WENATCHEE WASTEWATER TREATMENT PLANT
CLASS II INSPECTION
DECEMBER 11-13, 1989

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ABSTRACT

A Class II inspection was conducted at the Wenatchee Wastewater Treatment Plant on December 11-13, 1989. Weekly average NPDES permit limits for total suspended solids (TSS) and biochemical oxygen demand (BOD_5) were being met at the time of the inspection. Effluent concentrations of copper, lead, mercury, silver, zinc, cyanide, and 4,4'-DDT exceeded the Environmental Protection Agency (EPA) acute and/or chronic criteria for freshwater. Bioassays showed no effluent toxicity to Microtox, some acute toxicity to rainbow trout, and moderate acute and chronic toxicity to *Ceriodaphnia dubia*. Preliminary results of the ongoing centrifuge study of effluent particulates are presented and discussed.

INTRODUCTION

A Class II inspection was conducted on December 11-13, 1989, at the Wenatchee Wastewater Treatment Plant (WTP). Conducting the inspection were Jeanne Andreasson, Norm Glenn, Pat Hallinan, Marc Heffner, and Keith Seiders from the Department of Ecology (Ecology) Compliance Monitoring Section. Dale Van Donsel and Lee Fearon from Ecology's Quality Assurance Section evaluated the WTP's laboratory procedures. The inspection was requested by Polly Zehm from Ecology's Central Regional Office. Mel Heckler, Operations Manager, represented the WTP and provided assistance. The Wenatchee WTP is a secondary treatment (activated sludge) facility which discharges treated effluent into the Columbia River. The plant is currently discharging under NPDES Permit No. WA-002394-9. This permit expires on July 2, 1990.

Objectives of the Survey

1. Verify the accuracy of the permittee's flow measurement device.

2. Verify compliance with permit parameters: BOD, TSS, Fecal Coliform Bacteria, and pH.

3. Assess the permittee's self-monitoring by reviewing laboratory sampling procedures and by comparing the split sample results for permit parameters obtained by the Ecology and permittee laboratories on composite samples.

4. Analyze the performance of the WTP by reviewing Ecology's analysis of selected permittee monitoring parameters in influent, effluent, and sludge.

5. Identify toxic pollutants in WTP influent, effluent, and sludge.

6. Establish the sensitivity of selected organisms to toxicity in the WTP effluent through bioassays.

7. Advance the state of the art of compliance inspections by contributing to the ongoing developmental efforts with centrifugation.

LOCATION AND DESCRIPTION

The Wenatchee WTP is located in the City of Wenatchee between Worthen Street and the Columbia River (Figure 1). The original primary treatment facility was built in 1959 and upgraded to secondary (activated sludge) treatment in 1976. A schematic of the plant is shown in Figure 2.

Raw sewage flows from the grit chamber to the sewage shredder, where it is pumped to the primary clarifier. Effluent from the primary clarifier flows to the aeration basins, the two secondary clarifiers, and finally the two chlorine contact chambers, which are concentric with the secondary clarifiers. Final chlorinated effluent is discharged through a three foot Parshall flume to the Columbia River.

Sludge from the primary clarifier is digested, then loaded into trucks for landfill or land application disposal. Sludge from the secondary clarifiers is thickened, then trucked to a landfill for disposal.

METHODS

Flow was measured over a 24-hour period by a Marsh-McBirney Flo-Tote Model 260 portable computerized flowmeter system. The Flo-Tote flowmeter measured fluid velocity and fluid level via transducers encapsulated in a sensor which was placed in the open flow channel just above the Parshall flume. The Flo-Tote calculated the flow rate using the transducer readings, channel measurements, and a site calibration coefficient.

Ecology collected influent composite and grab samples at the grit chamber. Chlorinated effluent composite and grab samples were collected from the effluent channel just above the Parshall flume. Wenatchee collected their routine composites for determining permit compliance at these locations.

Ecology's composite samples were collected with ISCO automatic samplers set to collect approximately 330 milliliters every 30 minutes. Sample collection jugs were continually iced to cool samples as they were collected. The sampling equipment (glass collection jugs, tubing, strainers and stainless steel beakers) was specially cleaned following the priority pollutant cleaning procedures outlined in Appendix A. Field transfer blanks for volatile organics (VOAs) and cyanide were prepared by transferring organic free water directly into sample containers. Base neutral acid extractables (BNA), pesticide/polychlorinated biphenyls (PCBs), and metals transfer blanks were prepared by pumping a one liter rinse of organic free water through a clean compositor, discarding the rinse, then pumping six liters of organic free water through and transferring the water to appropriate sample containers.

Wenatchee received splits from the Ecology's influent and effluent composites for BOD_5, chemical oxygen demand (COD), and TSS analysis. Ecology received splits, sufficient for TSS and COD analysis, from Wenatchee's influent and effluent composite samples.

A three part manual composite of chlorinated effluent was collected concurrently with the effluent grabs for acute (rainbow trout and Microtox) and chronic (survival and reproduction of *Ceriodaphnia dubia*) bioassays. Bioassays were conducted on samples both as received and with the chlorine residual neutralized.

A sample of the digested primary clarifier sludge was collected at the truck loading facility. A sample split of thickened secondary clarifier sludge was received from the WTP laboratory.

A receiving water (Columbia River) sample was collected from shore approximately 3000 feet upstream of the WTP for water hardness determination.

The Class II Inspection sampling locations are noted on Figure 2. A complete list of sampling stations, dates, and parameters is given in Table 1. The analytical methods used by Ecology are given in Table 2 along with the laboratory performing the analysis.

Effluent particulate matter was collected using two Alfa Laval bowl type continuous centrifuges (model WSB/MAB 103) following procedures described by Andreasson (1991). A small peristaltic pump was used to pump effluent from the effluent channel to the centrifuges. The centrifuges were cleaned prior to sampling following procedures described by Seiders (1989).

RESULTS AND DISCUSSION

Flow

The WTP's totalizer reading of 3.2 MGD was in acceptable agreement (within 10%) with Ecology's 24-hour Flo-Tote result of 3.0 MGD (EPA, 1988). Flow measurements are summarized in Table 3. A summary of the average hourly flow rate calculated by the Flo-Tote is included in Appendix B.

Comparison of Inspection Results to NPDES Permit Requirements

General chemistry results are summarized in Table 4. The plant was operating within the permit requirements for weekly average BOD_5 and TSS concentrations and loads. Monthly average BOD_5 concentration and load, and monthly average TSS requirements were met. However, the monthly average TSS concentration limit of 30 mg/L was exceeded during the inspection. BOD_5 and TSS removal efficiencies were 90% and 85% respectively. Fecal coliform numbers, pH, and flow were within permit limits (Table 5).

Assessment of Self-monitoring

Split sample analysis showed good BOD_5 and COD agreement between laboratories, with the exception of one Ecology COD result, which appears high in relation to other samples.

