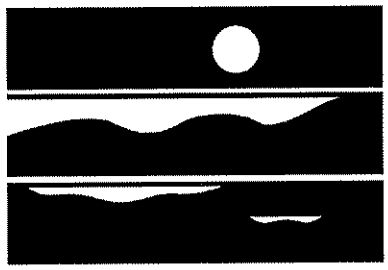

City of Blaine
Wastewater Treatment Plant
Class II Inspection

September 1997

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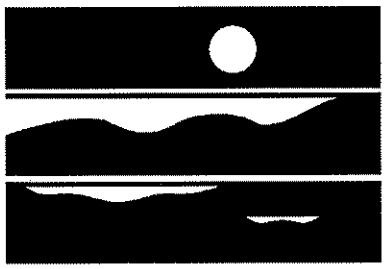

City of Blaine
Wastewater Treatment Plant
Class II Inspection

by
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Environmental Investigations and Laboratory Services Program
Olympia, Washington 98504-7710

September 1997

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Abstract

An announced Class II inspection was conducted December 2-4, 1996 at the Blaine Wastewater Treatment Plant, located in Whatcom County. Influent characteristics were generally similar to other typical treatment plants with weak influent. Moderately effective reductions in BOD_5, TOC, TSS, and ammonia nitrogen occurred across the Blaine treatment plant. Effluent ammonia nitrogen concentration was expected to be reduced to below water quality criteria at the edge of the acute and chronic mixing zone, but it was determined that a reasonable potential exists for the effluent result to exceed the allowable chronic whole effluent ammonia nitrogen concentration. Blaine should conduct additional sampling to determine if this potential persists as sample size increases. Blaine might also establish mitigating dilution factors by conducting a dilution zone study of their discharge.

The 24-hour composite BOD_5 and TSS concentrations were within the NPDES weekly and monthly permit limits, but the percent reduction in BOD_5 was less than the minimum required by the permit. Effluent fecal coliform results were exceptionally high and exceeded both monthly and weekly average permit limits. All other inspection results were within applicable effluent limits and influent loading limits. Detected whole effluent priority pollutant organics and metals concentrations were generally within marine water quality criteria, with the exception of copper, which exceeded the acute criterion. Blaine should ensure that all concentrations remain within applicable criteria or limits. Split sample comparisons found Ecology and Blaine TSS sample results to be generally similar, but the BOD_5 results to be substantially different for both sample and laboratory comparisons. Blaine should review sampling and analytic procedures for BOD_5. Fecal coliform concentrations in Blaine sludge exceeds the pathogen limits of Class A land application requirements and it is recommended that these concentrations be reduced for this level of use. Organic and metal concentrations were well within both EPA land application concentration limits and state dangerous waste regulation designation criteria. Discharge from industrial contributors are not expected to have an appreciable effect on plant performance or effluent quality.

Summary

Flow Measurements

Blaine determined its effluent flows by in-line totalizer flow measurements taken above the chlorine contact chamber. The daily 24-hour combined totalized effluent flows from 8:36-8:36 AM (December 3-4) was 0.583 MGD. Average daily flow over a three-day period (December 2-4) was 0.623 MGD. The inaccessibility of the effluent in-line flow meter precluded independent verification of effluent flow measurements.

Wastewater General Chemistry and Treatment Plant Design

Treatment Plant Influent

Influent concentrations of five-day biochemical oxygen demand (BOD_5), total solids (TS), total non-volatile solids (TNVS), total suspended solids (TSS), total Kjeldahl nitrogen (TKN), and ammonia nitrogen (NH_3-N) were similar to typical weak concentrations for untreated domestic wastewater. The average influent oil & grease concentration (O&G) was 50% less than the typical weak concentration. The total organic carbon (TOC) was less than the typical weak concentration, and the BOD_5/TOC ratio was about two times greater than typical values. Since TOC is a measure of biologically inactive as well as active organic carbon, the ratio suggests a scarcity of compounds resistant to biological degradation in the influent. This would indicate a smaller concentration, relative to typical treatment plant influents, of those persistent organic compounds capable of passing through the treatment system.

Treatment Plant Effluent

The data suggest moderately effective treatment of TSS and BOD_5. Ammonia nitrification across the plant was partially effective. The TS reduction was small and cannot fully account for reductions in TSS. A mass balance calculation projected a maximum end-of-pipe concentration that would not violate the total ammonia criteria at the acute and chronic dilution zone boundaries. The Blaine permit does not include specific dilution factors for either the acute or chronic dilution zone boundary, so a dilution factor of one was used in the calculation. The effluent ammonia nitrogen concentration determined during the inspection was 3.06 mg/L, which by direct comparison was less than the calculated maximum whole effluent acute and chronic criteria (23.37 mg/L and 3.51 mg/L respectively). However, using a multiplier based on a single sample and a 95% probability of achieving the water quality standards, it was determined a reasonable potential exists

for the effluent result to exceed the allowable chronic whole effluent ammonia nitrogen concentration.

NPDES Permit Comparisons

Both the Ecology and Blaine composite 24-hour effluent BOD_5 concentrations and loads were below the permit monthly average limit and the weekly average limit. The percent reduction in BOD_5 concentration across the plant was less than the minimum monthly average reduction required by the permit. The Blaine percent reduction was also less than the permit requirement. The Blaine effluent sample suffered from elevated holding temperature which rendered their results less reliable than Ecology results.

The Ecology 24-hour composite effluent TSS concentration and load were within the monthly and weekly average permit limits. Percent reduction across the plant was exactly equal to the monthly average reduction required by the permit. The Blaine sample concentrations and loads gave similar results. The effluent pH values were within the permitted range. The reported totalized average influent flow was well below the NPDES permit design limit for the maximum month. Influent BOD_5 and TSS loads were well below permit overloading limits.

Effluent fecal coliform results (2,200 and 70,000 colonies/100ml) were exceptionally high and exceeded both monthly and weekly average permit limits. During the inspection wastewater in the chlorine contact chamber appeared murky with a noticeable brown tint and it was possible that the chamber was not operating correctly. Calculation of the contact chamber length to width ratio and average retention time determined that both these figures exceed minimum values for typical chlorine contact chambers (Metcalf & Eddy, 1992). The high fecal coliform density, found in the presence of a detectable chlorine residual, may be the result of short-circuiting across the chlorine contact chamber.

Detected Priority Pollutant Organics And Metals

Five VOA compounds and twenty BNA compounds were detected in the effluent samples, but the results did not exceed marine acute and chronic water quality criteria. One pesticide compound, gamma-BHC, was detected in the effluent at 0.009 µg/L, but this concentration was also well within the marine acute water quality criterion.

Three priority pollutant metals were detected in the plant effluent. Copper (9.9 µg/L) exceeded the marine acute water quality criterion by a factor of 4 (EPA, 1986) and would exceed the criteria at the edge of the acute dilution zone. Mercury (0.012 µg/L) and zinc (31µg/L) were less than acute and chronic water quality criteria.

Split Samples

Sample Comparisons

Ecology analyses of composite samples collected by Ecology and Blaine produced similar results for TSS, but substantially different results for BOD_5. For TSS relative percent differences (RPD) were less than the variation in interlaboratory precision, but for BOD_5 they were greater. The Blaine BOD_5 results were generally less than the Ecology results and this may be due to elevated holding temperatures during compositing and storage.

Laboratory Comparisons

Only two parameters from four samples were available for laboratory comparisons. Ecology and Blaine laboratory results were extremely close for TSS, but much less precise for BOD_5. The Blaine BOD_5 results were consistently less than the Ecology results, suggesting that the Blaine laboratory performance was poor.

Sludge

General Chemistry

The sludge dry weight fecal coliform result was 120,000 colonies per gram, exceeding the maximum limit for fecal coliform density as required for Class A sewage sludge land application, but within the Class B designation limit. The dry weight total coliform density was 533,000 colonies per gram. The dry weight E. coli density was 78,000 colonies per gram.

Detected Priority Pollutants

Eleven metals were detected in the sludge. The highest concentrations found were for zinc, copper, lead, chromium, and silver. The concentrations of priority pollutants in the sludge did not exceed either EPA standards for land application of sewage sludge or screening concentrations for the dangerous waste designation criteria.

Industrial Contributors

Justesen, Inc.

During the inspection pH, copper, lead, and zinc results were all well below both monthly and daily permit limits. Percent contributions from Justesen, Inc. to the Blaine total influent loads for TSS and total phosphorus were less than 1%. Percent contributions of

copper and zinc to the Blaine effluent loads were approximately 2% and 0.05% respectively. These small loads were not expected to appreciably effect either treatment plant performance or effluent quality.

Copper, zinc, and lead were the priority pollutant metal compounds found at the highest concentrations. Percent contribution of copper to the Blaine effluent load was 2.4%. Percent contributions for all other parameters were less than 1%. These loads are also not expected to have an appreciable effect on treatment plant performance or effluent quality.

Recommendations

Flow Measurements

- Blaine should evaluate options to reconfigure their effluent flow measurement system to allow reasonably accessible and independent verification.

General Chemistry and Plant Design

- Blaine should conduct additional sampling to determine whether a potential exists for whole effluent ammonia nitrogen concentrations to exceed ammonia nitrogen criteria.

- Since the potential for exceedence is highly sensitive to dilution factors, Blaine should conduct studies to establish dilution factors for their discharge.

NPDES Permit Comparisons

- Blaine should take steps to reduce elevated effluent fecal coliform concentration to acceptable levels.

- Blaine should determine if high fecal coliform densities in the effluent are caused by short-circuiting in the chlorine contact chamber.

Detected Priority Pollutant Organics And Metals

- Blaine should ensure that copper concentrations remain within water quality criteria.

Split Samples

- Blaine should review sampling and laboratory procedures to ensure good analytic performance.

Sludge

- Blaine should ensure that treated sludge destined for land application meets applicable pathogen density restrictions under 40 CFR 257.32.

Introduction

An announced Class II inspection was conducted December 2-4, 1996 at the Blaine Wastewater Treatment Plant (WWTP), located in Whatcom County. Pretreated wastewaters from several industrial contributors, including Justesen, Inc. (Justesen) and Geographics, Inc. (Geographics) were also inspected. Guy Hoyle-Dodson and Steven Golding, environmental engineers for the Department of Ecology, Environmental Investigations and Laboratory Services (EILS) Program, conducted the investigation. Ed Abassi, permit manager for Ecology's Northwest Regional Office, provided background information and assisted in planning the inspection. Clifford Ness, Lead Operator of the Blaine WWTP, also provided information on facility operation and assistance on site.

