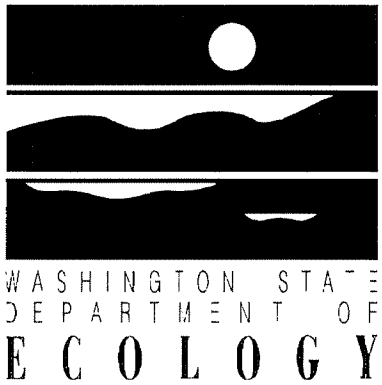

City of Sumner
Wastewater Treatment Plant
Class II Inspection, April 22-24, 1996

November 1996

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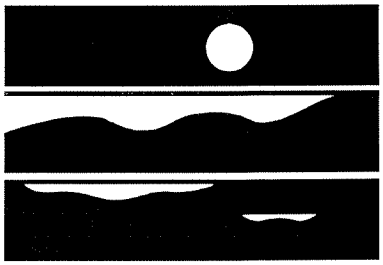

City of Sumner
Wastewater Treatment Plant
Class II Inspection, April 22-24, 1996

by
Steven Golding

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

November 1996

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Abstract

A Class II inspection was conducted at the City of Sumner Wastewater Treatment Plant (WWTP) on April 22-24, 1996. The plant was performing marginally during the inspection. The conventional parameters of BOD_5 and TSS indicate effective biological and physical treatment. However, effluent BOD_5 loading exceeded the permitted monthly average, and percent BOD_5 removal was slightly less than the monthly average requirement. Fecal coliform counts were high, exceeding the permitted monthly average, and the effluent chlorine concentration exceeded the daily maximum permit limit. Improvements in regulating chlorine and sulfur dioxide concentrations are recommended. An extended period of rainfall during the inspection, with inflow and infiltration problems, caused daily average plant flows to double from the week before the inspection, with negative impacts on plant operation. Nitrification in the plant was effectively reducing effluent NH_3.

Two priority pollutant metals were detected in the WWTP effluent. Both zinc and copper were found in concentrations that did not exceed water quality criteria at mixing zone boundaries. The copper concentration at the acute mixing zone boundary (4.07 µg/L) was 7% lower than the state acute water quality criterion (4.37µg/L). The aerobically digested sludge did not meet EPA Class A sewage sludge requirements but did meet Class B requirements.

Summary

Flow Measurements

The plant has an inline influent flow meter that did not allow verification by Ecology. Bonney Lake influent flow is measured with a Parshall flume. Sumner influent flow is determined by subtracting Bonney Lake influent flow from total plant influent flow.

NPDES Permit Compliance / General Chemistry / Plant Operation

The WWTP was performing marginally during the inspection. The conventional parameters of BOD_5 and TSS indicate acceptable biological and physical treatment. However, percent BOD_5 removal was slightly less than the monthly average requirement, and effluent BOD_5 loading exceeded the permitted monthly average. Fecal coliform counts were high, exceeding the permitted monthly average. At the same time effluent chlorine concentration exceeded the daily maximum permit limit. Improvements in regulating chlorine concentrations and sulfur dioxide concentrations are recommended.

An extended period of rainfall during the inspection, with inflow and infiltration problems, caused daily average plant flows to double from the week before the inspection, with negative impacts on plant operation. Nitrification in the plant was effectively reducing effluent NH_3.

Split Sample Results

Considerable variability was found among influent samples. This is likely a result of nonhomogeneity within influent subsamples typical of domestic wastewater influent. TSS and BOD_5 concentrations from the Ecology composite effluent sample were lower than those from the Sumner sample. This appears to be the result of the different sampling methods employed during a period of highly variable flow. Ecology subsamples were time-proportioned while Sumner subsamples were flow-proportioned.

Priority Pollutant Metals Scans

Two priority pollutant metals, zinc and copper, were detected in the WWTP effluent. Both metals were found in concentrations not exceeding water quality criteria at mixing zone boundaries. The copper concentration at the acute mixing zone boundary (4.07 µg/L) was 7% lower than the state acute water quality criterion (4.37µg/L). Zinc concentrations were lower than water quality criterion.

Sludge

The aerobically digested sludge is transferred to city-owned trucks and spread on pasture land leased by the city. The sludge did not meet EPA Class A sewage sludge requirements but did meet Class B requirements.

Recommendations

- Sumner should continue efforts to reduce inflow and infiltration.
- Chlorine and sulfur dioxide dosing should both be controlled so as to meet permit limits for fecal coliform and chlorine.
- The inline meter should be calibrated at least once per year.

Introduction

A Class II inspection was conducted at the City of Sumner (Sumner) Wastewater Treatment Plant (WWTP) on April 22-24, 1996. Conducting the inspection were Steven Golding of Ecology's Toxics Investigations Section and Kathleen Emmett of Ecology's Southwest Regional Office. Assisting from the Sumner staff was Greg Kongslie, Foreman. Darrel Anderson, Municipal Unit Supervisor of Ecology's Southwest Regional Office, requested the inspection.

The City of Sumner operates a wastewater treatment plant located on the west side of Sumner (Figure 1). Wastewater entering the collection system is primarily domestic sewage from residential and light commercial activities. In the mid-1980s the facility was expanded to provide capacity for the City of Bonney Lake, South Hill Sewer District, and unincorporated portions of Pierce County.

Treatment processes consist of screening and grit removal followed by biological secondary treatment via complete mix activated sludge process, secondary clarification and chlorine disinfection followed by dechlorination at the downstream end of the final chlorine contact chamber (Figure 2). Sulfur dioxide is used for dechlorination. Sludge is aerobically digested and trucked by tanker truck for disposal to pasture land. Effluent is discharged to the White River (Stuck River) approximately 140 feet upstream from the confluence with the Puyallup River via a 24 inch submerged outfall with a single port diffuser.

The discharge is regulated by NPDES discharge permit #WA-002335-3. The permit was issued on September 29, 1992. The permit was modified on July 31, 1994 and expires on September 29, 1997.

Objectives of the inspection included:

- Evaluate NPDES permit compliance.
- Evaluate self-monitoring data through split sample analyses.
- Compare effluent sample results with state and federal water quality criteria.
- Provide data to help assess the potential need for a pretreatment program.