TSS agreement between laboratories was good on Ecology's influent composite sample, but was not good on the other three composite samples.

Two fecal coliform samples collected by Ecology had counts of 23 and 31 bacteria per 100 mL. Wenatchee collected one sample for fecal coliform analysis which they split with Ecology. The Wenatchee and Ecology results on the split sample were 46 and 770 bacteria per mL, respectively. Ecology's high bacteria count could be due to contamination of the sample during splitting.

Ecology and Wenatchee analyzed identical EPA Performance Evaluation samples which were provided to each laboratory at the time of the inspection. Both laboratories' results were within the control limits for the analyses performed with the exception of one duplicate TSS result by Wenatchee (Table 6).

Representatives from Ecology's Quality Assurance Section conducted a review of the WTP's laboratory procedures. Their evaluation and comments are included in Appendix C.

Plant Performance Evaluation

Nitrification was occurring in the plant as evidenced by the increase in nitrate and nitrite and the decrease in ammonia and alkalinity in the effluent over the influent.

Priority pollutants (discussed in the following section) were, generally speaking, reduced in the effluent. An exception was cyanide which was detected at a higher concentration in the effluent than in the influent.

Identification of Toxic Pollutants in Influent, Effluent, and Sludge

The complete scan of influent and effluent priority pollutant VOAs, BNAs, pesticides, PCBs, and total recoverable metals, as well as primary and secondary sludge total metals, is included in Appendix D.

Influent and Effluent Chemistry

A number of organics were detected in influent and effluent samples. Three VOAs (methylene chloride, chloroform, and toluene) and three BNAs (phenol, 4-methylphenol, and diethyl phthalate) were detected in the effluent at levels less than the sample quantitation limit (Table 7). Five of the BNAs analyzed had unusable results based on unacceptable matrix spike recoveries. The field transfer blank was not available for BNA or pesticide/PCB analysis due to a laboratory accident.

Eight pesticides were detected in the influent and three (Lindane, 4,4'-DDE and 4,4'-DDT) in the effluent. The effluent level of 4,4'-DDT was ten times EPA's chronic criteria for freshwater (EPA, 1986).

Influent and effluent metals, cyanide concentrations, and water quality criteria are presented in Table 8. Effluent concentrations of copper, lead, mercury, silver, zinc, and cyanide exceeded acute and/or chronic water quality criteria for freshwater (EPA, 1986).

Sludge Chemistry

Primary and secondary sludge chemical analyses, data from previous inspections of activated sludge facilities, and proposed EPA regulations for two sludge disposal methods are included in Table 9. The metal concentrations were well within the range of previous inspections (Hallinan, 1988) and were below EPA's proposed limits for non-agricultural land application and surface disposal (EPA, 1989a).

The presence of 4,4'-DDE and 4,4'-DDT in the influent and effluent suggests that these compounds may also occur in the sludge. EPA has proposed a maximum DDT/DDE/DDD (total) concentration of 0.11 mg/Kg dry weight for non-agricultural land application of sludge (EPA, 1989a). A pesticide analysis was not conducted on Wenatchee's sludge; however, a rough approximation of the maximum DDT/DDE/DDD (total) concentration possible in the sludge can be calculated assuming:

1. the difference between influent and effluent DDT/DDE/DDD (total) ends up in the sludge. This assumes no breakdown of the pesticides during treatment;

	influent (ug/L)	effluent (ug/L)	difference (ug/L)
4,4'-DDE	.019	.012	.007
4,4'-DDT	.016	.010	.006
4,4'-DDD	none detected	none detected	---
DDT/DDE/DDD (total)	.035	.022	.013

[At a flow rate of 3.0 MGD, 0.013 μg/L is equivalent to a daily load of 148 mg DDT/DDE/DDD (total) to the sludge.]

2. the typical volume of sludge pumped is 7000 gal/day;

3. the density of the sludge is approximately 8.3 lb/gal (3.8 Kg/gal); and

4. the typical solids content of the sludge is 5.4%.

From 2, 3 and 4, the weight of sludge (dry basis) produced per day is:

$$7000 \text{ gal} \times 3.8 \frac{\text{Kg}}{\text{gal}} \times 5.4\% \text{ solids} = 1436 \text{ Kg}$$

The calculated concentration of DDT/DDE/DDD (total) in the sludge is:

$$148 \text{ mg} \div 1436 \text{ Kg} = .10 \text{ mg/Kg}$$

This approximated possible concentration is very near the proposed maximum DDT/DDE/DDD (total) concentration of 0.11 mg/Kg dry weight for non-agricultural land application.

Bioassay Analysis

Microtox showed no toxicity in either chlorinated effluent or chlorine neutralized effluent.

The rainbow trout bioassay showed 7% mortality in 100% effluent (chlorinated) and a 20% mortality in 100% effluent with the chlorine residual neutralized. The difference in mortality between the neutralized sample and the non-neutralized sample is not statistically significant, but does suggest the possibility of an interaction between the sample components and the sodium thiosulfate used to neutralize the chlorine (Stinson, 1990).

Ceriodaphnia dubia survival was virtually identical in both chlorinated and dechlorinated samples. The LC_{50} was estimated at 25%, the NOEC was 25%, and the LOEC was 50% for both treatments. No reproduction was observed above the 25% concentration for either treatment. Overall reproduction was less in the dechlorinated sample than in the untreated sample. This was evident in the control containing sodium thiosulfate as well, suggesting either a contaminant in the sodium thiosulfate or possibly a sensitivity specific to *Ceriodaphnia* (Stinson, 1990a). The NOEC and LOEC were 12.5% and 25%, respectively, for both treatments.

The bioassay results are summarized in Table 10.

The acute toxicity to *Ceriodaphnia* could be due to copper, silver and/or zinc present in the effluent at levels exceeding EPA acute criteria. Chronic criteria were exceeded by these metals as well as lead, mercury, cyanide, and 4,4'-DDT (Tables 7 and 8).

Centrifuge Study

Centrifuge solids (the particulate fraction of the whole effluent) and return activated sludge (RAS) priority pollutant scans are included in Appendix E. Table 11 compares the chemical loading based on centrifuge solids (calculated from 41 mg/L TSS in the effluent and a flow rate of 3.0 MGD) to the chemical loading of the whole effluent (particulate fraction plus dissolved fraction).

The VOA and BNA loadings indicate that some organics may be residing predominantly in the dissolved fraction of the effluent. The large number of organics found at low loadings in the centrifuge solids may be the result of these compounds being highly concentrated, hence, more detectable in the particulates.

More pesticides and metals were detected in the centrifuge solids than the total effluent. As with the VOAs and BNAs, the greater number of chemicals found could be the result of these chemicals being highly concentrated in the particulates.

When detected both in the centrifuge solids and whole effluent, loadings of pesticides and metals were lower in the centrifuge solids than the effluent (lead is an exception). This is not unexpected since the whole effluent is the sum of the dissolved and particulate (centrifuge solids) fractions. Other possible factors contributing to the lower loading in the centrifuge solids include incomplete extraction of the chemicals due to the analytical procedures selected and uncertainties in analytical results.