The Blaine WWTP provides treatment services to the city of Blaine (pop: 2,380) and surrounding community. The plant design population equivalent is 7,640. The facility treats sewage from a largely residential population, with a small number of commercial and industrial contributors. An NPDES Permit (Permit No. WA-002264-1) was issued October 2, 1991 with an expiration date of October 2, 1996. Two industrial contributors discharge process wastewater to the Blaine collection system: (1) Justesen -- phosphate conversion coating and (2) Geographics -- graphic arts printing and stick-on-letter manufacturing. Justesen has a state waste discharge permit (permit # ST 7319) and Geographics is currently under evaluation for inclusion in the state waste discharge program. Blaine treatment plant effluent permit limits include five-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), fecal coliform, and chlorine. Water quality standards limit concentrations of ammonia nitrogen (NH_3-N), priority pollutant metals, and priority pollutant organics.

The Class II inspection was initiated by the Department of Ecology to evaluate permit compliance and to provide information about facility loading and performance. Special attention was paid to Justesen and Geographics contributions to the treatment system. The inspection also focused on flow measurements and sludge characterization.

Specific objectives of the inspection included:

1. Assess NPDES permit compliance by comparison of influent and effluent concentrations and loads to permit limitations

2. Assess wastewater toxicity by comparing priority pollutant organics and metals scan concentrations to Washington state acute and chronic water quality criteria

3. Evaluate treatment plant performance across the treatment system

4. Evaluate any impacts the Justesen and the Geographics effluents may have on treatment plant efficiency and final effluent toxicity

5. Evaluate the facility's self-monitoring program through sample splits and independent laboratory analysis

6. Assess sludge toxicity by comparing priority pollutant organics and metals scan concentrations to applicable land application standard and hazardous waste characterization limits

Setting

The Blaine wastewater treatment facility is located in Whatcom County, Washington, southwest of the city of Blaine (Figure 1). The WWTP treatment system consists of headworks with screening, an equalization basin, rotating biological contactors, secondary clarifiers, chlorine contact chamber, aerobic sludge digestion system, and a multiport discharge. Treatment plant discharge is to Semiahmoo Bay, in the northern Puget Sound, on the west side of Semiahmoo spit.

Compliance History

The original facility, constructed in 1980, has had a history of operational and water quality problems. A 1983 Class II inspection determined that the plant was achieving only 70% to 76% removal efficiencies for BOD_5 and TSS respectively, primarily due to weak influent loading (Heffner, 1983). Bypass discharge of several restaurants, businesses, and fish processors into Semaihmoo Bay was noted. Fecal coliform in the WWTP effluent exceeded the permit limit, likely due to a malfunctioning chlorinator. Influent flow approached 80% of the design capacity. Grit buildup in the RBC basin was discovered to be impacting the performance of the RBC, necessitating regular cleaning of the basins. Grease buildup in the basins was also identified as a problem.

A 1982 evaluation of discharges to Drayton Harbor (Kendra, 1986) determined that overloads at the Blaine wastewater treatment plant were attributed to excessive organic, solids, and grease loads contributed by local seafood processors. City officials elected to divert the untreated processing waste stream to the mouth of Drayton Harbor for several weeks. Wastewater samples showed high turbidity, solids, oil & grease, biochemical oxygen demand, ammonia, and fecal coliform. A literature review indicated that adverse effects of the discharge may have included solids accumulation, oxygen depletion, ammonia toxicity, and impairment of aesthetic values. A popular recreational crab fishery at the harbor mouth may have been threatened by fecal coliform contamination from the raw sewage component of the waste.

Most fish processing wastewaters were physically separated from the domestic sanitary sewage collection system and are now discharged directly to Semiahmoo Bay. The Blaine treatment plant was generally in compliance with permit limits from 1986 to 1991, with occasional reported violations. Flow to the Blaine treatment plant consistently increased during this period, resulting in influent flow and BOD_5 loads that exceeded the design capacity. The requirements for percent reduction of BOD_5 and TSS were regularly violated during the winter months. Slugs of wastewaters from fish related industries produced plant upsets and operational difficulties at the Blaine treatment facility (Fact Sheet, 1991).

Plant Design

The existing WWTP treatment process consists of influent pumping followed by fine screening through rotary drum screens (Figure 2). Influent average design flow during the maximum month is 0.8 MGD. Flow is directed to an equalization basin where supernatant from the aerobic sludge digestors is added. Two parallel banks of rotating biological contactors, each with three drums in series, provide secondary biological treatment. Secondary sedimentation is accomplished by two secondary clarifiers operated in parallel. The final effluent is disinfected in a chlorine contact chamber and discharged into Semiahmoo Bay. The outfall is discharged to the west into Semiahmoo Bay through a submerged diffuser approximately 2600 feet from shore at a depth of 70 feet. An aerobic sludge digestor treats sludge from the secondary clarifiers. Digested liquid sludge is hauled for land application.

Industrial Contributors

Justesen collects process wastewater contaminated with metals (from tanks used in the electroplating of fireplace screens with a phosphate conversion coating). A 350 gallon sedimentation tank is used to remove suspended solids before discharge to the Blaine collection system. Discharge volumes are reported to range from 350 to 400 gallons per day. Geographics produces wastewater from a photographic print operation and stick-on letter manufacturing process. Installation of a vapor recovery system has significantly reduced the discharge of volatile organics to the Blaine collection system (Ferry, 1996). Other wastewater treatment processes include a charcoal filter dye recovery system and a sedimentation tank with paper filter. A final 540 gallon holding tank collects wastewater from all processes and is drained to the Blaine collection system approximately once per week. Discharge volumes are reported to be approximately
400 gallons per week.

Procedure

Ecology collected both grab and composite samples at the WWTP. Composite samples were collected December 3-4, 1996 from plant wastewater at two stations (Figure 2 & Appendix A): the influent at the headworks just upstream of the rotating screens, and the disinfected effluent just above the weir at the end of the chlorine contact chamber. All strainers were submerged approximately 12 inches below the surface of the flow and positioned to prevent entrainment of sediments. All composite samples were collected using Ecology ISCO composite samplers with equal volumes of the sample collected every 30 minutes over a 24-hour period. A single transfer blank was also collected on December 2 by running deionized (DI) water through the effluent compositor prior to sampling.

Grab samples targeting TSS, nutrients, and cyanide were collected from both influent and effluent samples on December 3 in the morning and afternoon. The effluent grab target analytes also included chlorine and volatile organics. Morning and afternoon grab samples for fecal coliform were taken December 4 from the effluent sample location. Sludge samples were collected from the aerobic sludge digestion basin on December 3. Grab samples were taken from the end of the Justesen sedimentation tank and from the Geographics holding tank, also on December 3.

Blaine treatment plant personnel collected composite samples on December 2-3 from both the influent and the effluent, the former from above the headworks rotating screens and the latter from just above the final effluent weir. The Blaine sample locations were similar to the locations of Ecology's influent and effluent composite samplers. The Blaine composite samples were split for analysis by both Ecology and Blaine laboratories. Parameters analyzed, samples collected, and the sampling schedule appear in Appendix B.

Samples for Ecology analysis were put in appropriate containers and preserved as necessary. Samples were packed in ice for delivery to the Ecology Manchester Environmental Laboratory. Holding time restrictions were observed for all samples. Analytical procedures and laboratories performing the analyses are summarized in Appendix C. Sampling quality assurance included priority pollutant cleaning of sampling equipment (Appendix D).

Quality Assurance/Quality Control

A transfer blank was submitted for metals analysis to establish baseline sampling conditions. Sample equipment preparation included ultra cleaning to remove trace contaminants. Sampling in the field followed all protocols for holding times, preservation, and chain-of-custody set forth in the Manchester Environmental Laboratory Lab Users Manual (Ecology, 1994).

Laboratory QA/QC, including holding times, matrix spike and duplicate spike sample analyses, surrogate recoveries, laboratory control sample analysis, and precision data were, with a few exceptions, within appropriate ranges. Initial calibration verification standards and continuing calibration standards were within USEPA (CLP) control limits. Procedural blanks were predominantly free from contamination. Qualifiers are included in the data table where appropriate. The following are specific concerns:

General Chemistry

Sample analysis for total phosphorus was delayed by two days because of a power outage and lab closure, with the result that holding times were exceeded by two days. A "G" qualifier for total coliform in the sludge sample indicate that the result may be greater than or equal to the reported result.

Volatile, Semivolatile, and Pesticide/PCB Organics

Low levels of certain target volatile and semi-volatile compounds were detected in laboratory blanks. The EPA "five times rule" was applied to all target compounds found in the blank. If the concentrations of the compounds in the samples were greater than or equal to five times the concentration of the compounds in the associated method blank, they are considered native to the sample. The semi-volatile water samples were extracted with methylene chloride following the Manchester modification of the EPA CLP and SW 846 8270 procedure with capillary GC/MS analysis of the sample extracts. For the chlorinated pesticide/PCB analysis dibutlylchlorendate soil surrogate recoveries and tetraxhloro-m-xylene dropped to 40% and 29% respectively. The latter drop was due to the sample going dry during concentration and some loss of the more volatile organics. No qualifiers were added based on other surrogate recoveries being within acceptable limits.

Metals

Spike recoveries for selenium in the water samples and selenium, arsenic, antimony, and silver in the sludge sample were outside CLP acceptance limits of +/- 25%. These parameter results have been qualified with a "J" qualifier as an estimate due to poor recovery. Continuing calibration verification standards for antimony was greater than 1.10 µg/L. Laboratory control sample (LCS) analysis for silver, antimony, selenium and thallium were outside the excepted window. Data for these elements are qualified (depending on level) with either "J" as an estimate or "UJ" as undetected at estimated detection level due to low recovery from the LCS sample. A five times dilution series for zinc was analyzed and the % RSD indicated a possible interference problem. Zinc data are qualified with a "J" as an estimate since the % RSD was greater than 10%.

Results and Discussion

Flow Measurements

Blaine determined plant effluent flows for NPDES permit reporting purposes by in-line totalizer flow measurements above the chlorine contact chamber. Influent flow was not recorded. Daily 24-hour combined totalized effluent flows reported by Blaine were 0.656 MGD for December 2-3 (time: 1356-1437) and 0.583 MGD for December 3-4 (time: 0836-0826) with an average daily flow over the three-day period of 0.623 MGD. The inaccessibility of the effluent in-line flow meter precluded independent verification of effluent flow measurements. Blaine should evaluate options to reconfigure their effluent flow measurement system to allow independent verification.

General Chemistry Results And Treatment Plant Effectiveness

Treatment Plant Influent

Ecology general chemistry results are presented in Table 1. Influent concentrations of five-day biochemical oxygen demand (BOD_5 - 120 mg/L), total solids (TS - 395 mg/L), total non-volatile solids (TNVS - 215 mg/L) total suspended solids (TSS - 86 mg/L), and ammonia nitrogen (NH_3-N - 11 mg/L) were all similar to typical concentrations found in weak untreated domestic wastewater (Metcalf & Eddy, 1991). The total organic carbon (TOC - 48.8 mg/L) was less than the typical weak concentration and the BOD_5/TOC ratio (2.46) was approximately 50% greater than typical values (Metcalf & Eddy, 1991). Since TOC is a measure of biologically inactive as well as active organic carbons, the ratio suggests a scarcity of compounds resistant to biological degradation in the influent. This would imply a smaller concentration, relative to typical treatment plant influents, of those persistent organic compounds capable of passing through the treatment system.