Procedures

Composite and grab samples were collected by Ecology at influent (Inf-1; Inf-2; Inf-E), aeration (Aer-1; Aer-2), effluent (Eff-1; Eff-2; Eff-E), sludge (Sludge), and receiving water (Rcv-Wtr) locations (Figure 2). Ecology conducted field measurements on all but the sludge samples. Sumner collected composite samples of influent (Inf-S) and effluent (Eff-S). The Ecology influent samples were of the combined influent stream of all influents entering the plant. The Sumner influent sample was a flow-weighted sample. Sumner tests Bonney Lake influent separately from the Sumner influent (the remainder of the influent) for billing purposes, and the two results are combined in proportion to their flows to determine compliance with Sumner's NPDES permit.

A more detailed description of sampling procedures appears in Appendix A. Sampling station descriptions appear in Table 1. The sampling schedule, parameters analyzed, and sample splits are included in Appendix B. Ecology analytical methods and laboratories performing the analyses are summarized in Appendix C. Ecology field and laboratory QA/QC are summarized in Appendix D. Quality assurance cleaning procedures are included in Appendix E. A glossary appears in Appendix F.

Results and Discussion

Flow Measurements

Sumner influent flow measurements were used to represent effluent flow and to calculate permit parameter loads in lbs/day. An inline meter which did not lend itself to verification by Ecology was used. The meter should be calibrated at least once per year as specified in the permit.

Although influent flow is used to represent effluent flow for determining compliance with effluent limitations, effluent flow is measured with a Parshall flume. These flow measurements are adjusted for water reuse. The effluent meter was not operable the day of the inspection. On the two days following the inspection, measured effluent flow was 89% and 84% of measured influent flow as reported by plant personnel.

Total flow was determined from the influent flow meter totalizer for the period from 0902 on April 23, 1996 to 0850 on April 24, 1996. The flow prorated to a 24-hour period was 3.225 MGD. Sumner personnel determined the flow from 0800 to 0800 on the same days to also be 3.225 MGD. Bonney Lake influent flow during this time was determined by plant personnel to be 0.988 MGD.

Bonney Lake influent is measured with a Parshall flume. The Sumner portion of the influent flow rate (total influent with the exclusion of Bonney Lake influent) is determined by subtracting Bonney Lake influent flow rate from total influent flow rate. Influent flow measurements are used to weight-average total influent BOD_5 and TSS concentrations.

NPDES Permit Compliance / General Chemistry / Plant Operation

The WWTP was performing marginally during the inspection. The conventional parameters of BOD_5 and TSS indicate acceptable biological and physical treatment (Table 2). However, fecal coliform counts were high, indicating that the effluent was inadequately disinfected. Fecal coliform counts exceeded permitted monthly average and weekly average counts. At the same time the effluent chlorine concentration exceeded the daily maximum permit limit. The effluent met National Pollutant Discharge Elimination System (NPDES) permit limits for 5-day biochemical oxygen demand (BOD_5) with the exception of BOD_5 loading, which exceeded the permitted monthly average. Total suspended solids (TSS), pH, NH_3-N, copper, and mercury met permit limits (Table 3). TSS removal was 88%, meeting the permit requirement of at least 85% removal. BOD_5 removal was 83%, slightly less than the permit requirement of at least 85% removal, based on the Ecology analysis of the Sumner influent and effluent samples.

The Sumner sample results were used to calculate percent removals because the Sumner samples were flow-weighted while the Ecology samples were time-weighted. Flow-weighted sample collection is more representative than time-weighted sample collection during periods of high variability in plant flow such as were encountered during the inspection.

The Sumner influent, with a BOD_5 of 161 mg/L, is weak for biodegradable organics when compared with typical wastewater (Metcalf and Eddy, 1991). The plant's low BOD_5 removal is due in part to the dilute influent resulting from inflow and infiltration.

Effluent TSS loading was within the permitted loading. High flow rates resulting from inflow and infiltration were responsible for effluent BOD_5 loading (753 lbs/day) exceeding the permitted monthly average (655 lbs/day). The plant flow for April 16, 1996 was estimated to be 1.7 MGD (Kongslie, 1996). Plant personnel were planning at that time to shut down a secondary clarifier, leaving one clarifier to operate throughout the dry summer season. A rain event with a duration of several days began at the time of the inspection, increasing the plant flow to 3.456 MGD during the period 1700 on April 22 to 1700 on April 23. The single secondary clarifier that was operating at the beginning of the inspection was joined by a second secondary clarifier put into operation to handle the increased flow. Inflow and infiltration (I & I) has been cited as a continuing problem for the Sumner facility (Ecology, 1992a).

The discharge permit for Sumner specifies that when the average flow for any month exceeds 2.62 MGD and the upgrades listed in condition S4 B occur, the permitted maximum monthly average flow will be increased to 3.42 MGD, with corresponding increases in permitted effluent BOD_5 and TSS loadings. Plant personnel report that as of mid-September 1996 monthly average plant flow has remained below 2.62 MGD (Kongslie, 1996). The rapid increase in plant flow that occurred during the inspection, a doubling of daily average flow from the previous week, is an indication that I & I continues to be a problem. The plant foreman reports that efforts have been underway to reduce infiltration in collection mains and that a portion of the collection system has been identified to be disproportionately responsible for infiltration. The city of Sumner should continue efforts to reduce I &I.

The simultaneous occurrence of high fecal coliform counts and high effluent chlorine indicates both inadequate chlorination and inadequate dechlorination at the time of sampling.

Sumner injects sulfur dioxide at the end of final chlorine contact chamber for dechlorination. The detention time in the remaining chlorine contact volume is 57.7 minutes at 3.42 MGD average daily design flow and 23.1 minutes at 8.55 MGD peak flow (Kennedy/Jenks, 1996). Required detention times are one hour at average daily design flow and 20 minutes at peak daily design flow (Ecology, 1992b).

A chlorine analyzer is used at the plant to monitor and control chlorine dose just upstream of the chlorine contact chambers. Chlorine is not monitored in the chlorine contact chambers. It is monitored again only after sulfination. Control of sulfur dioxide dosing is flow-paced (Kongslie, 1996). This creates the potential for difficulties in coordinating the dosing of chlorine and sulfur dioxide, particularly during rapidly changing plant flow conditions such as occurred during the inspection. One approach to achieving improved control of dechlorination is to employ continuous monitoring of chlorine and sulfur dioxide with automatic process control of sulfur dioxide dosing.