The questions raised in the Wenatchee study are being investigated in ongoing centrifuge work.

Daphnia magna (elutriate) and Microtox bioassays conducted on the centrifuge solids showed the material to be highly toxic. A 100% mortality occurred within 24 hours in the *Daphnia magna* test and an EC_{50} of 2.0% was exhibited by Microtox. These results are summarized in Table 10.

CONCLUSIONS AND RECOMMENDATIONS

Ecology's 24-hour flow measurement was in good agreement with the WTP totalizer's 24-hour reading.

Weekly average permit requirements were met at the time of the inspection.

Agreement between Ecology and the WTP lab was generally good for BOD_5, COD, and fecal coliform. TSS results did not show good agreement on three of four composite sample analyses. Further split sample or performance evaluation sample TSS analyses are recommended. Ecology's Quality Assurance Section personnel have made recommendations for improved quality assurance procedures in the laboratory.

Several priority pollutants (copper, lead, mercury, silver, zinc, cyanide, and 4,4'-DDT) were detected in the effluent at levels exceeding acute and/or chronic criteria for freshwater. Low to moderate toxicity was shown in bioassays conducted on rainbow trout and *Ceriodaphnia dubia*.

There is a possibility that DDD/DDE/DDT exists in the sludge at a level approaching EPA's proposed criteria for land application of sludge. Since a pesticide analysis of the sludge was not performed as part of the Class II inspection, it is recommended that one be conducted.

Although particulate matter samples were gathered and the resulting data analyzed, it is too early in Ecology's piloting of centrifugation to draw any definitive conclusions from the data.