Treatment Plant Effluent

Relative percent reductions across the entire system were calculated and the results presented in Table 2. Ecology results showed a total BOD_5 percent reduction across the system of 80% with a final effluent concentration of 24 mg/L. TSS decreased to 13 mg/L and ammonia nitrogen to 3.06 mg/L, for removal efficiencies of 85% and 72% respectively. Removal efficiency across the plant for TOC was 64%. Total phosphorous was reduced 26%. Nitrate and nitrite nitrogen concentrations increased from 0.223 mg/L to 8.11 mg/L. Analysis of Blaine samples displayed equivalent reductions in TSS, BOD_5, and total phosphorus and slightly greater reductions in TS and ammonia nitrogen. The

Blaine TOC result was slightly less than the Ecology result. The data suggest moderately effective treatment of TSS and BOD_5. The plant was achieving partial nitrification. The TS reduction was small and cannot fully account for reductions in TSS.

A mass balance was calculated to project a maximum end-of-pipe concentration which would not produce a violation of total ammonia criteria at the acute and chronic dilution zone boundaries (Ecology, 1994). The Blaine permit does not include specific dilution factors, so a dilution factor of 1 was used in the calculation. An average receiving water ammonia nitrogen concentration of 0.037 mg/L was used in the calculation. The calculation also used adjusted total ammonia nitrogen criteria, that were based upon the receiving water pH, salinity, and temperature. All receiving water values used in the calculation were averages of samples collected by Ecology at the mouth of Drayton Harbor during each November from 1977 through 1987 (Eisner, 1997). The maximum allowable whole effluent ammonia nitrogen concentrations were 23.37 mg/L and 3.51 mg/L for the acute and chronic criteria respectively. The actual effluent ammonia nitrogen concentration determined during the inspection was 3.06 mg/L, which by direct comparison would be less than both the acute and chronic criteria.

An additional mass balance was calculated using a multiplier based on a single sample result and a 95% probability of achieving the water quality standards (EPA, 1991). The calculation determined that a reasonable potential exists for the effluent result to exceed the allowable chronic whole effluent ammonia nitrogen concentration. Since this is based on a single result, Blaine should conduct additional sampling to determine if the potential still exists for multiple sample results. Also, since the potential for exceedence is highly sensitive to dilution factors, establishing dilution factors would likely eliminate this potential to exceed water quality standards. It would be advantageous for Blaine to conduct studies to establish dilution factors for their discharge.

NPDES Permit Comparisons

Table 3 compares inspection results to NPDES permit limits. The Ecology composite 24-hour effluent BOD_5 concentration (24 mg/L) was below the permit monthly average limit and the weekly average limit. The effluent 24-hour composite BOD_5 load (117 lb/day) was 59% of the NPDES permit monthly average effluent load and 39% of the weekly average load limit. The percent reduction from the influent concentration (80%) was less than the minimum monthly average reduction (85%) required by the permit. The Blaine sample 24-hour effluent BOD_5 results (18 mg/L and 88 lb/day) were also within permit limits, and the percent reduction (81%) was also less than the permit requirement. A Blaine sample holding temperature (6.9°C) that was greater than the recommended 4°C may render the Blaine results less reliable than the Ecology results.

The Ecology 24-hour composite effluent TSS concentration (13 mg/L) and load (63 lb/day) were within the monthly and weekly average permit limits. Percent reduction

across the plant (85%) was just equal to the 85% monthly average reduction required by the permit. The Blaine sample concentrations and loads gave similar results. The effluent pH values were within the permitted range. The reported totalized average influent flow of 0.583 MGD was well below the NPDES permit design limit for the maximum month of 0.8 MGD. Influent BOD_5 and TSS loads were well below permit overloading limits.

Effluent fecal coliform results (2,200 and 70,000 colonies/100ml) were exceptionally high and exceeded both monthly and weekly average permit limits. Even without fecal coliform contributions during the rest of December, the monthly average calculated from the latter single result would still violate the monthly and weekly permit average. The high fecal coliform concentration was even more unusual, since a chlorine residual of 0.2 mg/L was detected in an effluent grab sample. During the inspection wastewater in the chlorine contact chamber appeared murky with a noticeable brown tint and it is possible that the chamber was not operating correctly. Calculation of the contact chamber length-to-width ratio was 40 and average retention time during the inspection was 77 minutes, and both these figures exceed minimum values for typical chlorine contact chambers (Metcalf & Eddy, 1992). The high fecal coliform density, found in the presence of a detectable chlorine residual, may indicate short-circuiting across the chlorine contact chamber. Blaine should determine the cause of the high fecal coliform densities and take steps to reduce these densities to acceptable levels. Blaine should develop a response plan that includes steps to notify the proper state and county authorities when fecal coliform concentrations are discharged at elevated concentrations.

Detected Priority Pollutant Organics And Metals

Table 4 summarizes concentrations of organic and metal parameters detected with priority pollutant scans. Appendix E contains results of all targeted organic compounds and metals results. Tentatively identified compounds are presented in appendix F. A glossary is included in appendix G.

Five VOA compounds and twenty BNA compounds were detected in the effluent samples. The results did not exceed marine acute and chronic water quality criteria. One pesticide compound, gamma-BHC, was detected in the effluent at 0.009 µg/L, but this concentration was well within the marine acute water quality criteria.

Three priority pollutant metals were detected in the plant effluent. Copper (9.9 µg/L) exceeded the marine acute water quality criteria by a factor of 4 (EPA, 1986). Mercury (0.012 µg/L) and zinc (31µg/L) were less than respective acute and chronic water quality criteria. Absent a permitted dilution factor, copper would exceed the criteria at the edge of the acute dilution zone. The establishment of dilution factors would likely reduce concentrations to below water quality criteria at the acute dilution zone boundary. Absent a dilution factor, Blaine should reduce concentrations in the whole effluent.

Split Samples

Sample Comparisons

Ecology analysis of composite samples collected by Ecology and Blaine produced very similar results for TSS, but substantially different results for BOD_5 (Table 5). Relative percent differences (RPD) between pairs of TSS composite samples were less than variation in precision cited in the EPA comparison of interlaboratory analysis of selected parameters (EPA, 1983). RPD of effluent TSS grab samples were much higher (average: 131%), but since grabs were taken at different times this could be due to variations in effluent quality. Temperature and pH results were generally similar. The RPD between Ecology and Blaine composite BOD_5 results averaged 28%. This was greater than the variation in precision cited by both the EPA comparison of interlaboratory analysis and Manchester Laboratory's evaluation of intralaboratory analysis. The Blaine sample BOD_5 results were generally less than the Ecology results and this may be due to elevated holding temperatures or to inadequate mixing before drawing aliquots from the composite sample bottle. Blaine ensured that sample procedures conform to standard holding times and techniques. The percent reductions in BOD_5 across the treatment plant were similar for both Ecology and Blaine results.

Laboratory Comparisons

Only two parameters from four samples were available for laboratory comparisons, so conclusions may have negligible statistical power. Ecology and Blaine laboratory results for influent samples collected by Blaine were extremely close for TSS, but much less precise for BOD_5. The average RPDs between influent analyses was 0.6% for TSS, and 19% for BOD_5. For effluent results RPDs for TSS and BOD_5 equaled 3.9% and 37% respectively. Blaine BOD_5 laboratory results were consistently less than Ecology results. This may suggest that the Blaine laboratory was producing inaccurate BOD_5 results. Blaine should review laboratory procedures.

Sludge

General Chemistry

General chemistry sludge results are presented in Table 1. The sludge dry weight fecal coliform density was 120,000 colonies per gram (540,000 #/100gram - wet wt. - MPN: most probable number). The dry weight result exceeded the maximum limit for fecal coliform density of 1000 #/g dry wt. as required for Class A sewage sludge land application, but is within the Class B designation limit of 2,000,000 #/gram dry wt. (EPA, 1993). The dry weight total coliform density was, at a minimum, 533,000 colonies per gram (2,400,000 #/100 gram - wet wt. - MPN: most probable number). The dry

weight E. coli density was 78,000 colonies per gram (350,000 #/100g - wet wt. - MPN: most probable number). Blaine should ensure that treated sludge destined for land application meets applicable pathogen density restrictions under 40 CFR 257.32.

Detected Priority Pollutants

Eleven metals were detected in the sludge (Table 4). Zinc, copper, lead, chromium, and silver concentrations (541 mg/Kg dry-wt., 360 mg/Kg dry-wt., 60.6 mg/Kg dry-wt., 23.5 mg/Kg dry-wt., and 6.48 mg/Kg dry-wt. respectively) were found at the highest concentrations. The concentrations of priority pollutants in the sludge did not exceed either EPA standards for land application of sewage sludge (EPA, 1993) or screening concentrations for the dangerous waste designation criteria (Table 6).

Industrial Contributors

Justesen, Inc.

Justesen reported its discharge to the Blaine collection system to be approximately 350-450 gallons per day, although this flow could not be independently verified during the inspection. State discharge permit limits include monthly and daily averages for flow, pH, cadmium, cyanide, copper, lead, and zinc. Parameters detected during the inspection were as follows (Table 4):

Parameter	Result
pH	8.2
copper	247 µg/L
lead	1.3 µg/L
zinc	23 µg/L

All these values were well below both monthly and daily permit limits. TSS and total phosphorus results were 16 mg/L and 9.74 mg/L respectively (Table 1). Percent contributions from Justesen to the total loads in the Blaine influent for TSS and total phosphorus were less than 1%. Percent contributions of copper and zinc to the Blaine effluent load were approximately 2% and 0.05% respectively. Lead concentration in the Blaine effluent was less than detect and a percent loading from the Justesen discharge could not be calculated. These small loads from the Justesen discharge were not expected to appreciably affect either treatment plant performance or effluent quality.

Geographics, Inc.

Geographics discharges approximately 400 gallons per day to the Blaine collection system. Currently the facility does not have a state discharge permit. Detected priority pollutant metal results were as follows:

Parameter	Result
cadmium	1 µg/L
copper	390 µg/L
lead	7 µg/L
nickel	20 µg/L
zinc	318 µg/L

Percent contribution of copper to the Blaine effluent load was 2.4%. Percent contributions for all other parameters were less than 1%. These loads are also not expected to have an appreciable effect on treatment plant performance or effluent quality.