A comparison of influent ammonia and nitrate-nitrite concentrations indicates the WWTP was achieving substantial nitrification at the time of the inspection. Ammonia concentrations were reduced from 11.8 mg/L in the influent to 0.419 mg/L in the effluent. Nitrate-nitrite concentrations increased correspondingly from 0.438 mg/L in the influent to 5.57 mg/L in the effluent. Consistent with stoichiometry, alkalinity was reduced from 149 mg/L to 74.6 mg/L. The remaining 74.6 mg/L alkalinity in the effluent indicates that the concentration in the aeration basins is sufficient so as not to inhibit further nitrification.

The Sumner WWTP has in the past had problems with poorly settling floc resulting in high effluent TSS concentrations (Heffner, 1991). It was found that the wastewater contribution from the yeast production process at Fleishmans Yeast was responsible for the problem. The problem is reported to have been largely solved (Heffner, 1991; Kongslie, 1996). During the past year yeast production has stopped at the facility. The facility, that now produces only vinegar, has been renamed Integrated Ingredients (Kongslie, 1996).

Split Sample Results

Samples were split to determine the comparability of Ecology and permittee laboratory results and sampling methods (Table 4). Ecology and Sumner laboratory analyses for each sample showed considerably variability for influent samples, up to a 27% relative percent difference for the Ecology influent sample. No consistent trend was found for influent TSS and BOD_5 strengths between Ecology and Sumner samples, suggesting that the differences found were a result of nonhomogeneity within the influent subsamples typical of domestic wastewater influent. Ecology and Sumner laboratory analyses for effluent samples showed good agreement with TSS results agreeing within 4 mg/L and BOD_5 results agreeing within 5 mg/L.

Analytical results for influent samples collected by Ecology and by Sumner, and analyzed by both Ecology and Sumner, showed reasonable agreement. Influent TSS concentrations were within 9% relative percent difference. Influent BOD_5 concentrations were within 39% relative percent difference.

The lower TSS and BOD_5 effluent concentrations of the Ecology composite sample, as compared with the Sumner composite sample, can be explained by Ecology's time-

weighted collection method. Time-weighting causes a disproportionate amount of sample to be collected during low flow conditions, when the plant could be expected to have been producing an effluent with lower concentrations of TSS and BOD_5. The Sumner flow-weighted composite effluent sample can be expected to be representative of the effluent during the 24-hour period of collection. The difference between time-weighted and flow-weighted results is exaggerated during periods of high flow variations, as during the inspection.

Priority Pollutant Metals Scans

Two priority pollutant metals, copper (15 µg/L) and zinc (20 µg/L), were detected in the WWTP effluent sample (Table 5). The transfer blank analysis of distilled water run through the effluent compositor showed no contamination except for 0.11 µg/L cadmium, slightly above the 0.1 µg/L detection limit.

Effluent and transfer blank samples were inadvertently analyzed for total metals rather than total recoverable metals. Total recoverable metals can be compared directly with water quality criteria. Since total metals results are greater than total recoverable results, if a total metals effluent concentration is lower than water quality criteria, it is shown that there is no exceedance of that criteria. Therefore, the effluent zinc concentration (20 µg/L) does not exceed acute (33.8 µg/L) or chronic (30.7 µg/L) water quality criteria.

According to Randy Knox (1996) of the Manchester Environmental Laboratory, total metals can be expected to be close to total recoverable metals results. Even with a low estimate of total recoverable metals in effluent (obtained by multiplying total metals by 0.7) the copper effluent concentration (15 µg/L) exceeded acute (4.37 µg/L) and chronic (3.28 µg/L) state fresh water quality criteria. Water quality criteria apply to the boundaries of the acute and chronic mixing zone, however, rather than to undiluted effluent. The water quality-based permit limit for copper is based on compliance with state water quality criteria using a mixing zone analysis. The effluent copper concentration (0.015 mg/L) was lower than the monthly average permit limit (0.016 mg/L).

Industrial Contributors

Eight industrial contributors of wastewater to the Sumner WWTP have been identified (Kongslie, 1996). Seven of these are food processors: Integrated Ingredients (manufacturing vinegar), Northwest Baking Company, Washington Rhubarb Growers Association, Beatrice Cheese, Webber Meats, Crown Meats, and Smithco Meats. Primary areas of concern for these contributors include organics and solids loadings and pH. Any impacts from the potential for high organic loading from these facilities was obscured by the high WWTP flow with dilution of influent by inflow and infiltration from the rain event during the inspection.

Exide Battery is permitted to discharge to the City of Sumner WWTP under State Waste Discharge Permit No. 6026. The following is a summary of the Exide Battery effluent limitations. In addition to these effluent limitations, the permit specifies monitoring conditions for cadmium, nickel, and zinc.

Parameter	Monthly Maximum	Monthly Average	Daily Maximum
Flow (gal)	20,000	--	3,500
Copper (T)		0.19 µg/L	0.49 µg/L
Lead (T)		0.15 µg/L	0.40 µg/L

Where (T) indicates total metals

Of the priority pollutant metals, copper alone was found to exceed water quality criteria in the Sumner effluent (not considering mixing zone dilution). The permitted loading of copper from Exide Battery to the Sumner WWTP is 0.0143 lbs/day based on a daily maximum flow of 3,500 gallons and a daily maximum copper concentration of 0.49 µg/L. This copper loading is 3.5% of the plant effluent copper loading of 0.403 lbs/day. It can be expected that a portion of Exide Battery metals loading to the WWTP is captured in biosolids, resulting in a maximum permitted contribution of Exide Battery to effluent copper of less than 3.5%.

With the assumption that Exide Battery is complying with permit limits, greater than 96.5% of effluent copper during the inspection can be attributed to other sources. These may include the use of copper pipes in supplying water in buildings. With no metals exceeding state water quality criteria after mixing zone dilution, the results of this inspection do not warrant the recommendation of a pretreatment program for metals contributors.