REFERENCES

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FIGURES

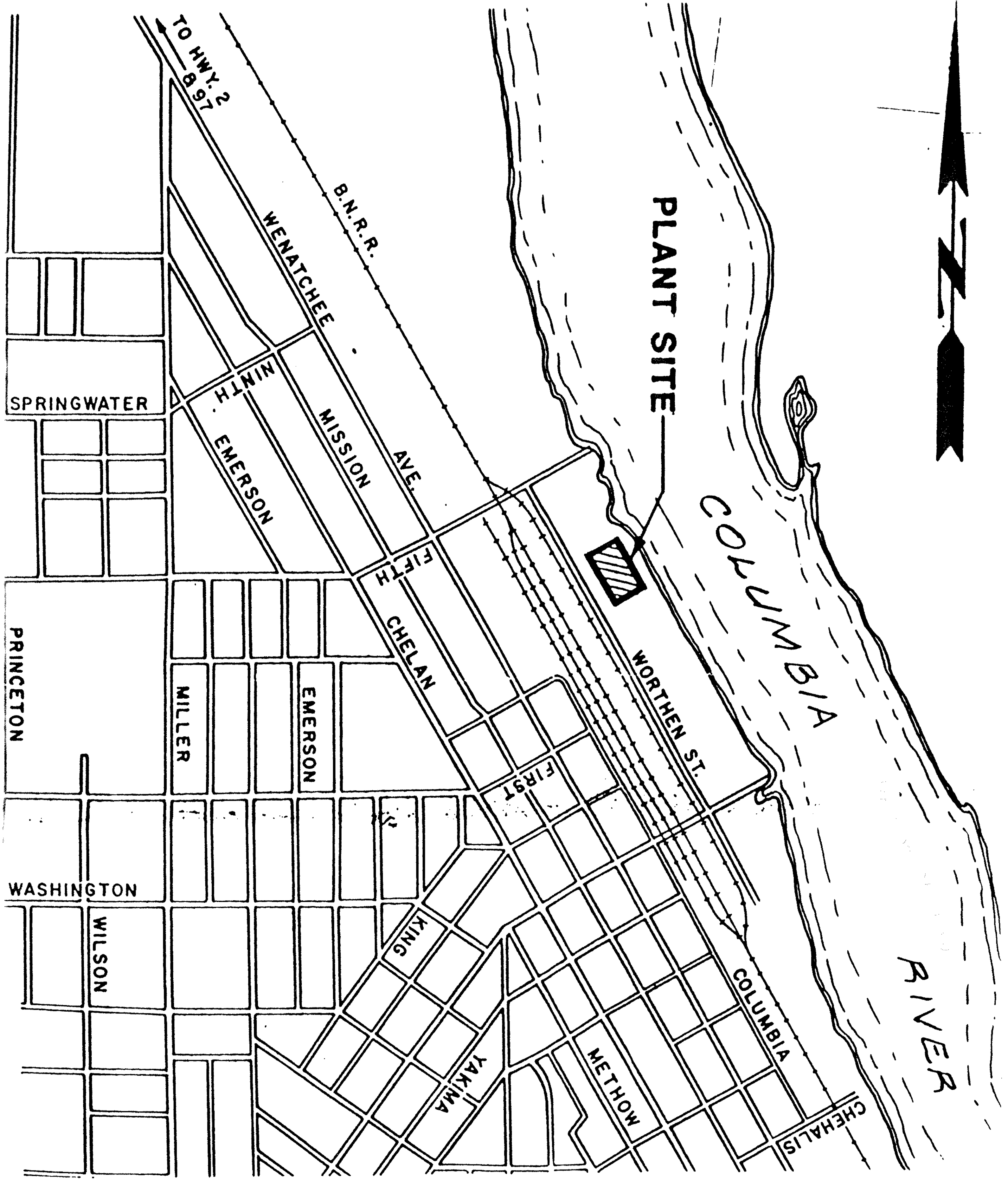


FIGURE 1 - Wenatchee WTP Site Location

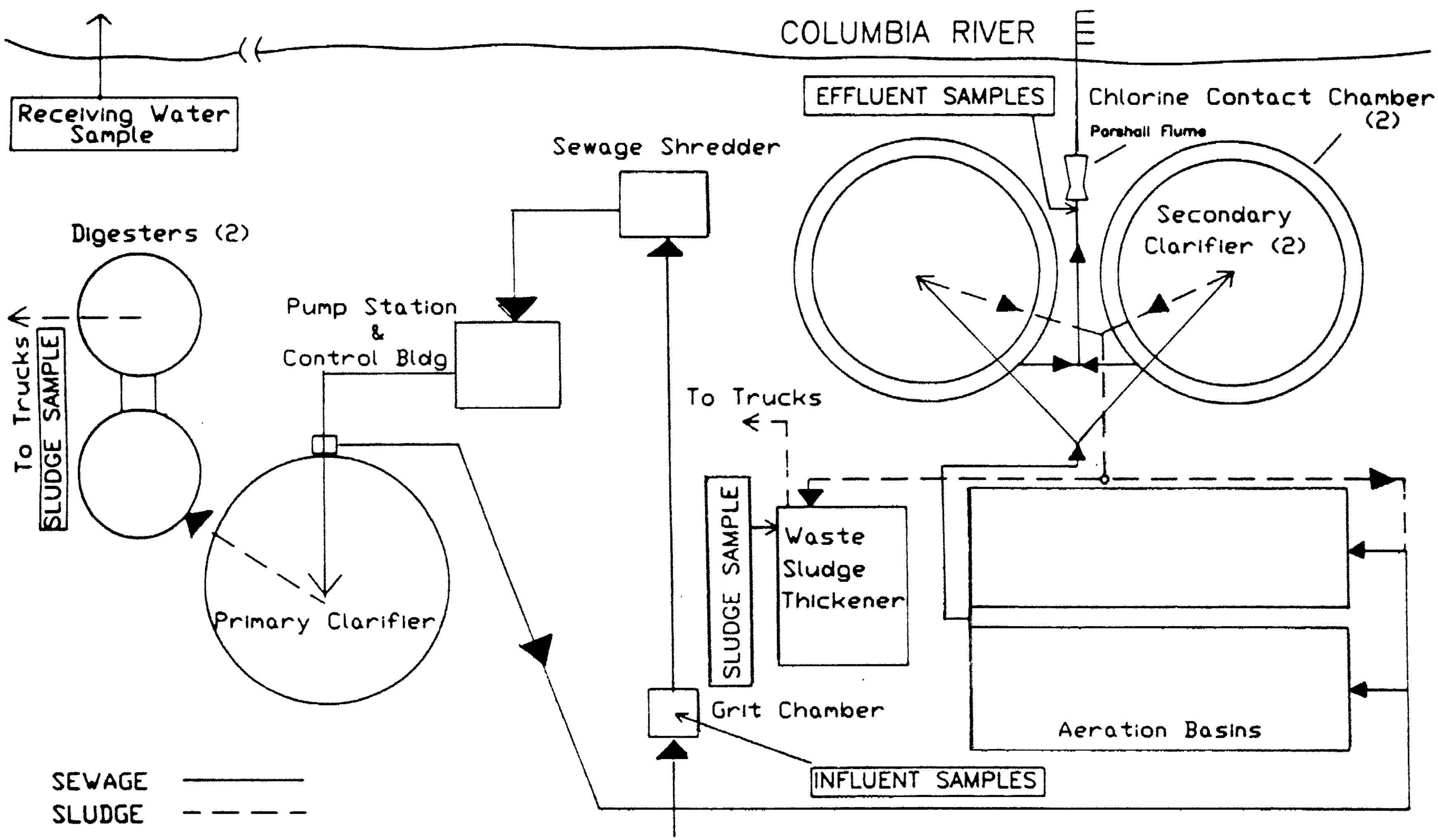


FIGURE 2 - WENATCHEE WTP SCHEMATIC - DECEMBER 1989

TABLES

Table 1 - Sampling times and parameters analyzed - Wenatchee - December 1989

Station:	Influent					Effluent							Blank	Digester sludge	Thickener sludge	Receiving water	EPA sample
Sampler:	Ecology	Wenatchee	Ecology	Ecology	Ecology	Ecology	Wenatchee	Ecology	Ecology	Ecology	Ecology	Wenatchee	Ecology	Ecology	Ecology	Ecology	Ecology
Type:	Composite	Composite	Grab	Grab	Grab	Composite	Composite	Grab	Grab	Grab	Grab	Grab		Grab	Grab	Grab	
Date:	12/13	12/13	12/12	12/12	12/13	12/13	12/13	12/12	12/12	12/13	12/13	12/13	12/11	12/12	12/12	12/12	
Parameter / Sample ID #:	508081	508080	508082	508083	508084	508086	508085	508087	508088	508089	508090	508096	508094	508092	508093	508091	508095
GENERAL CHEMISTRY																	
Turbidity (NTU)	X		X	X	X	X		X	X	X							
Conductivity (umhos/cm)	X		X	X	X	X		X	X	X							
Alkalinity (mg/L as $CaCO_3$)	X		X	X	X	X		X	X	X							
Hardness (mg/L as $CaCO_3$)	X		X	X	X	X		X	X	X						X	
Cyanide (ug/L)	X					X		X	X				X				
SOLIDS (mg/L)																	
TS	X					X											
TNVS	X					X											
TSS	X	X	X	X	X	X	X	X	X	X							X
TNVSS	X					X											
BOD_5 (mg/L)	X					X											X
BOD_5 inhibited (mg/L)	X					X											
COD (mg/L)	X	X	X	X	X	X	X	X	X	X							X
NUTRIENTS (mg/L)																	
NH_3-N	X		X	X	X	X		X	X	X							
NO_3+NO_2-N	X		X	X	X	X		X	X	X							
T-Phosphate	X		X	X	X	X		X	X	X							
NO_2-N	X			X	X	X			X	X							
Fecal Coliform (#/100mL)										X	X	X					
% Solids														X	X		
% Volatile solids														X	X		
Phenols (ug/L)	X		X	X		X		X	X				X				
PRIORITY POLLUTANTS																	
BNA's	X					X							X				
Pest/PCB	X					X							X				
VOA			X	X				X	X	X			X				
Metals	X					X							X	X	X		
BIOASSAYS																	
Trout						X(2)*											
Microtox						X(2)*											
Ceriodaphnia						X(2)*											
FIELD OBSERVATIONS																	
Temp (°C)	X		X	X	X	X		X	X	X							
pH (S.U.)	X		X	X	X	X		X	X	X							
Conductivity (umhos/cm)	X		X	X		X		X	X	X							
Chlorine (mg/L)			X	X		X		X	X	X							

* Two bioassays were conducted, one on chlorinated and one on dechlorinated effluent.

Table 2 - Analytical Methods and Laboratories used Wenatchee - December 1989.

Laboratory Analyses	Method used for Ecology analysis (Ecology, 1988)	Laboratory performing analysis
Turbidity	APHA, 1989: 2130B	Ecology
Conductivity	APHA, 1989: 2510B	Ecology
Alkalinity	APHA, 1989: 2320B	Ecology
Hardness	APHA, 1989: 2340C	Ecology
Cyanide	EPA, 1983: 335.2-1	Ecology
Total solids	APHA, 1989: 2540B	Ecology
Total nonvolatile solids	APHA, 1989: 2540E	Ecology
Total suspended solids	APHA, 1989: 2540D	Ecology
Total nonvolatile suspended solids	APHA, 1989: 2540E	Ecology
BOD_5	APHA, 1989: 5210B	Ecology
BOD_5-inhibited	APHA, 1989: 5210B	Ecology
COD	APHA, 1989: 5220D	Ecology
NH_3-N	EPA, 1983: 350.1	Ecology
NO_3+NO_2-N	EPA, 1983: 353.2	Ecology
T-Phosphate	EPA, 1983: 365.1	Ecology
NO_2-N	EPA, 1983: 353.2	Ecology
Fecal coliform	APHA, 1989: 9221C	Ecology
% Solids	APHA, 1989: 2540G	Ecology
% Volatile solids	APHA, 1989: 2540G	Ecology
Phenols	EPA, 1983: 420.1	Ecology
BNA's (water)	EPA, 1984: 625	Ecology
PCB/Pesticides (water)	EPA, 1984: 608	Ecology
Volatile organics (water)	EPA, 1984: 624	Weyerhaeuser Technical Center
Metals-priority pollutant (water)	Tetra Tech, 1986	Analytical Resources, Inc.
Metals-priority pollutant (solids)	Tetra Tech, 1986	Analytical Recources, Inc.
Salmonid - acute	Ecology, 1981	Ecology
Microtox - acute	Beckman	Ecology
Ceriodaphnia dubia - chronic/acute	EPA, 1989	Ecology

Table 3 - Flow Measurements - Wenatchee - December 1989.