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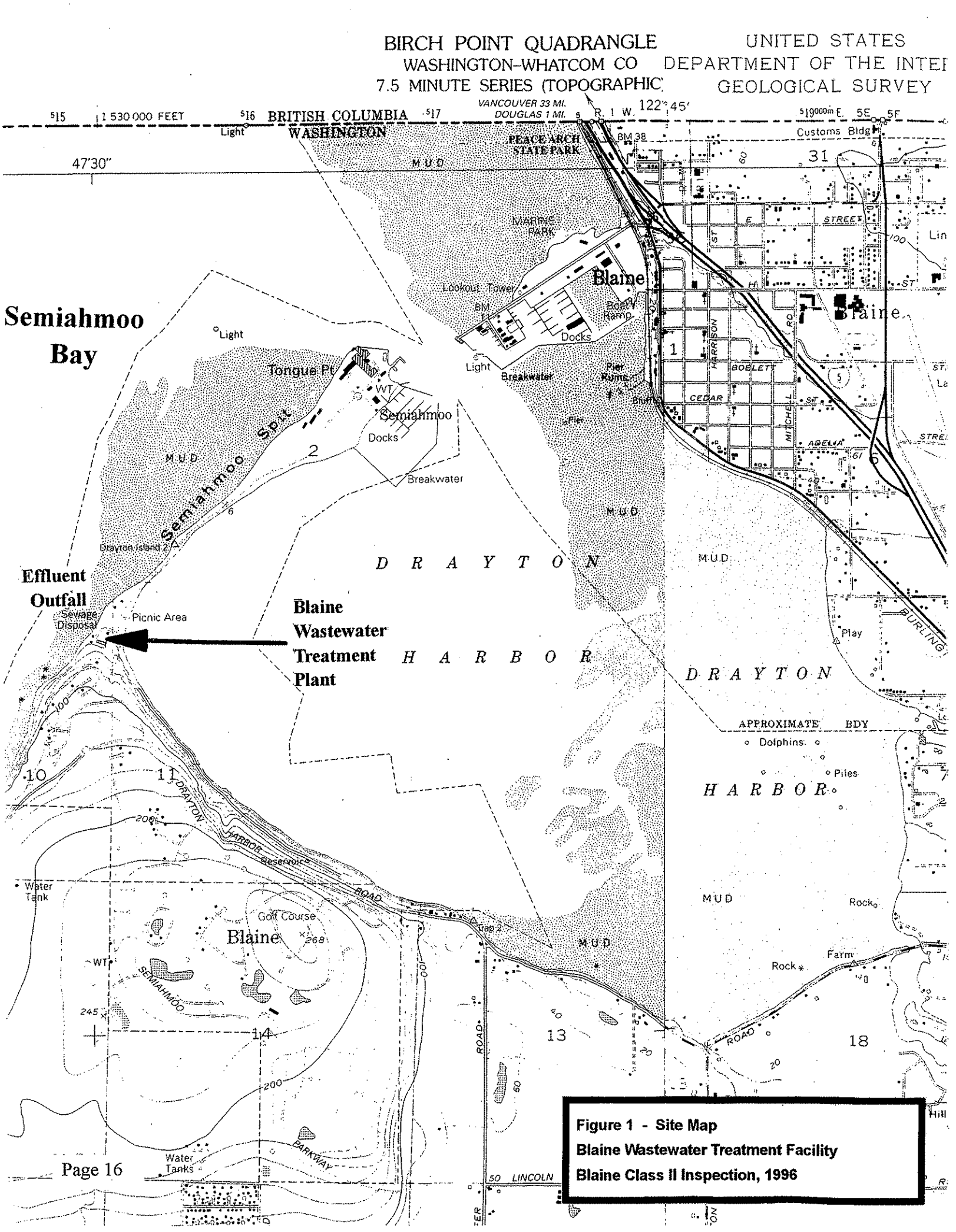

Figure 1 - Site Map
Blaine Wastewater Treatment Facility
Blaine Class II Inspection, 1996

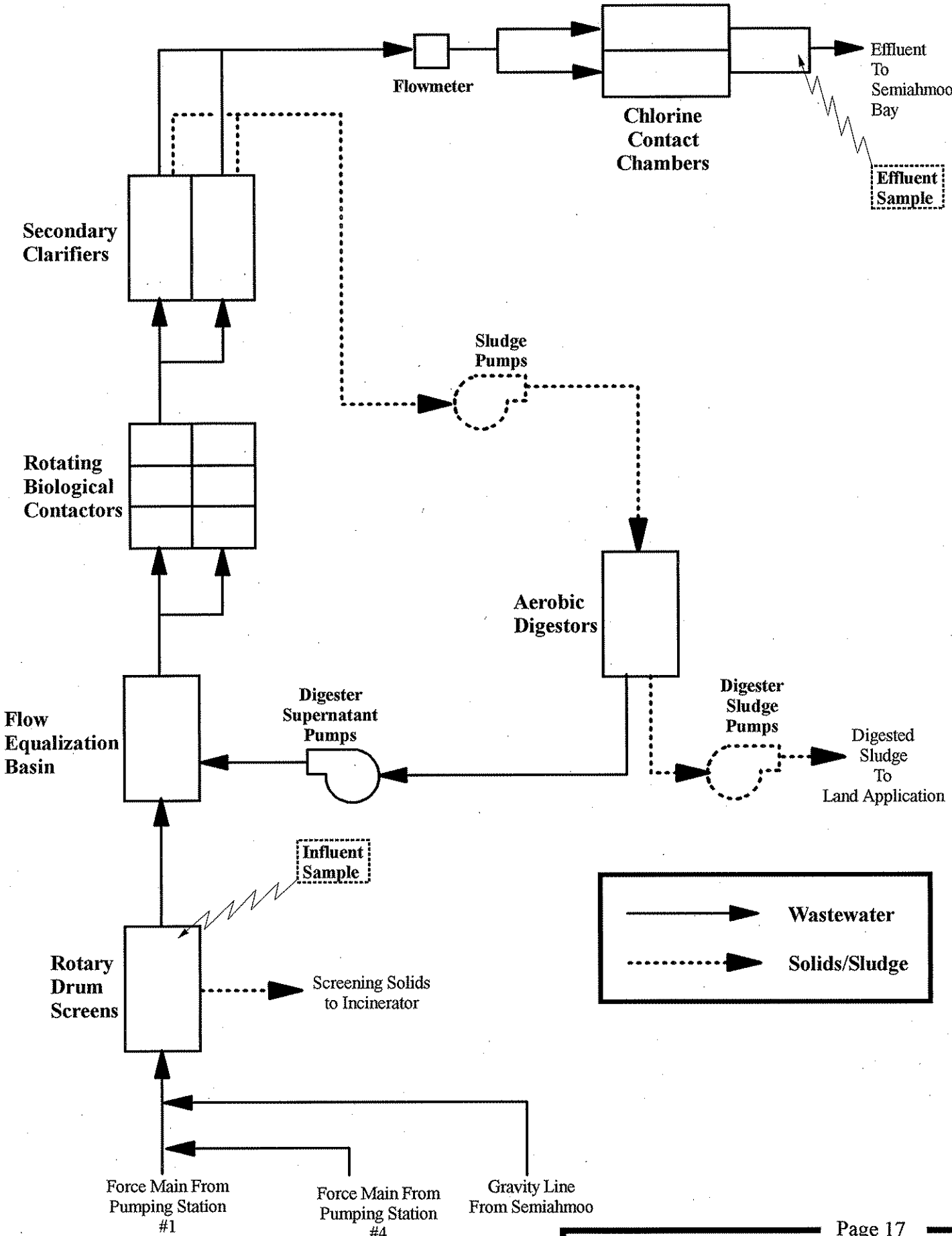

Figure #2
Blaine Treatment Plant Process Schematic
Blaine Class II Inspection, December, 1996

Table 1 - Ecology General Chemistry Results - City of Blaine Class II Inspection, December 1996.

Parameter	LocationI:	Inf-1	Inf-2	Inf-E	Inf-B	Eff-1	Eff-2
	Type:	grab	grab	comp	comp	grab	grab
	Date:	12/03/96	12/03/96	12/3-4/96	12/2-3/96	12/03/96	12/03/96
	Time:	0917	1343	0800-0800	1430-1430	0944	1402
	Lab Log #:	498230	498231	498232	49823	498234	498235
GENERAL CHEMISTRY							
Conductivity (umhos/cm)		411	602	498	460	382	420
Alkalinity (mg/L CaCO3)				174	162		
Hardness (mg/L CaCO3)				86.6	82.8		
SOLIDS 4							
TS (mg/L)				395	353		
TNVS (mg/L)				215	188		
TSS (mg/L)		35	87	86	85	11	13
TNVSS (mg/L)				15	16		
% Solids							
% Volatile Solids							
OXYGEN DEMAND PARAMETERS							
BOD5 (mg/L)				120	94		
TOC (water mg/L)		46.9	59.7	48.8	40.9	13.8	14.9
TOC (soil)							
NUTRIENTS							
NH3-N (mg/L)		12	12	11	9.8	1.17	4.46
NO2+NO3-N (mg/L)		0.419	0.244	0.223	0.236	7.19	8.28
Total-P (mg/L)		6.19 J	5.85 J	4.2 J	3.83 J	2.86 J	3.32 J
MISCELLANEOUS							
F-Coliform - MF (#/100mL)							
Fecal Coliform - MPN(soil/sed #/100g-wet wt)							
T-Coliform - MPN(soil/sed #/100g-wet wt)							
E coli - MPN(soil/sed #/100g-wet wt)							
Cyanide total (ug/L)		0.01 U	0.01 U			0.014	0.022
Cyanide (wk & dis ug/L)		0.01 U	0.01 U			0.02	0.021
FIELD OBSERVATIONS							
Temperature (C)		10.8	12.5			11.4	12
Temp-cooled (°C)+				3.2	7.9		
pH		7.4	7.6	7.5	8.0	7.5	7.5
Conductivity (umhos/cm)		420	541	5.34	487	404	444
Chlorine (mg/L)						0.2	

E	Ecology sample	grab	Grab sample
B	Blaine sample	comp	Composite sample
Inf	Influent sample	J	The analyte was positively identified. The associated numerical result is an estimate.
-+	Refrigerated sample	U	The analyte was not detected at or above the reported result.

Table 1 - Ecology General Chemistry Results - City of Blaine Class II Inspection, December 1996.