Sludge

The aerobically digested sludge is transferred to city-owned tank trucks and spread on pasture land leased by the city.

The aerobically digested sample contained 2.51% solids and 1.61% volatile solids. The fecal coliform count of 1,390,000/100g-dry wt (35,000/100g-wet wt) was higher than the 1,000/gm (100,000/100 g-dry wt) maximum limit for Class A sewage sludge in accordance with EPA regulations (EPA, 1993). Class A sewage sludge is suitable for use on agricultural lands without time restrictions to harvesting. The fecal coliform count of the sludge sample did meet requirements for Class B sewage sludge (200,000,000/100g-dry wt). EPA regulations stipulate that animals shall not be allowed to graze on the land for 30 days after application of Class B sewage sludge.

References

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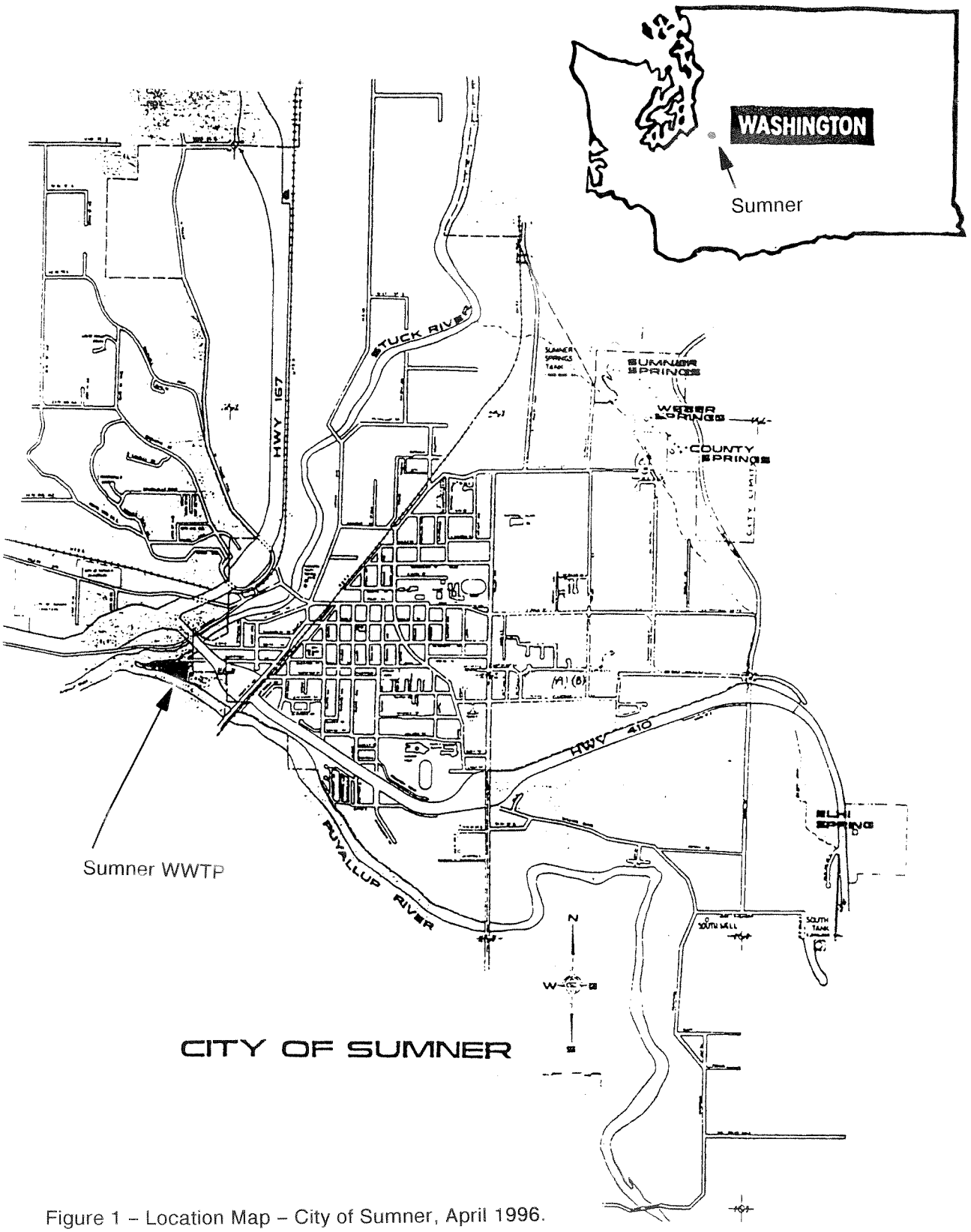

Figure 1 – Location Map – City of Sumner, April 1996.