Flowmeter	Date	Time	Totalizer Reading	24 hour flow
WTP	12/12	1055	572,513	
(Totalizer)	12/12	1605	573,345	3.2 MGD
	12/13	0938	575,615	
Ecology	12/12	1010		3.0 MGD
(Flo-Tote)	12/13	0950		

Table 4 - General Chemistry Results - Wenatchee - December 1989

Parameter	Station:	Influent					Effluent							Blank	Digester sludge	Thickener sludge	Receiving water	EPA sample
	Sampler:	Ecology	Wenatchee	Ecology	Ecology	Ecology	Ecology	Wenatchee	Ecology	Ecology	Ecology	Ecology	Wenatchee	Ecology	Ecology	Ecology	Ecology	Ecology
	Type:	Composite	Composite	Grab	Grab	Grab	Composite	Composite	Grab	Grab	Grab	Grab	Grab		Grab	Grab	Grab	
	Date:	12/13	12/13	12/12	12/12	12/13	12/13	12/13	12/12	12/12	12/13	12/13	12/13	12/11	12/12	12/12	12/12	
	Time:			1030	1400	0840			0940	1445	0945	1230		1530	0835	1100	1630	
	Sample ID #:	508081	508080	508082	508083	508084	508086	508085	508087	508088	508089	508090	508096	508094	508092	508093	508091	508095
GENERAL CHEMISTRY																		
Turbidity (NTU)		44		99	81	84	18		18	18	17						0.7	
Conductivity (umhos/cm)		716		662	626	839	588		561	586	565							
Alkalinity (mg/L as $CaCO_3$)		235		248	232	270	83.9		65.8	79.4	71.4							
Hardness (mg/L as $CaCO_3$)		105		100	113	103	111		108	102	111						47	
Cyanide (ug/L)		4					16		18	4				2 U				
SOLIDS (mg/L)																		
TS		649					442											
TNVS		260					220											
TSS		270	240	190	170	240	41	37	43	50	51							41
TNVSS		26					1 U											
BOD_5 (mg/L)		202					20											60
BOD_5 inhibited (mg/L)		160					17											
COD (mg/L)		1190	407	504	527	457	113	110	93.6	104	104							97.2
NUTRIENTS (mg/L)																		
NH_3-N		32.8		24.3	23.0	NS	7.11		2.74	5.77	5.42							12.9
NO_3+NO_2-N		0.12		0.20	0.17	NS	19.7		21.8	20.3	21.3							9.13
T-Phosphate		11.8		12.2	11.4	NS	10.1		9.18	9.38	10.7							
NO_2-N		0.02			0.01	0.04	0.44			0.45	0.40							
Fecal Coliform (#/100mL)											23	31	770					
% Solids															5.4	5.2		
% Volatile solids															3.4	4.3		
Phenol (ug/L)		31		20	31		2		2	2				2 U				
FIELD OBSERVATIONS																		
Temp (°C)		1.6		15.1	15.7	15.8	1.6		13.9	13.9	11.3							
pH (S.U.)		8.11		8.07	7.79	8.26	7.32		6.96	6.96	6.87							
Conductivity (umhos/cm)		280		539	586		270		454	541	210							
Chlorine (mg/L)							0.5 (tot)		<0.1/0.9	0.6/0.8	<0.1/1.0							

NS No Sample
U Indicates compound was analyzed for but not detected at the given detection limit.

Table 5 - Comparison of NPDES Permit Limits to Inspection Results - Wenatchee - December 1989.

Parameter	NPDES Permit Limits Monthly Average	NPDES Permit Limits Weekly Average	Ecology's Inspection Results (composite sample unless noted)
BOD_5			
mg/L	30	45	20
lb/D	1,350	2,025	500
% Removal	85		90
TSS			
mg/L	30	45	41
lb/D	1,290	1,935	1,025
% Removal	85		85
Fecal coliform (#/100 ml)	200	400	23 *
			31 *
Flow			
MGD	5.0		3.0
pH	Shall not be outside the range 6.0-9.0		7.0*
			7.0*
			6.9*

* Results from grab samples

Table 6 - Comparison of Split Samples - Wenatchee - December 1989.

Station	Sampler	Laboratory	TSS	BOD_5	COD	Fecal Coliform
Influent	Ecology	Ecology	270	202	1190	
		Wenatchee	259	190	480 *	
Influent	Wenatchee	Ecology	240		407	
		Wenatchee	159	170	470	
Effluent	Ecology	Ecology	41	20	113	23/31
		Wenatchee	81	25	105 *	
Effluent	Wenatchee	Ecology	37		110	770
		Wenatchee	72	72	115	46
EPA Performance evaluation samples		Ecology	41	60	97.2	
		Wenatchee	29,35		80	
		True Value	41.9	59.7	91.7	
		Acceptance Limits	(33.3-46.6)	(41.7-85.7)	(74.8-109)	

* Average of 2 results

Table 7 - Influent and Effluent Priority Pollutant Organics - Wenatchee - December 1989.