ParamIII	LocationII:	Eff-E	Eff-B	Eff-3	Eff-4	Sludge	JustEff	Geograph
	Type:	comp	comp	grab-comp	grab-comp	grab	grab	grab
	Date:	12/3-4/96	12/2-3/96	12/04/96	12/04/96	12/03/96	12/03/96	12/03/96
	Time:	0800-0800	1430-1430	0847	1115	1030	1050	1600
	Lab Log #:	49823	498237	49823	498239	498241	498240	498243
GENERAL CHEMISTRY								
Conductivity (umhos/cm)		438	413	427	462		421	452
Alkalinity (mg/L CaCO3)		107	104					
Hardness (mg/L CaCO3)		83.7	81.5				61.4	64.7
SOLIDS 4								
TS (mg/L)		357	286					
TNVS (mg/L)		223	180					
TSS (mg/L)		13	13	11	37		16	17
TNVSS (mg/L)		4	4					
% Solids						4.5		
% Volatile Solids						3.1		
OXYGEN DEMAND PARAMETERS								
BOD5 (mg/L)		24	18					
TOC (water mg/L)		17.6	15.8			33.4		
TOC (soil)								
NUTRIENTS								
NH3-N (mg/L)		3.06	2.33					
NO2+NO3-N (mg/L)		8.11	6.18					
Total-P (mg/L)		3.11 J	2.85 J				9.74 J	
MISCELLANEOUS								
F-Coliform - MF (#/100mL)				2200	70000			
Fecal Coliform - MPN(soil/sed #/100g-wet wt)						540000		
T-Coliform - MPN(soil/sed #/100g-wet wt)						2400000 G		
E coli - MPN(soil/sed #/100g-wet wt)						350000		
Cyanide total (ug/L)								
Cyanide (wk & dis ug/L)								
FIELD OBSERVATIONS								
Temperature (°C)				11.7	12.5		17.3	8.9
Temp-cooled (°C)+		2.2	6.9					
pH		7.4	7.9	7.2	7.2		8.2	7.6
Conductivity (umhos/cm)		482	445	434	484		441	479
Chlorine (mg/L)								

E	Ecology sample	Trnblk	Transfer balnk
B	Blaine sample	grab	Grab sample
Eff	Effluent sample	comp	Composite sample
JustEff	Justesen, Inc. sample	J	The analyte was positively identified. The associated numerical result is an estimate.
Geograph	Geographics , Inc.	U	The analyte was not detected at or above the reported result.
Sludge	Sludge sample	G	Greater than or equal to the estimate value.
-+	Refrigerated sample		

Table 2 - Percent Reduction General Chemistry Results - City of Blaine Class II Inspection, December 1996.

Parameter	Location:	Inf-E	Eff-E	Ecology Percent Reduction In Load Across Treatment Plant*	Inf-B	Eff-B	Blaine Percent Reduction In Load Across Treatment Plant*
	Type:	comp	comp		comp	comp	
	Date:	12/3-4/96	12/3-4/96		12/2-3/96	12/2-3/96	
	Time:	0800-0800	0800-0800		1430-1430	1430-1430	
	Lab Log #:	498232	498236		498233	498237	
GENERAL CHEMISTRY							
Conductivity (umhos/cm)		498	438	12%	460	413	10%
Alkalinity (mg/L CaCO3)		174	107	39%	162	104	36%
Hardness (mg/L CaCO3)		86.6	83.7	3%	82.8	81.5	2%
SOLIDS							
TS (mg/L)		395	357	10%	353	286	19%
TNVS (mg/L)		215	223	-4%	188	180	4%
TSS (mg/L)		86	13	85%	85	13	85%
TNVSS (mg/L)		15	4	73%	16	4	75%
OXYGEN DEMAND PARAMETERS							
BOD5 (mg/L)		120	24	80%	94	18	81%
TOC (water mg/L)		48.8	17.6	64%	40.9	15.8	61%
NUTRIENTS							
NH3-N (mg/L)		11	3.06	72%	9.8	2.33	76%
NO2+NO3-N (mg/L)		0.223	8.11	-3537%	0.236	6.18	-2519%
Total-P (mg/L)		4.2 J	3.1 J	26%	3.83 J	2.85 J	26%
FIELD OBSERVATIONS							
pH		7.5	7.4	-35% #	8.0	7.9	-45% #
Conductivity (umhos/cm)		534	482	10%	487	445	9%

E	Ecology sample
B	Blaine sample
Inf	Influent sample
Eff	Effluent sample
grab	Grab sample
comp	Composite sample

#	Based on hydrogen ion concentration
*	Based on Blaine totalized measurements of effluent flow recorded on12/3-4/96 (0.583 MGD).
J	The analyte was positively identified. The associated numerical result is an estimate.

Table 3 - NPDES Comparison Results - Blaine Class II Inspection - December, 1996.

Parameter	NPDES Permit Effluent Limits			Inspection Results							
				Ecology Composites		Blaine Composites		Ecology Grabs			
	Monthly Average	Weekly Average	Location:	Inf-E	Eff-E	Inf-B	Eff-B	Eff-1	Eff-2	Eff-3	Eff-4
			Type:	comp	comp	comp	comp	grab	grab	grab-comp	grab-comp
			Date:	12/3-4/96	12/3-4/96	12/2-3/96	12/2-3/96	12/03/96	12/03/96	12/04/96	12/04/96
			Time:	0800-0800	0800-0800	1430-1430	1430-1430	0944	1402	0847	1115
			Lab Log #:	498232	498236	498233	498237	498234	498235	498238	498239
Effluent Biochemical Oxygen Demand (BOD_5)											
Concentration: (mg/L)	30	45			24		18				
Loading: (lbs/day)	200	300			117 *		88 *				
Percent Reduction	≥85% Monthly averages shall not exceed 30 mg/L or 15% of influent monthly average				80%		81%				
Effluent Total Suspended Solids (TSS)											
Concentration (mg/L)	30	45			13		13	11	13	11	37
Loading: (lbs/day)	200	300			63 *		63 *				
Percent Reduction	≥85% Monthly averages shall not exceed 30 mg/L or 15% of influent monthly average				85%		85%				
Effluent Fecal Coliform											
Concentration (count/100 mL)	200	400								2,200	70,000
Effluent pH											
(S.U.)	6.0 < pH < 9.0							7.51	8.28	7.22	7.16
Influent Flow Overloading Limits	Average Flow for Maximum Month										
(MGD)	0.8				0.583						
Influent BOD_5 Overloading Limits											
(mg/L)					120		94				
(lbs/day)	2088				583 *		457				
Influent TSS Overloading Limits											
(mg/L)					86		85				
(lbs/day)	2642				418 *		413				

E Ecology sample
B Blaine sample
Inf Influent sample
Ef Effluent sample
comp Composite sample
grab Grab sample.

Ef-3 AM effluent fecal coliform sample
Ef-4 PM effluent fecal coliform sample
* Load calculated from daily effluent flow of 0.583 MGD recorded 12/3-4/96.

Table 4 - Detected VOA, BNA, Pesticide/PCB and Metals Scan Results - Blaine Class II Inspection, December 1996.

Parameter	Location:	Eff-1	Eff-2	Water Quality Criteria	
	Type:	grab	grab		
	Date:	12/03/96	12/03/96		
	Time:	0944	1402	Marine Acute	Marine Chronic
	Lab Log #:	498234	498235		
VOA Compounds		µg/L	µg/L	µg/L	µg/L
Acetone		17	28		
Chloroform		0.7 J	1	12000 *(a)	6400 *(a)
Bromodichloromethane		0.3 J	0.16 J	12000 *(a)	6400 *(a)
Tetrahydrofuran		3.2	3.2		
Toluene		0.47 J	0.43 J	6300 *	5000 *

	Location:	Eff-E	Water Quality Criteria	
	Type:	comp		
	Date:	12/3-4/96		
	Time:	0800-0800	Marine Acute	Marine Chronic
	Lab Log #:	498236		
BNA Compounds		µg/L	µg/L	µg/L
1,4-Dichlorobenzene		0.22	1970 *(h)	
Naphthalene		0.041 J	2350 *	
Benzoic Acid		1.5		
Isophorone		0.14	12900 *	
Diethylphthalate		0.87	2.944 *(i)	3.4 *(i)
Phenanthrene		0.022 J	300 *(n)	
Butylbenzylphthalate		0.85	2.944 *(i)	3.4 *(i)
Naphthalene		0.041 J	2350 *	
2-Methylnaphthalene		0.03 J		
Benzyl Alcohol		0.19		
4-Methylphenol		0.91		
1,4-Dichlorobenzene		0.22	1970 *(h)	
Phenol		0.34	5800 *	
Pyrene		0.037 J	300 *(n)	
Dimethylphthalate		0.037 J	2.944 *(i)	3.4 *(i)
Fluoranthene		0.035 J	40 *	16 *
Chrysene		0.023 J	300 *(n)	
1-Methylnaphthalene		0.021 J		
3B-Coprostanol		11		
Caffeine		7.2		

E	Ecology sample	n	Total Polynuclear Aromatic Hydrocarbons
Eff	Effluent sample	J	The analyte was positively identified. The associated numerical result is an estimate.
a	Total Halomethanes	*	Insufficient data to develop criteria. Value presented is the LOEL - Lowest Observed Effect Level.
h	Total Dichlorobenzenes		
i	Total Phthalate Esters		

Table 4 - Detected VOA, BNA, Pesticide/PCB and Metals Scan Results - Blaine Class II Inspection, December 1996.

Location:	Eff-E	Water Quality Criteria	
Type:	comp		
Date:	12/3-4/96	Marine Acute	Marine Chronic
Time:	0800-0800		
Lab Log #:	498236		
Pesticide/PCB Compounds	µg/L	µg/L	µg/L
gamma-BHC (Lindane)	0.009	0.16	

Location:	Eff-E	Trnsblk	Water Quality Criteria		Sludge	JustEff	Geograph
Type:	comp	grab			grab	grab	grab
Date:	12/3-4/96	12/02/96	Marine Acute	Marine Chronic	12/03/96	12/03/96	12/03/96
Time:	0800-0800	1530			1030	1050	1600
Lab Log #:	498236	498242			498241	498240	498243
Metals	µg/L	µg/L	µg/L	µg/L	mg/Kg-dry wt	µg/L	µg/L
Arsenic					3.3 J	14	
Pentavalent			2319 *	13 *			
Trivalent			69	36			
Beryllium					0.19		
Cadmium		0.28	37.2	8	3.4		1
Chromium					23.5		
Hexavalent			1100	50 *			
Trivalent			10300 *				
Copper	9.9		2.5		360	247	390
Lead			151	5.8	60.6	1.3	7
Mercury	0.012		2.1	0.025	1.49		
Nickel			71	7.9	21		20
Selenium			300	71	3.9 J		
Silver			1.2		6.48 J		
Zinc	31	12	85	77	541 J	23	318

E	Ecology sample	Trnsblk	Effluent transfer blank
Inf	Influent sample	J	The analyte was positively identified. The associated numerical result is an estimate.
Eff	Effluent sample	*	Insufficient data to develop criteria. Value presented is the LOEL - Lowest Observed Effect Level.
JustEff	Justesen, Inc. sample	comp	Composite sample
Geograph	Geographics , Inc.	grab	Grab sample.
Sludge	Sludge sample		

Table 5 - Split Sample Result Comparison - Blaine Class II, December 1996

	Location:	Inf-E	Inf-B	Eff-3	Eff-4	Ef-B-Grab*	Eff-E	Eff-B
	Type:	comp	comp	grab-comp	grab-comp	grab	comp	comp
	Date:	12/3-4/96	12/2-3/96	12/04/96	12/04/96	12/04/96	12/3-4/96	12/2-3/96
	Time:	0800-0800	1430-1430	0847	1115	1430	0800-0800	1430-1430
	Lab Log #:	498232	498233	498238	498239		498236	498237
General Chemistry								
Parameter	**Laboratory**							
TSS	Ecology	86	85	11	37		13	13
(mg/L)	Blaine	82	88			5	15	10
BOD5	Ecology	120	94				24	18
(mg/L)	Blaine	104	72				15	14
Temperature	Ecology			11.7	12.5			
	Blaine					12		
pH	Ecology			7.22	7.16			
	Blaine					7.80		