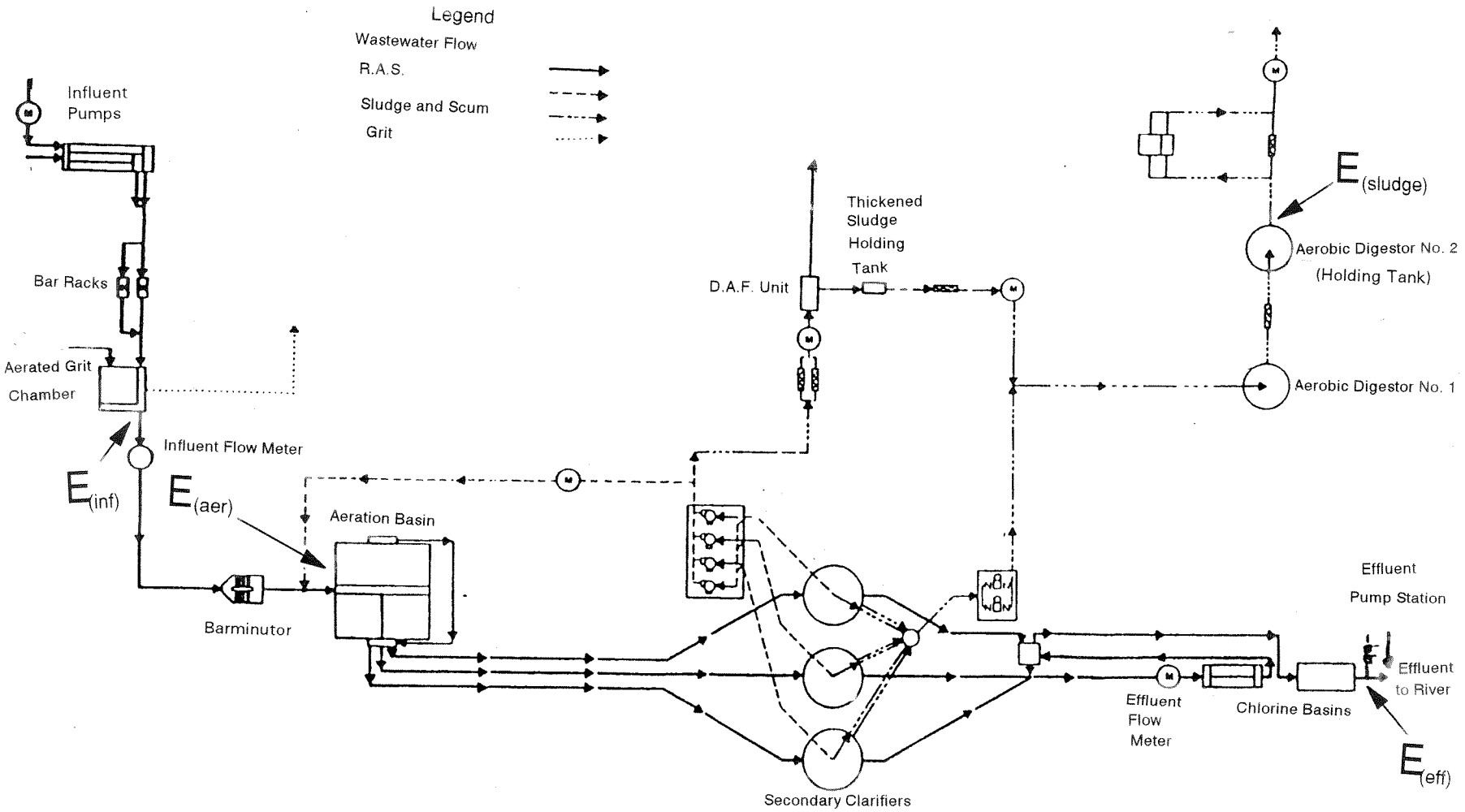

Figure 2 – Flow Schematic – City of Sumner, April 1996.

$E_{(inf)}$ - Ecology influent sampling location

$E_{(aer)}$ - Ecology aeration basin sampling location

$E_{(eff)}$ - Ecology effluent sampling location

$E_{(sludge)}$ - Ecology sludge sampling location

Table 1 - Sampling Station Descriptions - Sumner, April 1996.

Ecology influent grab and composite samples (Inf-1,2; Inf-E)

Influent grab samples were taken from the influent flow channel in a well mixed area downstream of the screw pumps. The influent compositor sample intake was placed at the same location, one foot below the surface.

Sumner influent composite samples of Sumner influent (Inf-SS)

Influent composite samples of Sumner influent were taken 8 inches upstream of the outfall discharge into the screw pump channel.

Sumner influent composite samples of Bonney Lake influent (Inf-SB)

Bonney Lake influent samples were collected at a site one mile from State Route 410, one foot downstream of the Parshall flume which is used to measure Bonney Lake influent flow rate.

Aeration basin grab samples (Aer-1,2)

Mixed liquor samples were obtained from the southeast aeration basin in a well mixed region. Samples were collected from a walkway adjacent to the center of the aeration basin.

Ecology effluent grab and composite samples (Eff-1,2,3,4; Eff-E)

Effluent grab samples were taken from the end of the chlorine contact chamber two feet upstream of the effluent weir. The effluent compositor was placed in the same location, one foot below the surface.

Sumner effluent composite samples (Eff-S)

Effluent composite samples were taken from the end of the chlorine contact chamber two feet upstream of the effluent weir, one foot below the surface.

Sludge

Sludge was sampled from a bucket dipped into the central portion of the aerobic digester in a well mixed region. Sludge fecal coliform samples were dipped out of the bucket.

Table 2 - General Chemistry Results - Sumner, April 1996.

	Location:	Inf-1	Inf-2	Inf-E	Inf-SS	Inf-SB
	Type:	grab	grab	comp	comp	comp
	Date:	4/23	4/23	4/23-24	4/23-24	4/23-24
	Time:	1040	1410	0800-0800	0800-0800	0800-0800
	Lab Log #:	178130	178131	178132	178133	178145
GENERAL CHEMISTRY						
Conductivity (umhos/cm)		333	369	402	533	524
Alkalinity (mg/L CaCO3)				149	162	196
Hardness (mg/L CaCO3)				77.8	90.6	80.5
TS (mg/L)				466	534	659
TNVS (mg/L)				248	278	355
TSS (mg/L)		167	238	193	130	340
TNVSS (mg/L)				66	26	160
% Solids						
% Volatile Solids						
Cyanide (total mg/L)						
Cyanide (wk & dis mg/L)						
OXYGEN DEMAND PARAMETERS						
BOD5 (mg/L)				109	155	176
TOC (water mg/L)		24.0	69.0	31.2	32.8	49.8
TOC (soil mg/L)						
NUTRIENTS						
NH3-N (mg/L)		8.99	8.64	11.8	13.2	16.0
NO2+NO3-N (mg/L)		0.536	0.713	0.438	0.248	0.023
Total-P (mg/L)		3.38	3.61	4.22	4.28	5.28
MISCELLANEOUS						
F-Coliform MF (#/100mL)						
Fecal Coliform (sediment - #/100g)						
Total Coliform (sediment - #/100g)						
FIELD OBSERVATIONS						
Temperature (C)		13.6	13.5			
Temp-cooled (C)				3.2	9.0	12.0
pH		7.1	7.5	8.4	8.2	8.2
Conductivity (umhos/cm)		356	410	432	570	545
Chlorine Free (mg/L)						
Total (mg/L)						

E - Ecology sample
S - Sumner sample
SS - Sumner sample, Sumner inf
SB - Sumner sample, Bonney Lake influent
grab - grab sample
comp - composite sample
grab-comp - grab-composite sample
Inf - influent sample
Eff - effluent sample
Aer - aeration basin sample
Sludge - digested sludge sample
RcvWtr- receiving water sample
TrnsBlk - transfer blank

Table 2 - (cont'd) - Sumner, April 1996.