	Influent		Effluent			Blank	EPA Quality Criteria* Freshwater	
	Sample 1	Sample 2	Sample 1	Sample 2	Sample 3		Acute (ug/L)	Chronic (ug/L)
Volatile Organics (ug/L)								
Methylene Chloride	2 J	5 U	4 J	3 J	5 J	5 U	--	--
Acetone	1,000 DJ	200 DJ	10 UJ	10 UJ	7 UJ	21 BJ	--	--
Chloroform	3 J	6	5 U	2 J	1 J	5 U	28,900 **	1,240 **
1,1,1-Trichloroethane	3 J	4 J	5 U	5 U	5 U	5 U	--	--
Tetrachloroethene	3 J	3 J	5 U	5 U	5 U	5 U	5,280 **	840 **
Toluene	4 J	21	2 J	2 J	2 J	5 U	17,500 **	--
Ethylbenzene	7	12	5 U	5 U	5 U	5 U	32,000 **	--
total Xylenes	30	81	5 U	5 U	5 U	5 U	--	--
BNA's (ug/L)								
Phenol	31 U		0.8 J			LAC	10,200 **	2,560 **
1,4-Dichlorobenzene	2 J		2 U			LAC	1,120 **†	763 **†
4-Methylphenol	43		2 J			LAC	--	--
Diethyl phthalate	6 J		0.2 J			LAC	--	--
Butylbenzylpthalate	8 J		2 U			LAC	--	--
Benzyl Alcohol	REJ		REJ			LAC	--	--
Benzoic Acid	REJ		REJ			LAC	--	--
3-Nitroanaline	REJ		REJ			LAC	--	--
2,4-Dinitrophenol	REJ		REJ			LAC	--	--
Pentachlorophenol	REJ		REJ			LAC	55 **	3.2**
Pesticides (ug/L)								
alpha-BHC	0.018		0.010 U			LAC	100 **††	--
beta-BHC	0.036		0.010 U			LAC	100 **††	--
gamma-BHC (Lindane)	0.085		0.093			LAC	100 **††	--
alpha-Endosulfan	0.020		0.010 U			LAC	.22†††	.056†††
4,4'-DDE	0.019		0.012			LAC	1,050 **	--
beta-Endosulfan	0.043		0.010 U			LAC	.22†††	.056†††
4,4'-DDT	0.016		0.010			LAC	1.1	.001
Methoxychlor	0.020		0.010 U			LAC	--	.03

* EPA, 1986
** L.O.E.L. (Lowest observable effects level)
† (total Dichlorobenzenes)
†† (total BHC)
††† (total Endosulfan)
U Indicates compound was analyzed for but not detected at the given detection limit
D Indicates that the result is from a dilution
J Indicates an estimated value when result is less than specified detection limit.
B Indicates the analyte was found in the method blank as well as the sample. Indicates possible/probable blank contamination.
LAC There was an accident in the laboratory that either destroyed the sample or rendered it not suitable for analysis
REJ The data are unusable (compound may or may not be present).

Table 8 - Influent and Effluent Priority Pollutant Metals and Cyanide Detected - Wenatchee - December 1989.

	Influent	Effluent	EPA Quality Criteria* Freshwater+ Acute (ug/L)	Freshwater+ Chronic (ug/L)	Freshwater++ Acute (ug/L)	Freshwater++ Chronic (ug/L)
Metals (ug/L)						
Arsenic (III)	2	2	360	190	360	190
Copper	51	31 AC	19.6	12.9	8.7	6.2
Lead	28	7 C	93	3.6	31	1.2
Mercury	0.2	0.2 C	2.4	0.012	2.4	0.012
Silver	3 U	5 AC	4.9	0.12	1.1	0.12
Zinc	341	174 AC	350	47	172	47
Cyanide (ug/L)	4	16 C	22	5.2	22	5.2

* EPA, 1986

\+ Hardness dependant criteria based on 111 mg/L hardness as $CaCO_3$ in effluent composite.

++ Hardness dependant criteria based on 47 mg/L hardness as $CaCO_3$ in Columbia River receiving water.

U Indicates compound was analyzed for but not detected at the given detection limit.

A Indicates acute water quality criteria is exceeded (may be based on effluent or receiving water hardness).

C Indicates chronic water quality criteria is exceeded (may be based on effluent or receiving water hardness).

Table 9 - Sludge Analysis and Disposal Criteria - Wenatchee - December 1989.

	Sludge Analysis (mg/Kg dry weight)		EPA proposed maximum concentration (mg/Kg dry weight)		Data from previous inspection***		
	Digester	Thickner	L.A.*	S.D.**	Mean (mg/Kg dry weight)	Range (mg/Kg dry weight)	Number of samples
TOTAL METALS							
Antimony	6.0	2.8					
Arsenic	9.6 J	3.5 J	36	36			
Beryllium	1.8 U	2.1 U					
Cadmium	7.0	6.5	380	385	7.6	0.1-25	34
Chromium	49.6	34.4	3100		61.8	15-300	34
Copper	552	525	3300	3300.3	398	75-1700	34
Lead	426	305	1600	1622	207	34-600	34
Mercury	5.55	2.65	30	17			
Nickel	18 U	21 U	990	988	25.5	0.1-62	29
Selenium	1.8 U	2.1 U	64				
Silver	72.6	95.4					
Thallium	1.8 U	2.1 U					
Zinc	1820	1170	8600		1200	165-3370	33
DDT/DDE/DDD (total)	0.10 +		0.11	0.95			

* EPA, 1989 (Standards for the Disposal of Sewage Sludge; Proposed Rule for Non-Agricultural Land Application).

** EPA, 1989 (Standards for the Disposal of Sewage Sludge; Proposed Rule for Surface Disposal Sites).

*** Summary of digested sludge data from activated sludge plants from previous inspections (Hallinan, 1988).

\+ Calculated from influent and effluent concentrations (see text)

U Indicates compound was analyzed for but not detected at the given detection limit.

J Indicates an estimated value when result is less than specified detection limit.

Table 10 - Bioassay Results - Wenatchee - December 1989

EFFLUENT - Microtox:

	EC_{50} (%)
Effluent (as received)	>100
Effluent (chlorine residual neutralized)	>100

96-hour Rainbow trout bioassay (100% concentration)

	# of live organisms		%
	initial	final	Mortality
Effluent (as received)	30	28	7
Effluent (Cl_2 residual neutralized)	30	24	20
Control	30	30	0
Thiosulfate Control	30	30	0

Ceriodaphnia dubia - 7 day survival and reproduction

	Survival (# of live adults after 7 days)		Reproduction (average # of young/adult)	
Effluent concentration	effluent as rec'd	effluent Cl_2 neutralized	effluent as rec'd	effluent Cl_2 neutralized
Control	10.0	9.0	15.4	4.4
6.25%	9.0	10.0	27.7	18.5
12.5%	10.0	10.0	26.1	14.5
25%	10.0	10.0	1.7	0.6
50%	0.0	0.0	0.0	0.0
100%	0.0	0.0	0.0	0.0
NOEC*	25%	25%	12.5%	12.5%
LOEC**	50%	50%	25%	25%

CENTRIFUGE SOLIDS - Microtox

	EC_{50} (%)
Centrifuge solids extract (30 grams extracted with a total of 30 ml. of Microtox diluent)	2.0

Daphnia magna:

	Survival (5 organisms per replicate) Replicate number							%
	1	2	3	4	5	6	7	Survival
Control	5	5	5	5	5	5	5	100
Centrifuge solids elutriate+	0	0	0	0	0	0	0	0

* No observable effects concentration
** Lowest observable effects concentration
+ Tested following a modification of the method of Nebeker, et al. (1984)

Table 11 - Comparison of Centrifuge Solids to Effluent loading - Wenatchee - December 1989