E	Ecology sample	*	Separate Blaine grab sample taken more than 3 hours later than last Ecology grab sample.
B	Blaine sample	Ef	Effluent sample
grab	grab sample	Inf	Influent sample
comp	Composite sample	Eff-3 & Eff-4	Ecology fecal coliform samples

Table 6 - Sludge Result Comparisons to the EPA Land Application Concentration Criteria and to the Dangerous Waste Concentration Thresholds - Blaine Class II, December 1996

Parameter	Location: Sludge Type: grab Date: 12/03/96 Time: 1030 Lab Log #: 498241	Volumetric Concentration of Parameters@	EPA Standards for Land Application of Sewage Sludge		Dangerous Waste Regulations Designation Criteria	
			Ceiling Concentrations *	Pollutant Concentrations **	Toxicity Characteristics List+	Screening Concentrations# (20 Times)
Metals	(mg/Kg-dry wt.)	(mg/L)	(mg/Kg-dry wt.)	(mg/Kg-dry wt.)	(mg/L)	(mg/L)
Arsenic	3.3 J	**0.15**	75	41	5.0	**100.0**
Cadmium	3.4	**0.15**	85	39	1.0	**20.0**
Chromium (Total)	23.5	**1.1**	3000	1200	5.0	**100.0**
Copper	360	**N.A.**	4300	1500		**N.A.**
Lead	60.6	**2.7**	840	300	5.0	**100.0**
Mercury (Total)	1.49	**0.07**	57	17	0.2	**4.0**
Nickel	21	**N.A.**	420	420		**N.A.**
Selenium	3.9	**0.18**	100	36	1.0	**20.0**
Silver	6.5 J	**0.29**	N.A.	N.A.	5.0	**100.0**
Zinc	541 J	**N.A.**	7500	2800		**N.A.**

* Ceiling concentration limit for bulk sewage sludge or for sewage sludge sold or given away in a bag or other container.

** Pollutant concentration limit of bulk sewage sludge if it is applied to agricultural land, forest land, a public contact site, or a reclamation site.

\+ Maximum concentration of the contaminants for the leachate extract toxicity characteristic.

\# Screening concentration criteria of parameter which recommends that such wastes be designated by test methods set forth in WAC 173-303-110.

@ Wet weight concentration of parameter converted to volumetric concentration assuming a sludge specific gravity of 1.01.

Sludge Ecology sample of Blaine sludge

J The analyte was positively identified. The associated numerical result is an estimate.

N.A. Not Applicable

Appendices

Appendix A - Sampling Stations Descriptions - Blaine Class II - December, 1996

Inf-E-#	Ecology grab samples of Blaine influent wastewater collected from the primary influent channel above the influent screens. Collected 12/03/96 in both A.M. and P.M.
Inf-E	Ecology 24-hour composite sample of Blaine influent wastewater collected from the primary influent channel above the influent rotating screen. Collected 12/03-04/96 from 0800 - 0800.
Inf-B	Blaine 24-hour composite sample of treatment plant influent wastewater collected from the influent channel just above the influent rotating screen. Collected 12/02-03/96 from 1430 - 1430.
Ef-E-#	Ecology grab samples of Blaine effluent wastewater collected at the end of the main chlorine contact chamber, just prior to final discharge. Collected 12/03/96 in both A.M. and P.M.
Ef-E	Ecology 24-hour composite sample of Blaine effluent wastewater collected at the end of the main chlorine contact chamber, just prior to final discharge. Collected 12/03-04/96 from 0800 - 0800.
Ef-B	Blaine 24-hour composite samples of Blaine effluent wastewater collected at the end of the main chlorine contact chamber, just prior to final discharge. Collected 12/02-03/96 from 1430 - 1430.
Ef-E-3&4	Ecology fecal coliform grab samples of Blaine effluent wastewater collected at the end of the main chlorine contact chamber, just prior to final discharge. Collected 12/03/96, both in the A.M.
Sludge	Ecology grab sample of Blaine digested sludge collected from the aerobic sludge digestion tank. - Collected 12/03/96 in the A.M.
Trnsblk	Ecology grab sample of D.I water flushed through the effluent composite sampler, taken prior to sampling. The sample was analyzed for metals. Collected in the afternoon on12/02/96.
JustEff	Ecology grab sample of Justesen, Inc. process water effluent, taken from a sedimentation tank just prior to discharge to the Blaine collection system. Collected in the afternoon on 12/03/96.
Geograph	Ecology grab sample of Geographics, Inc. process water effluent, taken from a holding tank just prior to its discharge to the Blaine collection system. Collected in the afternoon on 12/03/96.

Appendix B - Sampling Schedule - City of Blaine, December 1996.

Parameter	Quantity	Location:	Inf-1	Inf-2	Inf-E	Inf-B	Eff-1	Eff-2
		Type:	grab	grab	comp	comp	grab	grab
		Date:	12/03/96	12/03/96	12/3-4/96	12/2-3/96	12/03/96	12/03/96
		Time:	0917	1343	0800-0800	1430-1430	0944	1402
		Lab Log #:	498230	498231	498232	498233	498234	498235
GENERAL CHEMISTRY								
Conductivity	12		E	E	E	E	E	E
Alkalinity	4				E	E		
Hardness	6				E	E		
SOLIDS								
TS	4				E	E		
TNVS	4				E	E		
TSS	11		E	E	EB	EB	E	E
TNVSS	4				E	E		
% Solids	1							
% Volatile Solids	1							
OXYGEN DEMAND PARAMETERS								
BOD5	4				EB	EB		
TOC (water)	8		E	E	E	E	E	E
TOC (soil/sed)	1							
NUTRIENTS								
NH3-N	8		E	E	E	E	E	E
NO2+NO3-N	8		E	E	E	E	E	E
Total-P	9		E	E	E	E	E	E
MISCELLANEOUS								
F-Coliform MF	2							
F-Coliform (soil/sed)	1							
T-Coliform (soil/sed)	1							
Cyanide (total)	4		E	E			E	E
Cyanide (wk & dis)	4		E	E			E	E
ORGANICS								
VOC (water)	3		E				E	E
BNAs (water)	4				E	E		
Pest/PCB (water) - Chlorinated	4				E	E		
Pest/PCB (soil/sed) - Chlorinated	1							
METALS								
PP Metals (water)	4							
PP Metals (water - spike, dupe)	1							
PP Metals (soil/sed)	1							
FIELD MEASUREMENTS								
Temperature	11		E	E	E	E	E	E
pH	11		E	E	E	E	E	E
Conductivity	11		E	E	E	E	E	E
Chlorine	1						E	
	149		12	11	17	17	13	12

E	Ecology sample	grab	Grab sample
B	Blaine sample	comp	Composite sample
Inf	Influent sample		
Eff	Effluent sample		

Appendix B (cont.) - Sampling Schedule - City of Blaine, December 1996.

Parameter	Location:	Eff-E	Eff-B	Eff-3	Eff-4	Sludge	Trnsblk	JustEff	Geograp
	Type:	comp	comp	grab-comp	grab-comp	grab	grab	grab	grab
	Date:	12/3-4/96	12/2-3/96	12/04/96	12/04/96	12/03/96	12/02/96	12/03/96	12/03/96
	Time:	0800-080	1430-143	0847	1115	1030	1530	1050	1600
	Lab Log #:	498236	498237	498238	498239	498241	498242	498240	498243
GENERAL CHEMISTRY									
Conductivity		E	E	E	E			E	E
Alkalinity		E	E						
Hardness		E	E					E	E
SOLIDS									
TS		E	E						
TNVS		E	E						
TSS		EB	EB	E	E			E	
TNVSS		E	E						
% Solids						E			
% Volatile Solids						E			
OXYGEN DEMAND PARAMETERS									
BOD5		EB	EB						
TOC (water)		E	E						
TOC (soil/sed)						E			
NUTRIENTS									
NH3-N		E	E						
NO2+NO3-N		E	E						
Total-P		E	E					E	
MISCELLANEOUS									
F-Coliform MF				E	E				
F-Coliform (soil/sed)						E			
T-Coliform (soil/sed)						E			
Cyanide (total)									
Cyanide (wk & dis)									
ORGANICS									
VOC (water)									
BNAs (water)		E	E						
Pest/PCB (water) - Chlorinated		E	E						
Pest/PCB (soil/sed) - Chlorinated						E			
METALS									
PP Metals (water)		E					E	E	E
PP Metals (water - spike, dupe)		E							
PP Metals (soil/sed)						E			
FIELD MEASUREMENTS									
Temperature		E	E	E	E			E	
pH		E	E	E	E			E	
Conductivity		E	E	E	E			E	
Chlorine									
		19	17	6	6	7	1	8	3

E	Ecology sample	Sludge	Sludge sample
B	Blaine sample	Trnblk	Transfer balnk
Eff	Effluent sample	grab	Grab sample
JustEff	Justesen, Inc. effluent sample	comp	Composite sample

Appendix C - Analytic Methods - Blaine Class II, December 1996

Parameter	Manchester Laboratory	APHA Methods	Lab Used
GENERAL CHEMISTRY			
Conductivity	EPA, Revised 1983: 120.1	APHA, 1989: 2510A	Manchester Lab
Alkalinity	EPA, Revised 1983: 310.1	APHA, 1989: 2320B.	Manchester Lab
Hardness	EPA, Revised 1983: 130.2	APHA, 1989: 2340C	Manchester Lab
SOLIDS			
TS	EPA, Revised 1983: 160.3	APHA, 1989: 2540B.	Manchester Lab
TNVS	EPA, Revised 1983: 160.3	APHA, 1989: 2540E.	Manchester Lab
TSS	EPA, Revised 1983: 160.2	APHA, 1989: 2540D.	Manchester Lab
TNVSS	EPA, Revised 1983: 160.2	APHA, 1989: 2540D&E.	Manchester Lab
% Solids	APHA, 1989: 2540G	APHA, 1989: 2540G	Manchester Lab
% Volatile Solids	EPA, Revised 1983: 160.4	APHA, 1989: 2540E.	Manchester Lab
OXYGEN DEMAND PARAMETERS			
BOD5	EPA, Revised 1983: 405.1	APHA, 1989: 5210B.	Manchester Lab
TOC (water)	EPA, Revised 1983: 415.1	APHA, 1989: 5310B.	Manchester Lab
TOC (soil/sed)	EPA, Revised 1983: 415.1	APHA, 1989: 5310B.	Manchester Lab
NUTRIENTS			
NH3-N	EPA, Revised 1983: 350.1	APHA, 1989: 4500-NH3D.	Manchester Lab
NO2+NO3-N	EPA, Revised 1983: 353.2	APHA, 1989: 4500-NO3F.	Manchester Lab
Total-P	EPA, Revised 1983: 365.3	APHA, 1989: 4500-PF.	Manchester Lab
MISCELLANEOUS			
F-Coliform MF	APHA, 1989: 9222D.	APHA, 1989: 9221D.	Manchester Lab
F-Coliform (soil/sed)	APHA, 1989: 9221A.	APHA, 1989: 9221A.	Manchester Lab
T-Coliform (soil/sed)	APHA, 1989: 9221A.	APHA, 1989: 9221A.	Manchester Lab
Cyanide (total)	EPA, Revised 1983: 335.2	APHA, 1989: 4500-CNC.	Manchester Lab
Cyanide (wk & dis)	APHA, 1989: 4500-CNI	APHA, 1989: 4500-CNI	Manchester Lab
ORGANICS			
VOC (water)	EPA, 1986: 8260	APHA, 1989: 6210D	Manchester Lab
BNAs (water)	EPA, 1986: 8270	APHA, 1989: 6410B.	Manchester Lab
Pest/PCB (water) - Chlorinated	EPA, 1986: 8080	APHA, 1989: 6630C.	Manchester Lab
Pest/PCB (soil/sed) - Chlorinated	EPA, 1986: 8080	APHA, 1989: 6630C.	Manchester Lab
METALS			
PP Metals (water)	EPA, Revised 1983: 200-299	APHA, 1989: 3000-3500*.	Manchester Lab
PP Metals (soil/sed)	EPA, Revised 1983: 200-299	APHA, 1989: 3000-3500*.	Manchester Lab

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APHA-AWWA-WPCF, 1989. Standard Methods for the Exanination of Water and Wastewater, 17th Edition.

