate under a separate Treatment Transition Period ("TTP"). During such TTP, in which the District owns and operates the System, the District shall collect all revenues for the City wastewater treatment plant and related facilities ("Plant"), and shall pay the City's full cost of Plant operation, which includes actual operation and maintenance costs, debt service attributable to the Plant, indirect City charges to the Plant and City utility taxes imposed on the Plant. After the transfer of ownership of the Plant to the regional wastewater alliance, the District shall not be obligated to pay the City's full cost of Plant operation.

h. The District shall operate and maintain the System as a separate component or unit of the District's wastewater system. After the transfer, or after the CTP, if any, the District employees shall operate and maintain the System. As soon as possible, the City shall discuss and negotiate the impacts of transferring the System to the District with the union that represents the City employees, taking into account a transition period, if any. Unless otherwise agreed by the Parties, the District shall not be required to hire City employees currently operating the System.

i. The District's service charges for System customers shall be higher than the service charges for other District customers, to account primarily for the capital investment required to provide necessary near-term infrastructure needs, including interconnection of the System with District infrastructure by constructing the Discovery Corridor Wastewater Transmission System ("DCWTS"), and for the compensation payments of paragraph 2d above, with the goal of reducing and eventually equalizing the cost-of-service based charges over time (exclusive of fees that apply only to the City service area per paragraph 2d above). The reduction in the System service charges will be based on a formula, which takes into account a beginning rate differential between the service charge for System customers and the service charge for other District customers and a programmed rate reduction for the addition of System customers over time. The District shall notify the City at least 60 days before any change in the System service charge. Any service charge increase(s) of more than a total of ten percent (10%) in a calendar year shall be approved jointly by the City and the District. The City anticipates an increase in the City's wastewater service charge of up to 10% effective January 1, 2013 to fund necessary City capital projects. If the System is transferred to the District, the initial District service charge applied to City customers in 2013 will not exceed the City's wastewater service charge on January 1, 2013.

j. To establish the connection charges for the System, the District shall use the same general formula as for other parts of the District's wastewater system, but shall take into account the System's status as a separate component or unit of the District's wastewater system, the capital investment associated with the DCWTS and the need to expand the System to provide economic development opportunities. The District shall notify the City at least 60 days before any change in the connection charge. Any connection charge increase(s) of more than a total of ten percent (10%) in a calendar year shall be approved jointly by the City and the District. The initial connection charge imposed by the District in the City will not exceed the City's 2012 connection charge.

k. With input from the City, the District shall adopt System levels of service, standards and fiscal policies that are consistent with general District levels of service, standards and fiscal policies, but that take into account the separate nature of the System and the City's comprehensive plan. The transfer agreement shall describe example categories of levels of service, such as operation and maintenance and repair and replacement.

l. With input from the City, the District shall adopt policies for construction and installation of capital improvements to the System. A list of prioritized initial capital projects for the System shall be attached to the transfer agreement as an exhibit. The transfer agreement will require the District to construct a minimum number of capital projects within a specified time frame.

m. The Parties shall establish an Oversight Committee, consisting of representatives of the City and the District, to monitor and discuss the District's ownership, operation, maintenance and improvement of the System, and to consider and provide input on the levels of service, standards and fiscal policies developed by the District. The transfer agreement shall establish some basic operational rules for the oversight committee, such as identification of representatives by position, frequency of meetings and quorum requirements.

n. The parties shall jointly approve any individual capital improvements in the City area that are over $1 million in estimated construction cost, increased by the *Engineering News Record* construction cost index for the region, unless the projects are already included in the prioritized initial capital project list described in paragraph 2l.

o. The District's adopted levels of service and policies for construction and installation of capital improvements shall, to the greatest extent possible, be consistent with the goals, policies and schedule of the City's comprehensive plan.

p. The Parties shall amend as necessary relevant comprehensive and capital plans, ordinances and resolutions relating to the ownership, operation and maintenance of the System.

q. The Parties shall establish and define the circumstances by which the City may regain full ownership and operational control of the System. Any regaining of ownership and control of the System shall reimburse the District for or provide for payment of any outstanding or un-recovered costs and expenses on capital improvements.

r. The Parties shall jointly determine how the City's existing cash reserves and fund balances for the System will be used in connection with the transfer of the System or the District's ownership, operation, maintenance and improvement of the System.

3. The Parties shall retain their right and option to support and participate in a new regional wastewater alliance, even if they are unable to enter into a System transfer agreement.
4. Using the Guiding Principles of paragraph 2 above, the staff and consultants of the City and the District shall prepare a draft System transfer agreement.
5. The Parties shall develop jointly a public outreach and community dialogue program and schedule for the potential System transfer.
6. This MOU shall terminate on December 31, 2012, but may be extended by agreement of the Parties.

CITY OF RIDGEFIELD	**CLARK REGIONAL WASTEWATER DISTRICT**
By: ______ City Manager	By: John M. Peters General Manager
Date: 05/10/12	Date: 05-08-2012
Attest:	*Attest:*
By: ______ City Clerk	By: Kim Thun Clerk to the Board
Approved as to Form:	*Approved as to Form:*
By: ______ City Attorney	By: ______ District Legal Counsel

Amendment to Memorandum of Understanding (MOU)
Ridgefield Wastewater Collection System Transfer

This AMENDMENT to the "Memorandum of Understanding (MOU) Regarding Ridgefield Wastewater Collection System Transfer" ("MOU") is entered into this 13 day of December, 2012 between the City of Ridgefield ("City") and the Clark Regional Wastewater District ("District"), referred to collectively as the Parties ("Parties"), both municipal corporations of the State of Washington.

Whereas, the Parties entered into the MOU on May 10, 2012; and

Whereas, the ninth recital of the MOU states that the Parties have determined it is in the best interests of the City citizens and the District customers for the City to work with the District to determine the means by which the District could own and operate the City's wastewater collection system on behalf of the City; and

Whereas, the tenth recital of the MOU states that the Parties desire to investigate and analyze a transfer of the City's system to the District ("collection system transfer") to ensure consistent and dependable service, maintain stable rates for all customers and promote economic development in the City and in the region; and

Whereas, since execution of the MOU, the staff of the Parties have developed a draft agreement that sets forth the terms and conditions of and procedures for the collection system transfer ("transfer agreement"); and

Whereas, the transfer agreement is substantially complete; and

Whereas, the staff of the Parties are obtaining, reviewing and preparing documents that relate to the collection system transfer, in preparation for the transfer; and

Whereas, the staff of the Parties need further time to obtain, review and prepare such documents and to carry out other aspects of the transfer; and

Whereas, the MOU expires on December 31, 2012; and

Whereas, Section 6 of the MOU authorizes the Parties to extend the MOU; and

Whereas, the City Council and the District Board of Commissioners have determined that an extension of the term of the MOU until December 31, 2013 will be in the best interests of the City and the District, and will be consistent with the anticipated date of the collection system transfer, which is January 1, 2014; now, therefore

1. The Parties agree to amend Section 6 of the MOU to read as follows:

This MOU shall terminate on December 31, 2013, but may be extended by agreement of the Parties.

2. All other sections of the MOU shall remain in full force and effect.

CITY OF RIDGEFIELD	**CLARK REGIONAL WASTEWATER DISTRICT**
By:________________ City Manager	By:________________ General Manager
Date: 12·13·12	Date: 12-27-2012
Attest:	*Attest:*
By:________________ City Clerk	By:________________ Clerk to the Board
Approved as to Form:	*Approved as to Form:*
By:________________ City Attorney	By:________________ District Legal Counsel