POLLUTANT	Centrifuge Solids* (loading)	Effluent** (loading)
VOA	(g/day)	(g/day)
Methylene Chloride	0.2	40 J
Acetone	85.9	
Carbon Disulfide	0.01 J	
Chloroform	0.115	
2-Butanone	15	
Tetrachloroethene	0.01 J	
Toluene	0.03	23 J
BNA's	(g/day)	(g/day)
Phenol		9 J
4-Methylphenol		23 J
Isophorone	0.21 J	
Diethyl Phthalate		2 J
Bis(2-Ethylhexyl)phthalate	16	
Di-n-Octyl Phthalate	0.65 J	
Pesticide/PCB's	(mg/day)	(mg/day)
alpha-BHC	25	
gamma-BHC (Lindane)	42	1060
4,4'-DDE	70	140
4,4'-DDD	27	
4,4'-DDT	61	110
Endosulfan Sulfate	74	
Metals	(g/day)	(g/day)
Antimony	1.7	
Arsenic		23
Cadmium	1.4	
Chromium	16.1	
Copper	165	352
Lead	162	79
Mercury	1.3	2
Nickel	8.8	
Silver	48	57
Zinc	447	1,976

* loading based on 41 mg/L TSS in effluent and 3.0 MGD. (does not include dissolved phase).
** loading based on 3.0 MGD. (whole effluent)
J Indicates an estimated value when result is less than specified detection limit.

APPENDICES

APPENDIX A

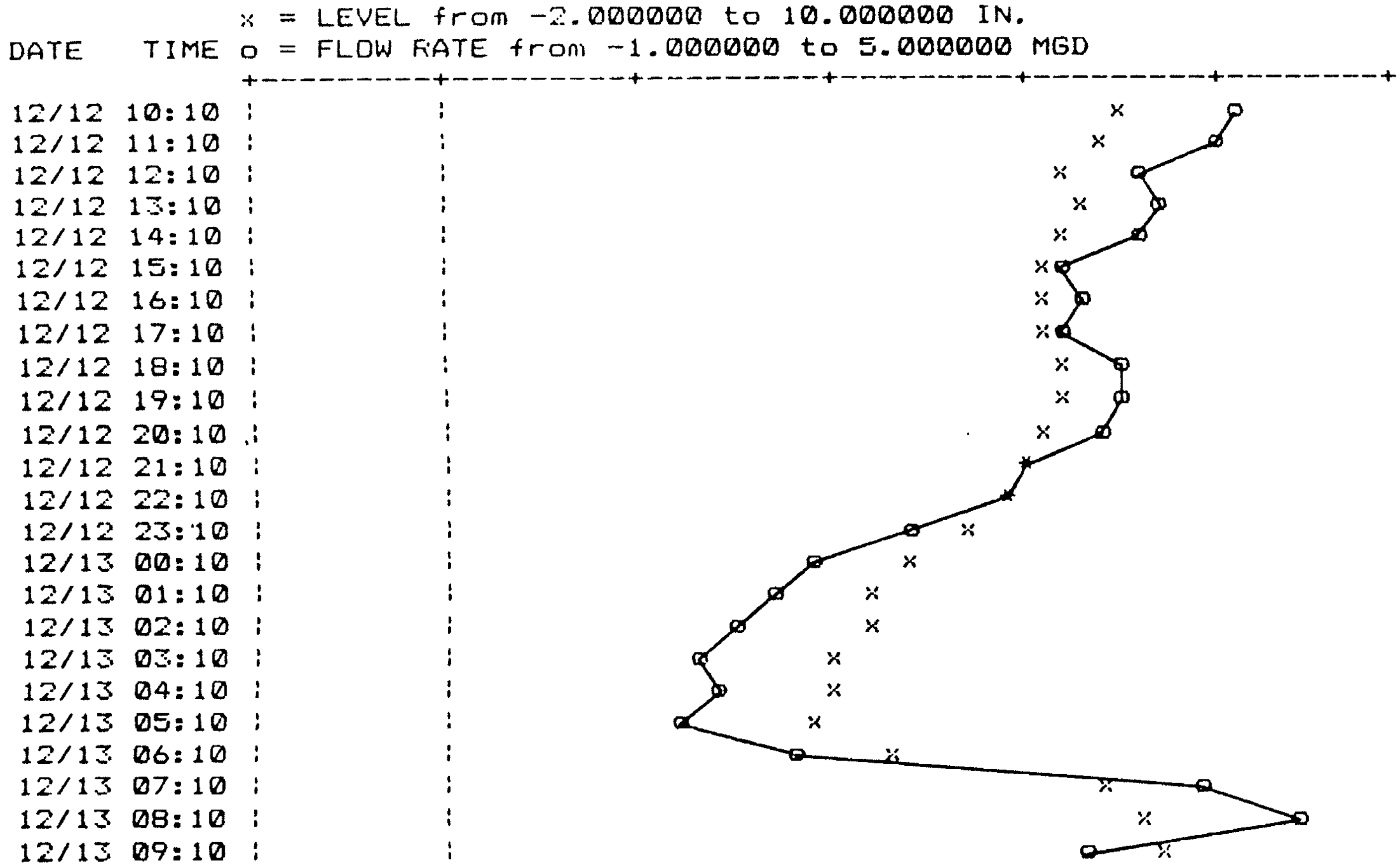
Priority Pollutant Sampling Equipment Cleaning Procedures

1. Wash with laboratory detergent
2. Rinse several times with tap water
3. Rinse with 10% HNO_3
4. Rinse three times with distilled/deionized water
5. Rinse with high purity methylene chloride
6. Rinse with high purity acetone
7. Allow to dry and seal with aluminum foil

Marsh - McBirney FLO-TOTE system Version 0.06

Instrument serial number A70500

Data file modification # 0
Report from: 12/12/89 10:10:00
Report to : 12/13/89 09:50:00
Site Identification:
WENATCHEE___________
CLASS_II____________
INSPECTION_________.



Appendix B - Instantaneous Flow measurements (Parshall Flume) - Wenatchee - December 1989

Date	Time	Parshall Flume Level (inches)	Parshall Flume Flow (MGD)
12/12	09:02	6	2.6
12/12	09:03	7.5	3.7
12/12	09:10	9	4.9
12/12	12:14	8.75	4.7
12/13	09:16	8.88	4.8
12/13	09:25	8.25	4.3
12/13	09:30	7.75	3.9
12/13	09:49	9	4.9

APPENDIX C

WASHINGTON STATE DEPARTMENT OF ECOLOGY
ENVIRONMENTAL INVESTIGATIONS AND LABORATORY SERVICES
QUALITY ASSURANCE SECTION

December 29, 1989

TO: Jeanne Andreasson

THROUGH: Cliff Kirchmer

FROM: Dale Van Donsel

SUBJECT: Wenatchee Water Pollution Control Plant

Evaluation of fecal coliform procedures indicated that the laboratory generally adhered to proper methodology, and that results could be relied upon for permit requirements. However, several items were noted where improvements could be made to produce more reliable data:

Water bath temperature control. Proper temperature control is one of the most important factors in the fecal coliform test. The temperature chosen determines which particular group of organisms will grow, and a tolerance of only ±0.2°C is allowed for water bath temperature control, and a thermometer graduated in one-degree intervals can not be read closely enough. The laboratory should acquire a thermometer graduated in 0.1 or 0.2 degree intervals. Special thermometers designed for use in the fecal coliform test are available. One that is recommended is the ERTCO Model 713. This is available from VWR Scientific in Seattle as their catalog number 61069-940, for $45.00. A daily record of water bath temperatures should also be maintained.