EPA, Revised 1983. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020 (Rev. March, 1983).

EPA, 1986: SW846. Test Methods for Evaluating Solid Waste Physical/Chemical Methods, SW-846, 3rd. ed.,November, 1986.

Appendix D - Quality Assurance/Quality Control - Blaine Class II Inspection - December, 1996

Priority Pollutant Cleaning Procedures for Wastewater Collection Equipment.

1. Wash with laboratory detergent
2. Rinse several times with tap water
3. Rinse with 10% HNO_3 solution
4. Rinse once with distilled/deionized water
5. Rinse with 10% HNO_3 solution
6. Rinse three (3) times with distilled/deionized water
7. Rinse with high purity acetone
8. Rinse with high purity Hexane
9. Rinse with high purity acetone
10. Allow to dry and seal with aluminum foil

Appendix E - VOA, BNA, Pesticide/PCB and Metals Scan Results - Blaine Class II Inspection, December 1996.

	Location:	Eff-1	Eff-2
	Type:	grab	grab
	Date:	12/03/96	12/03/96
	Time:	0944	1402
	Lab Log #:	498234	498235
VOA Compounds		µg/L	µg/L
Chloromethane		1 U	1 U
Dichlorodifluoromethane		REJ	10 U
Bromomethane		1 U	1 U
Vinyl Chloride		2 U	2 U
Chloroethane		1 U	1 U
Trichlorofluoromethane		1 U	1 U
Methylene Chloride		2 U	2 U
Acetone		17	28
Carbon Disulfide		2 U	2 U
1,1-Dichloroethene		1 U	1 U
1,1-Dichloroethane		1 U	1 U
trans-1,2-Dichloroethene		1 U	1 U
cis-1,2-Dichloroethene		1 U	1 U
2,2-Dichloropropane		1 U	1 U
Bromochloromethane		1 U	1 U
Chloroform		0.7 J	1
1,2-Dichloroethane		1 U	1 U
2-Butanone		2 U	2 U
1,1,1-Trichloroethane		1 U	1 U
Carbon Tetrachloride		1 U	1 U
1,1-Dichloropropene		1 U	1 U
Bromodichloromethane		0.3 J	0.16 J
1,2-Dichloropropane		1 U	1 U
Dibromomethane		1 U	1 U
trans-1,3-Dichloropropene		0.94 U	0.94 U
Trichloroethene		1 U	1 U

E	Ecology sample	J	The analyte was positively identified. The associated numerical result is an estimate.
Eff	Effluent sample	REJ	The datum is unsuitable for all purposes.
grab	Grab sample	U	The analyte was not detected at or above the reported result.

Appendix E (cont.) - VOA, BNA, Pesticide/PCB and Metals Scan Results - Blaine Class II Inspection, December 1996.

	Location:	Eff-1	Eff-2
	Type:	grab	grab
	Date:	12/03/96	12/03/96
	Time:	0944	1402
	Lab Log #:	498234	498235
VOA Compounds		µg/L	µg/L
Dibromochloromethane		1 U	1 U
1,2-Dibromoethane (EDB)		1 U	1 U
1,1,2-Trichloroethane		1 U	1 U
1,3-Dichloropropane		1 U	1 U
Benzene		1 U	1 U
cis-1,3-Dichloropropene		1.1 U	1.1 U
Bromoform		1 U	1 U
2-Hexanone		1 U	1 U
4-Methyl-2-Pentanone		2 U	2 U
Tetrachloroethene		1 U	1 U
1,1,2,2-Tetrachloroethane		1 U	1 U
1,1,1,2-Tetrachloroethane		1 U	1 U
Toluene		0.47 J	0.43 J
Chlorobenzene		1 U	1 U
Ethylbenzene		1 U	1 U
Styrene		1 U	1 U
Bromobenzene		1 U	1 U
1,2,3-Trichloropropane		1 U	1 U
2-Chlorotoluene		1 U	1 U
4-Chlorotoluene		1 U	1 U
1,2,4-Trimethylbenzene		1 U	1 U
tert-Butylbenzene		1 U	1 U
1,3,5-Trimethylbenzene		1 U	1 U
sec-Butylbenzene		1 U	1 U
p-Isopropyltoluene		1 U	1 UJ
1,2-Dibromo-3-Chloropropane		5 U	5 U
1,2,3-Trichlorobenzene		10 UJ	10 U
Isopropylbenzene (Cumene)		1 U	1 U

E	Ecology sample	J	The analyte was positively identified. The associated numerical result is an estimate.
Eff	Effluent sample	U	The analyte was not detected at or above the reported result.
grab	Grab sample	UJ	The anaylte was not detected at or above the reported estimated result.

Appendix E (cont.) - VOA, BNA, Pesticide/PCB and Metals Scan Results - Blaine Class II Inspection, December 1996.

	Location:	Eff-1	Eff-2	Eff-E
	Type:	grab	grab	comp
	Date:	12/03/96	12/03/96	12/3-4/96
	Time:	0944	1402	0800-0800
	Lab Log #:	498234	498235	498236
VOA Compounds		µg/L	µg/L	µg/L
1,4-Dichlorobenzene		1 UJ	1 UJ	0.22
1,2-Dichlorobenzene		1 U	1 U	0.13 U
1,2,4-Trichlorobenzene		10 UJ	10 U	0.13 U
Naphthalene		10 UJ	10 UJ	0.041 J
Hexachlorobutadiene		2 UJ	2 U	0.13 U
o-Xylene		1 U	1 U	
1,3-Dichlorobenzene		1 U	1 U	0.13 U
m & p-Xylene		2 U	2 U	
1,1-Dichloropropanone		1 U	1 U	
1-Chlorobutane		1 U	1 U	
2-Methyoxy-2-Methylpropane		1 U	1 U	
Acrylonitrile		2 U	2 U	
Allyl Chloride		1 U	1.00 U	
Chloroacetonitrile		1 U	1.0 U	
Ethyl Ether		1 U	1.00 U	
Ethylmethacrylate		1 U	1.00 U	
Hexachloroethane		1 U	1.00 U	0.13 U
Methyacrilonitrile		1 U	1.00 U	
Methyl acrylate		1 U	1.00 U	
Methyl Methacrylate		1 U	1.00 U	
n-Butylbenzene		1 U	1.0 U	
n-Propylbenzene		1 U	1.00 U	
Tetrachloroethene		1 U	1.0 U	
Pentachloroethane		1 U	1.00 U	
2-Nitropropane		1 U	1.00 U	
Tetrahydrofuran		3.2	3.20	
Trans-1,4-Dichloro-2-butene		2 U	2.00 U	
1,1,2 Trichlorotrifluoroethane		1 U	1.00 U	
Methyl Iodide		1 U	1.00 U	

E	Ecology sample	J	The analyte was positively identified. The associated numerical result is an estimate.
Eff	Effluent sample	U	The analyte was not detected at or above the reported result.
grab	Grab sample	UJ	The anaylte was not detected at or above the reported estimated result.
comp	Composite sample		

Appendix E (cont.) - VOA, BNA, Pesticide/PCB and Metals Scan Results - Blaine Class II Inspection, December 1996.

	Location:	Eff-1	Eff-2	Eff-E
	Type:	grab	grab	comp
	Date:	12/03/96	12/03/96	12/3-4/96
	Time:	0944	1402	0800-0800
	Lab Log #:	498234	498235	498236
BNA Compounds		µg/L	µg/L	µg/L
Benzo(a)Pyrene				0.13 U
2,4-Dinitrophenol				2.5 U
Dibenzo(a,h)Anthracene				0.13 U
Benzo(a)Anthracene				0.13 U
4-Chloro-3-Methylphenol				0.13 U
Aniline				0.13 U
Benzoic Acid				1.5
Hexachloroethane		1 U	1 U	0.13 U
Hexachlorocyclopentadiene				0.63 U
Isophorone				0.14
Acenaphthene				0.13 U
Diethylphthalate				0.87
Di-N-Butylphthalate				0.25 UJ
Phenanthrene				0.022 J
Butylbenzylphthalate				0.85
N-Nitrosodiphenylamine				0.13 U
Fluorene				0.13 U
Carbazole				0.25 U
Hexachlorobutadiene		2 UJ	2 U	0.13 U
Pentachlorophenol				1.3 U
2,4,6-Trichlorophenol				0.13 U
2-Nitroaniline				0.63 U
2-Nitrophenol				0.63 U
Naphthalene		10 UJ	10 UJ	0.041 J
2-Methylnaphthalene				0.03 J
2-Chloronaphthalene				0.13 U
3,3'-Dichlorobenzidine				0.13 U
Benzidine				1.3 U

E	Ecology sample	J	The analyte was positively identified. The associated numerical result is an estimate.
Eff	Effluent sample	U	The analyte was not detected at or above the reported result.
grab	Grab sample	UJ	The anaylte was not detected at or above the reported estimated result.
comp	Composite sample		

Appendix E (cont.) - VOA, BNA, Pesticide/PCB and Metals Scan Results - Blaine Class II Inspection, December 1996.