Location	Aer-1	Aer-2	Eff-1	Eff-2	Eff-E	Eff-S
Type:	grab	grab	grab	grab	comp	comp
Date:	4/23	4/23	4/23	4/23	4/23-24	4/23-24
Time:	1100	1425	1130	1510	0800-0800	0800-0800
Lab Log #:	178134	178135	178136	178137	178138	178139
GENERAL CHEMISTRY						
Conductivity (umhos/cm)			369	333	318	325
Alkalinity (mg/L CaCO3)					74.6	74.3
Hardness (mg/L CaCO3)					68.9	70.6
TS (mg/L)	2270	1750			242	261
TNVS (mg/L)	757	643			160	168
TSS (mg/L)	2070	1580	11	13	16	23
TNVSS (mg/L)	611	500			4	6
% Solids						
% Volatile Solids						
Cyanide (total mg/L)			<0.010			
Cyanide (wk & dis mg/L)			<0.010			
OXYGEN DEMAND PARAMETERS						
BOD5 (mg/L)					24	28
TOC (water mg/L)			6.77	7.74	8.30	7.49
TOC (soil mg/L)						
NUTRIENTS						
NH3-N (mg/L)			0.278	1.43	0.419	0.254
NO2+NO3-N (mg/L)			5.78	5.39	5.57	5.80
Total P (mg/L)			1.53	1.52	1.19	1.37
MISCELLANEOUS						
F-Coliform MF (#/100mL)						
Fecal Coliform (sediment - #/100g)						
Total Coliform (sediment - #/100g)						
FIELD OBSERVATIONS						
Temperature (C)	13.8	13.9	13.5	14		
Temp-cooled (C)					3.7	15.8
pH	7.3	7.6	7.8	7.7	7.1	7.0
Conductivity (um	355	326	420	350	334	342
Chlorine Free (mg/L)			<0.04	<0.04		
Total (mg/L)			<0.04	<0.04		

Table 2 - (cont'd) - Sumner, April 1996.

Location:	Eff-3	Eff-4	Sludge	RcvWtr	TrnsBlk
Type:	grab	grab	grab	grab	grab
Date:	4/24	4/24	4/23	4/23	4/22
Time:	1100	1105	1320	1340	1545
Lab Log #:	178140	178141	178142	178143	178144
GENERAL CHEMISTRY					
Conductivity (umhos/cm)					
Alkalinity (mg/L CaCO3)					
Hardness (mg/L CaCO3)				26.5	
TS (mg/L)					
TNVS (mg/L)					
TSS (mg/L)	5			111	
TNVSS (mg/L)					
% Solids			2.51		
% Volatile Solids			1.61		
Cyanide (total mg/L)					
Cyanide (wk & dis mg/L)					
OXYGEN DEMAND PARAMETERS					
BOD5 (mg/L)					
TOC (water mg/L)	5.63				
TOC (soil mg/L)			8,300		
NUTRIENTS					
NH3-N (mg/L)					
NO2+NO3-N (mg/L)					
Total P (mg/L)					
MISCELLANEOUS					
F-Coliform MF (#/100mL	600J	1300J			
Fecal Coliform (sediment - #/100g)			35,000		
Total Coliform (sediment - #/100g)			54,000		
FIELD OBSERVATIONS					
Temperature (C)	12.5	12.5		13.5	
Temp-cooled (C)					
pH				7.5	
Conductivity (umhos/cm	278			410	
Chlorine Free (mg/L)	0.06				
Total (mg/L)	0.16				

Table 3 - NPDES Permit Limits and Inspection Results - Sumner, April 1996.

	NPDES Limits		Inspection Results	
Parameter	Monthly Average	Weekly Average	Composite Samples	Grab Samples
BOD5	30 mg/L 655 lbs/day 85% removal	45 mg/L 983 lbs/day	28 mg/L 753 lbs/day 83% removal*	
TSS	30 mg/L 655 lbs/day 85% removal	45 mg/L 983 lbs/day	23 mg/L 619 lbs/day 88% removal	
Fecal Coliform	200/100 mL	400/100 mL		1500/100 mL 1200/100 mL
pH	6.0 to 9.0 (continuous)			7.8 7.7
Flow**	--	--	3.225 MGD	

	NPDES Limits		Inspection Results	
Parameter	Monthly Average	Daily Maximum	Composite Samples	Grab Samples
Chlorine (mg/L)	0.018	0.048		<0.04; <0.04; 0.16
NH3-N (mg/L) (Nov-Apr)	7	20.5	0.419	0.278 1.43
Copper*** (mg/L)	0.016	0.024	0.015	
Mercury*** (ug/L)		0.4	<0.05	

* Sumner analysis (143 mg/L) was used to represent influent BOD5 as Ecology influent BOD5 analysis (109 mg/L) is considered nonrepresenative.

** influent totalizer reading from 0800 on 04-23-96 to 0800 on 04-24-96.

*** Permit limits are recoverable metals. Inspection results are total metals.

Table 4 - Split Sample Results Comparison - Sumner, April 1996.

	Location:	Inf-E	Inf-S*	Eff-E	Eff-S
	Type:	comp	comp	comp	comp
	Date:	4/23-24	4/23-24	4/23-24	4/23-24
	Time:	0800-0800	0800-0800	0800-0800	0800-0800
	Lab Log #:	178132		178138	178139
	Sampled by:	Ecology	Sumner	Ecology	Sumner
Parameter	Analysis by:				
TSS (mg/L)					
	Ecology	193	194	16	23
	Sumner	174	191	16	27
BOD5 (mg/L)					
	Ecology	109	161	24	28
	Sumner	143	179	29	33

* Inf-S concentrations are flow-weighted averages of Sumner and Bonney Lake influents.

Inf- influent
Eff- effluent
E- Ecology sample
S- Sumner sample

Table 5 - Comparison of Metals Detected to Water Quality Criteria - Sumner, April 1996.

	Location:	Eff-E	Trnsblk	EPA/Ecology Water Quality Criteria			
	Type:	comp	grab				
	Date:	4/23-24	4/22	Acute		Chronic	
	Time:	0800-0800	1545	Fresh		Fresh	
	Lab Log#:	178138	178144				
		(ug/L)	(ug/L)	(ug/L)		(ug/L)	
Metals + +							
Antimony		40U	40U	9,000	*	1,600	*
Arsenic		1.5U	1.5U				
Beryllium		1U	1U	130	*	5.3	*
Cadmium		0.1U	0.11	0.8	+	0.3	+
Chromium		5U	5U				
Hexavalent				16		11	
Trivalent				585.2	+	69.8	+
Copper		15	5U	4.37	+	3.28	+
Lead		1.0U	1.0U	10.34	+	0.403	+
Mercury (Total)		0.05U	0.05U	2.4		0.012	
Nickel		10U	10U	438	+	49	+
Selenium		1.5U	1.5U	20		5.0	
Silver		0.5U	0.5U	0.220	+	0.12	
Thallium		1.5 U	1.5 U	1400	*	40	*
Zinc		20	4U	33.8	+	30.7	+

Eff - Effluent
E - Ecology sample
Trnsblk - transfer blank

++ Metals values are total .
U The analyte was not detected at or above the reported result.
* Insufficient data to develop criteria. Value presented is the LOEL - Lowest Observed Effect Level.
+ Hardness dependent criteria (26.5 mg/L used).

Appendices

Appendix A - Sampling Procedures - Sumner, April 1996.

Ecology Isco composite samplers were set up to collect equal volumes of sample every 30 minutes for 24 hours. The samples were then divided into subsamples for analysis. The compositors were iced to preserve samples.

Sumner collected flow-proportioned samples with the exception of Sumner influent, which was collected as a time-proportioned sample because the permanent sampler was temporarilly out of service.

Ecology influent and effluent composite samples and Sumner influent and effluent composite samples were split for both Ecology and Sumner laboratory analysis. Sampler configurations and locations are summarized in Figure 2 and Table 1.

Appendix B - Sampling Schedule - Sumner, April 1996.

	Location:	Inf-1	Inf-2	Inf-E	Inf-SS	Inf-SB
	Type:	grab	grab	comp	comp	comp
	Date:	4/23	4/23	4/23-24	4/23-24	4/23-24
	Time:	1040	1410	0800-0800	0800-0800	0800-0800
	Lab Log #:	178130	178131	178132	178133	178145
GENERAL CHEMISTRY						
Conductivity (umhos/cm)		E	E	E	E	E
Alkalinity (mg/L CaCO3)				E	E	E
Hardness (mg/L CaCO3)				E	E	E
TS (mg/L)				E	E	E
TNVS (mg/L)				E	E	E
TSS (mg/L)		E	E	ES	ES	ES
TNVSS (mg/L)				E	E	E
% Solids						
% Volatile Solids						
Cyanide (total mg/L)						
Cyanide (wk & dis mg/L)						
OXYGEN DEMAND PARAMETERS						
BOD5 (mg/L)				ES	ES	ES
TOC (water mg/L)		E	E	E	E	E
TOC (soil mg/L)						
NUTRIENTS						
NH3-N (mg/L)		E	E	E	E	E
NO2+NO3-N (mg/L)		E	E	E	E	E
Total-P (mg/L)		E	E	E	E	E
MISCELLANEOUS						
F-Coliform MF (#/100mL)						
Fecal Coliform (sediment - #/100g)						
Total Coliform (sediment - #/100g)						
PP Metals (ug/L)						
FIELD OBSERVATIONS						
Temperature (C)		E	E			
Temp-cooled (C)				E	E	E
pH		E	E	E	E	E
Conductivity (umhos/cm)		E	E	E	E	E
Chlorine Free (mg/L)						
Total (mg/L)						

- E - Ecology sample
- S - Sumner sample
- E - Ecology lab analysis
- S - Sumner lab analysis
- SS - Sumner sample, Sumner inf
- SB - Sumner sample, Bonney Lake influent
- grab - grab sample
- comp - composite sample
- Inf - Influent sample
- Eff - effluent sample
- Aer - aeration basin sample
- Sludge - digested sludge sample
- RcvWtr - receiving water sample
- TrnsBlk - transfer blank

Appendix B - (cont'd) - Sumner, April 1996.

Location	Aer-1	Aer-2	Eff-1	Eff-2	Eff-E	Eff-S
Type:	grab	grab	grab	grab	comp	comp
Date:	4/23	4/23	4/23	4/23	4/23-24	4/23-24
Time:	1100	1425	1130	1510	0800-0800	0800-0800
Lab Log #:	178134	178135	178136	178137	178138	178139
GENERAL CHEMISTRY						
Conductivity (umhos/cm)			E	E	E	E
Alkalinity (mg/L CaCO3)					E	E
Hardness (mg/L CaCO3)					E	E
TS (mg/L)	E	E			E	E
TNVS (mg/L)	E	E			E	E
TSS (mg/L)	E	E	E	E	ES	E
TNVSS (mg/L)	E	E			E	E
% Solids						
% Volatile Solids						
Cyanide (total mg/L)			E			
Cyanide (wk & dis mg/L)			E			
OXYGEN DEMAND PARAMETERS						
BOD5 (mg/L)					ES	E
TOC (water mg/L)			E	E	E	E
TOC (soil mg/L)						
NUTRIENTS						
NH3-N (mg/L)			E	E	E	E
NO2 + NO3-N (mg/L)			E	E	E	E
Total P (mg/L)			E	E	E	E
MISCELLANEOUS						
F-Coliform MF (#/100mL)						
Fecal Coliform (sediment - #/100g)						
Total Coliform (sediment - #/100g)						
PP Metals (ug/L)					E	
FIELD OBSERVATIONS						
Temperature (C)	E	E	E	E		
Temp-cooled (C)					E	E
pH	E	E	E	E	E	E
Conductivity (um	E	E	E	E	E	E
Chlorine Free (mg/L)			E	E		
Total (mg/L)			E	E		

Appendix B - (cont'd) - Sumner, April 1996.