	Location:	Eff-1	Eff-2	Eff-E
	Type:	grab	grab	comp
	Date:	12/03/96	12/03/96	12/3-4/96
	Time:	0944	1402	0800-0800
	Lab Log #:	498234	498235	498236
BNA Compounds		µg/L	µg/L	µg/L
2-Methylphenol				0.13 U
1,2-Dichlorobenzene		1 U	1 U	0.13 U
2,4,5-Trichlorophenol				0.63 U
Nitrobenzene				0.13 U
3-Nitroaniline				1.3 U
4-Nitroaniline				0.63 U
4-Nitrophenol				1.3 U
Benzyl Alcohol				0.19
4-Bromophenyl-Phenylether				0.13 U
2,4-Dimethylphenol				0.13 U
4-Methylphenol				0.91
1,4-Dichlorobenzene		1 UJ	1 UJ	0.22
4-Chloroaniline				0.13 U
Phenol				0.34
Pyridine				0.25 U
Bis(2-Chloroethyl)Ether				0.13 U
Bis(2-Chloroethoxy)Methane				0.13 U
Bis(2-Ethylhexyl) Phthalate				1.8 UJ
Di-n-Octyl Phthalate				0.13 U
Hexachlorobenzene				0.13 U
Anthracene				0.13 U
1,2,4-Trichlorobenzene		10 UJ	10 U	0.13 U
2,4-Dichlorophenol				0.13 U
2,4-Dinitrotoluene				0.63 U
1,2-Diphenylhydrazine				0.13 U
Pyrene				0.037 J
Dimethylphthalate				0.037 J
Dibenzofuran				0.13 U

E	Ecology sample	J	The analyte was positively identified. The associated numerical result is an estimate.
Eff	Effluent sample	U	The analyte was not detected at or above the reported result.
grab	Grab sample	UJ	The anaylte was not detected at or above the reported estimated result.
comp	Composite sample		

Appendix E (cont.) - VOA, BNA, Pesticide/PCB and Metals Scan Results - Blaine Class II Inspection, December 1996.

	Location:	Eff-1	Eff-2	Eff-E
	Type:	grab	grab	comp
	Date:	12/03/96	12/03/96	12/3-4/96
	Time:	0944	1402	0800-0800
	Lab Log #:	498234	498235	498236
BNA Compounds		µg/L	µg/L	µg/L
Benzo(ghi)perylene				0.13 U
Indeno(1,2,3-cd)Pyrene				0.13 U
Benzo(b)Fluoranthene				0.13 U
Fluoranthene				0.035 J
Benzo(k)Fluoranthene				0.13 U
Acenaphthylene				0.13 U
Chrysene				0.023 J
4,6-Dinitro-2-Methylphenol				1.3 U
1,3-Dichlorobenzene		1 U	1 U	0.13 U
2,6-Dinitrotoluene				0.63 U
N-Nitroso-di-n-Propylamine				0.25 U
4-Chlorophenyl-Phenylether				0.13 U
1-Methylnaphthalene				0.021 J
2-Chlorophenol				0.13 U
Retene				0.13 U
Nitrobenzene				0.13 U
3B-Coprostanol				11
Caffeine				7.2
1,2-Diphenylhydrazine				0.13 U
N-Nitrosodimethylamine				0.63 U
2,2'-Oxybis[1-chloropropane]				0.13 U

E	Ecology sample	J	The analyte was positively identified. The associated numerical result is an estimate.
Eff	Effluent sample	U	The analyte was not detected at or above the reported result.
grab	Grab sample	UJ	The anaylte was not detected at or above the reported estimated result.
comp	Composite sample		

Appendix E (cont.) - VOA, BNA, Pesticide/PCB and Metals Scan Results - Blaine Class II Inspection, December 1996.

Location:	Eff-E	Sludge
Type:	comp	grab
Date:	12/3-4/96	12/03/96
Time:	0800-0800	1030
Lab Log #:	498236	498241
Pesticide/PCB Compounds	µg/L	µg/Kg-dry wt.
beta-BHC	0.007 U	95 U
delta-BHC	0.007 U	95 U
gamma-BHC (Lindane)	0.009	95 U
Aldrin	0.007 U	95 U
Heptachlor	0.007 U	95 U
Heptachlor Epoxide	0.007 U	95 U
Endosulfan I	0.007 U	95 U
Dieldrin	0.007 U	95 U
4,4'-DDE	0.007 U	95 U
Endrin	0.007 U	95 U
Endosulfan II	0.007 U	95 U
4,4'-DDD	0.007 U	95 U
Endosulfan Sulfate	0.007 U	95 U
4,4'-DDT	0.007 U	95 U
Methoxychlor	0.007 U	95 U
Endrin Ketone	0.007 U	95 U
Toxaphene	0.21 U	2,900 U
PCB - 1016	0.07 U	950 U
PCB - 1221	0.07 U	950 U
PCB - 1232	0.07 U	950 U
PCB - 1242	0.07 U	950 U
PCB - 1248	0.07 U	950 U
PCB - 1254	0.07 U	950 U
PCB - 1260	0.07 U	950 U
Endrin Aldehyde	0.007 UJ	95 U
Chlordane (Tech)	0.07 U	950 U

E	Ecology sample	U	The analyte was not detected at or above the reported result.
Eff	Effluent sample	UJ	The anaylte was not detected at or above the reported estimated result.
comp	Composite sample		
Sludge	Sludge sample		

Appendix E (cont.) - VOA, BNA, Pesticide/PCB and Metals Scan Results - Blaine Class II Inspection, December 1996.

Location:	Eff-E	Sludge	Trnsblk	JustEff	Geograph
Type:	comp	grab	grab	grab	grab
Date:	12/3-4/96	12/03/96	12/02/96	12/03/96	12/03/96
Time:	0800-0800	1030	1530	1050	1600
Lab Log #:	498236	498241	498242	498240	498243
Metals	µg/L	µg/Kg-dry wt.	µg/L	µg/L	µg/L
Antimony	30 U	4 UJ	30 U	30 U	30 U
Arsenic	1.5 U	3.3 J	1.5 U	14	1.5 U
Beryllium	1 U	0.19	1 U	1 U	1 U
Cadmium	0.1 U	3.4	0.28	0.1 U	1
Chromium	5 U	23.5	5 U	5 U	5 U
Copper	9.9	360	1 U	247	390
Lead	1 U	60.6	1 U	1.3	7
Mercury	0.012	0.149	0.005 U	0.005 U	0.005 U
Nickel	10 U	21	10 U	10 U	20
Selenium	2 UJ	3.9 J	2 UJ	2 UJ	2 UJ
Silver	0.5 U	6.48 J	1 U	0.5 U	0.5 U
Thallium	1.5 U		2 U	1.5 U	1.5 U
Zinc	31	541 J	12	23	318

E	Ecology sample	J	The analyte was positively identified. The associated numerical result is an estimate.
Eff	Effluent sample	U	The analyte was not detected at or above the reported result.
comp	Composite sample	UJ	The anaylte was not detected at or above the reported estimated result.
Sludge	Sludge sample		
Trnsblk	Effluent transfer blank		
JustEff	Justesen, Inc. sample		
Geograph	Geographics , Inc. sample		

Appendix F - Tentatively Identified Compounds - Blaine Class II - December, 1996

Inf-E
comp
12/3-4/96
0800-0800
498232

Volatile Organic Analysis (VOA)

Parameter	Value/Qualifier/Units		
1. Ethanol, 2-(2-Butoxyethoxy)-, Acetate	62	NJ	µg/L
2. Cholesterol3. Unknown 01	20	NJ	µg/L

Eff-1
grab
12/03/96
0944
498234

Volatile Organic Analysis (VOA)

Parameter	Value/Qualifier/Units		
1. Heptane, 2,2,4-trimethyl-	0.25	NJ	µg/L

Eff-2
grab
12/03/96
1402
498235

Volatile Organic Analysis (VOA)

Parameter	Value/Qualifier/Units		
1. 7-Oxabicyclo[2.2.1]Heptane, 1-Methyl-4-(1-Methylethyl)	0.96	NJ	µg/L
2. Bicyclo[2.2.1]Hept-2-Ene, 1,7,7-Trimethyl-	2.3	NJ	µg/L

NJ There is evidence that the analyte is present. The associated numerical result is an estimate.

Appendix F (cont.) - Tentatively Identified Compounds - Blaine Class II - December, 1996

Eff-E
comp
12/3-4/96
0800-0800
498236

Base, Acids, and Neutral Analysis (BNA)

Parameter	Value	Qualifier	Units
1. Cholest-5-En-3-One	3.7	NJ	µg/L
2. Decanoic Acid	2.7	NJ	µg/L
3. Decanoic Acid, Di-	12	NJ	µg/L
4. Decanoic Acid, Penta-	3.5	NJ	µg/L
5. Decanoic Acid, Tetra-	17	NJ	µg/L
6. Ethanol, 2-(2-Butoxyethoxy)-	11	NJ	µg/L
7. Hexadecanoic Acid	75	NJ	µg/L
8. Octadecanoic Acid	72	NJ	µg/L
9. Oleic Acid	59	NJ	µg/L
10. Unknown 01	3.1	NJ	µg/L
11. Unknown 02	6.7	NJ	µg/L
12. Unknown 03	2.2	NJ	µg/L
13. Unknown 04	2.4	NJ	µg/L
14. Unknown 05	3.5	NJ	µg/L
15. Unknown 06	2.6	NJ	µg/L
16. Unknown 07	2.3	NJ	µg/L
17. Unknown 08	6.7	NJ	µg/L
18. Unknown 09	4.2	NJ	µg/L
19. Unknown 10	3.3	NJ	µg/L
20. Unknown 11	2.4	NJ	µg/L

NJ There is evidence that the analyte is present. The associated numerical result is an estimate.

Appendix G - GLOSSARY - Blaine Class II Inspection - December, 1994

B	Blaine
BOD_5	Five Day Biochemical Oxygen Demand
$CaCO_3$	Calcium Carbonate
CLP	Contract Laboratory Program
E	Ecology
EPA	Environmental Protection Agency
Kg	kilogram (1×10^3 grams)
L	Liter (1×10^3 milliliters)
lbs/day	Pounds per Day
m^3	Cubic meter (1×10^3 liters)
MF	Membrane Filter
mg	milligram (1×10^{-3} grams)
MGD	Million Gallons per Day
mL	Milliliter (1×10^{-3} liters)
MPN	Most Probable Number
NH_3	Ammonia
NPDES	National Pollutant Discharge Elimination System
PCB	Polychlorinated Biphenyls
pH	Negative Log_{10} of Hydrogen Ion Concentration
PO_4	Phosphate
PP	Priority Pollutant
QA/QC	Quality Assurance/Quality Control
RPD	Relative Percent Difference
TIC	Total Inorganic Carbon or Tentatively Identified Compound
TKN	Total Kjeldahl Nitrogen
TNVS	Total Non-Volatile Solids
TNVSS	Total Non-Volatile Suspended Solids
TOC	Total Organic Carbon
TP	Total Phosphorous
TS	Total Solids
TSS	Total Suspended Solids
TVS	Total Volatile Solids
µg	Microgram (1×10^{-6} grams)
µg/L	Micrograms per Liter
VOA	Volatile Organic Analysis
VSS	Volatile Suspended Solids
WWTP	Wastewater Treatment Plant