Location:	Eff-3	Eff-4	Sludge	RcvWtr	TrnsBlk
Type:	grab	grab	grab	grab	grab
Date:	4/24	4/24	4/23	4/23	4/22
Time:	1100	1105	1320	1340	1545
Lab Log #:	178140	178141	178142	178143	178144
GENERAL CHEMISTRY					
Conductivity (umhos/cm)					
Alkalinity (mg/L CaCO3)					
Hardness (mg/L CaCO3)				E	
TS (mg/L)					
TNVS (mg/L)					
TSS (mg/L)	E			E	
TNVSS (mg/L)					
% Solids			E		
% Volatile Solids			E		
Cyanide (total mg/L)					
Cyanide (wk & dis mg/L)					
OXYGEN DEMAND PARAMETERS					
BOD5 (mg/L)					
TOC (water mg/L)	E				
TOC (soil mg/L)			E		
NUTRIENTS					
NH3-N (mg/L)					
NO2 + NO3-N (mg/L)					
Total P (mg/L)					
MISCELLANEOUS					
F-Coliform MF (#/100mL	E	E			
Fecal Coliform (sediment - #/100g)			E		
Total Coliform (sediment - #/100g)			E		
PP Metals (ug/L)					E
FIELD OBSERVATIONS					
Temperature (C)	E	E		E	
Temp-cooled (C)					
pH				E	
Conductivity (umhos/cm	E			E	
Chlorine Free (mg/L)	E				
Total (mg/L)	E				

Appendix C - Ecology Analytical Methods - Sumner, April 1996.

Laboratory Analysis	Method Used for Ecology Analysis	Laboratory Performing Analysis
Conductivity	EPA, Revised 1983: 120.1	Manchester Laboratory
Alkalinity	EPA, Revised 1983: 310.1	Manchester Laboratory
Hardness	EPA, Revised 1983: 130.2	Manchester Laboratory
TS	EPA, Revised 1983: 160.3	Manchester Laboratory
TNVS	EPA, Revised 1983: 160.3	Manchester Laboratory
TSS	EPA, Revised 1983: 160.2	Manchester Laboratory
TNVSS	EPA, Revised 1983: 160.2	Manchester Laboratory
% Solids	APHA, 1992: 2540G.	Manchester Laboratory
% Volatile Solids	EPA, Revised 1983: 160.4	Manchester Laboratory
BOD5	EPA, Revised 1983: 405.1	Manchester Laboratory
TOC (water)	EPA, Revised 1983: 415.1	Manchester Laboratory
TOC (soil/sed)	EPA, Revised 1983: 415.1	Sound Analytical
NH3-N	EPA, Revised 1983: 350.1	Manchester Laboratory
NO2 + NO3-N	EPA, Revised 1983: 353.2	Manchester Laboratory
NO2-N	EPA, Revised 1983: 353.2	Manchester Laboratory
Total-P	EPA, Revised 1983: 365.3	Manchester Laboratory
F-Coliform MF	APHA, 1992: 9222D.	Manchester Laboratory
F-Coliform (soil/sed)	APHA, 1992: 9221A.	Manchester Laboratory
T-Coliform (soil/sed)	APHA, 1992: 9221A.	Manchester Laboratory
PP Metals (water)	EPA, Revised 1983: 200-299	Manchester Laboratory

METHOD BIBLIOGRAPHY

APHA-AWWA-WPCF, 1992. Standard Methods for the Examination of Water and Wastewater, 18th Edition.

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

Appendix D - Quality Assurance/Quality Control (QA/QC) - Sumner, April 1996.

SAMPLING QA/QC

Ecology quality assurance procedures for sampling included cleaning the sampling equipment for priority pollutant sampling prior to the inspection to prevent sample contamination (Appendix E). Chain-of-custody procedures were followed to assure the security of the samples (Ecology, 1994).

LABORATORY QA/QC

General Chemistry Analysis

The effluent fecal coliform samples were qualified due to an improper incubation period. Due to analyst error, the samples were not transferred to a 44.5°C bath during the test. The bath is to enhance the growth of stressed organisms. All QC with this run were within their acceptable windows, but the sample results were qualified with a "J" due to this oversight.

Analysis of all parameters was performed within USEPA established holding times. All initial and continuing calibration verification standards were within the USEPA (CLP) control limits. The CLP requirement for correlation coefficient was met.

The procedural blanks associated with these samples showed no analytically significant levels of analytes. All spike recoveries were within CLP acceptance limits.

The Relative Percent Difference (RPD) for all parameters were within their acceptance windows except for the Fecal Coliform sample 178141. Duplicate results were outside the 20% RPD limit. The imprecision is attributed to variability in reaction rates.

Laboratory control sample analyses were within the windows established for each parameter.

Metals Analysis

Antimony data is somewhat noisy. The ICP reporting level for antimony has been raised to 40 µg/L.

All analyses were performed within CLP holding times. All initial and continuing calibration verification standards were within the relevant CLP control limits. The AA calibration correlation coefficient met CLP calibration requirements. The procedural blanks associated with these samples show no analytically significant levels of analytes. Laboratory control sample analyses were within the windows established for each parameter.

LABORATORY AUDIT

Sumner received laboratory accreditation on June 2, 1992. The accreditation was most recently renewed effective July 8, 1996. The current accreditation is scheduled to expire July 7, 1997.

Appendix E - Priority Pollutant Cleaning Procedures - Sumner, April 1996.

CLEANING PROCEDURES FOR PRIORITY POLLUTANT METALS SAMPLING

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

Appendix F - Glossary of Terms - Sumner, April 1996.

B - Bonney Lake
BOD_5 - five day biochemical oxygen demand
comp - composite sample
est. - estimated concentration
E - Department of Ecology
Eff - effluent
EPA - United States Environmental Protection Agency
F-coli - fecal coliform bacteria
g - gram
grab - grab sample
Inf - influent
MF - membrane filter
mg - milligram
mg/L - milligram per liter
NPDES - National Pollutant Discharge Elimination System
pH - $-\log_{10}$ (hydrogen ion concentration)
QA - quality assurance
QC - quality control
S - Sumner
TIC - tentatively identified compound
TNVS - total nonvolatile solids
TNVSS - total nonvolatile suspended solids
TOC - total organic carbon
TS - total solids
TSS - total suspended solids
µg - microgram