Sample bottles. It is recommended that the sodium thiosulfate solution be added to sample bottles before sterilization rather than at the time of sample collection. There is less chance of its omission if sampling is done by alternate personnel. In addition, the thiosulfate solution would not have to be kept sterile.

Membrane filters. The 0.45μ membranes used for the fecal coliform test are acceptable. However, when new membranes are purchased, it is recommended that the laboratory obtain a type of filter developed for testing chlorinated effluents. The Millipore Corporation type HC filter (or equivalent if available) helps prevent heat damage to chlorine-injured coliforms during the critical first few hours at the very high temperature of the fecal coliform test. Because they have a larger pore size, they are less subject to clogging. Despite quantity discounts, it is good practice to order no more than a year's supply at a time.

Colony counting. Regardless of the volume filtered, fecal coliform colony counts should be calculated and recorded on the laboratory report per 100 mL.

Laboratory water. At the present time there is no information available about the suitability of the laboratory distilled water supply. As a minimum, it is recommended that the biological suitability test be done annually and after major alterations are done to the system. This test is done by Dr. Robert E. Pacha of Central Washington University at Ellensburg. This test is a very specialized and complicated one, and is well worth its current cost of $65.00. (The laboratory has been supplied with information regarding this service).

DJV:djv
cc:Norm Glenn

WASHINGTON STATE DEPARTMENT OF ECOLOGY
ENVIRONMENTAL INVESTIGATIONS AND LABORATORY SERVICES
QUALITY ASSURANCE SECTION

December 27, 1989

TO: Jeanne Andreasson

THROUGH: Cliff J. Kirchmer CJK

FROM: Lee C. Fearon LCF

SUBJECT: Wenatchee Water Treatment Plant Inspection

Evaluation of General Chemistry Tests

The evaluation in terms of comments and suggestions will be divided into two sections: Permit Parameter Tests and Non-Permit Parameter Tests. The purpose of QA Section participation was to offer observations upon the Wenatchee WTP laboratory operation in general and suggestions that if implemented would result in improvement of the operation.

PERMIT PARAMETER TESTS

BOD

The determination of oxygen in this test procedure is performed with a Yellow Springs Inc. Model 58 DO Meter in accordance with EPA approved methods.

The primary deficiency is that only minimal quality assurance is performed. The most critical QA element is that of the glucose/glutamic acid check as described in APHA (1989) Method 5210B, paragraph 4c. for the purpose of evaluation of dilution water quality, seed effectiveness, and analytical technique. The second element of QA, one duplicate per set should be continued. Refrigeration of the phosphate buffer nutrient solution would aid in its preservation.

Technically, the glucose/glutamic acid standard should be run with every BOD set. As a practical matter, since only three sets are run weekly, this standard should be set up once a week as a minimum.

An additional suggestion: That capability for doing the azide modification of the Winkler Method be developed and used as a cross check against the DO Method on the glucose/glutamic acid standard on a monthly basis.

TSS

Total suspended solids are run with absolutely no quality assurance. One duplicate should be run with every set. As practical minimum an EPA or commercial Control Suspension Standard of known concentration should be run at least once a week.

There was obvious difficulty in regulating the 103 - 105° C temperature range of the drying oven, which was in a hood. The hood contact with outside air and air currents through the hood was probably the main factor involved.

It is recommended that since there are no noxious fumes or vapors from the TSS samples that the drying oven be placed on either the control bench or the bench against the wall opposite the window.

pH

This test was being run in accordance with approved EPA procedures. It would be advisable for good QA procedure, however, if an EPA sample of known pH were checked at least on a weekly basis for verification of pH meter response.

NON-PERMIT PARAMETER TESTS

Ammonia Nitrogen

This test is being performed according to APHA (1989) 4500-NH_3 C Nesslerization Method (Direct and Following Distillation). The dilution water for blanks, standards, and dilutions is not ammonia free, since it is not prepared by either ion exchange or distillation from dilute (0.1 ml/L) of sulfuric acid.

No QA is performed. A method blank and check standard (prepared independently from the calibration standard) should be analyzed in each set set of samples. The second level of QA would consist of one sample duplicate per set and the highest QA level would involve one sample spike per set. The lowest or first QA level is required.

Nitrate Nitrogen

The APHA (1989) 4500-NO_3 E. Cadmium Reduction Method is being used and followed. No QA is applied. Minimal QA would involve one method blank and one check standard and one method blank per set. It is recommended that one duplicate and one spike be run per sample set, if possible.

COD

Tests were run according to APHA (1989) 5220D Closed Reflux Colorimetric Method without any quality assurance procedures.

The lowest level of QA, which is required, involves running one method blank and one potassium acid phthalate standard for each sample set. Again, one duplicate, and lastly one spike should be run and analyzed with each sample set, if possible.

GENERAL

There is no record keeping done on: samples taken (when, where, how much, by whom); equipment calibration and maintenance, eg. balance is not calibrated; control charts (difficult when only QA is duplicates on BOD).

Organics solvents were observed to be stored with inorganic acids.

According to Chapter Eight of the NPDES Compliance Inspection Manual, laboratory QA is required. In view of this, all phases of QA including record keeping can and should be enforced for the chemical tests required of the permittee.

cc: Norm Glenn

Appendix D - Results of priority pollutant scan - Wenatchee - December 1989

Station:	Influent	Influent	Effluent	Effluent	Effluent	Blank
Type:	Grab-1	Grab-2	Grab-1	Grab-2	Grab-3	Grab
Date:	12/12	12/12	12/12	12/12	12/13	12/11
Time:	AM	PM	AM	PM	AM	PM
Sample ID #:	508082	508083	508087	508088	508089	508094
VOA Compounds	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)

Chloromethane	10 U	10 U	10 U	10 U	10 U	10 U
Bromomethane	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl Chloride	5 U	5 U	5 U	5 U	5 U	5 U
Chloroethane	10 U	10 U	10 U	10 U	10 U	10 U
Methylene Chloride	2 J	5 U	4 J	3 J	5 U	5 U
Acetone	1000 DJ	200 DJ	10 UJ	10 UJ	7 UJ	21 BJ
Carbon Disulfide	5 U	5 U	5 U	5 U	5 U	5 U
1,1-Dichloroethene	5 U	5 U	5 U	5 U	5 U	5 U
1,1-Dichloroethane	5 U	5 U	5 U	5 U	5 U	5 U
1,2-Dichloroethene (total)	5 U	5 U	5 U	5 U	5 U	5 U
Chloroform	3 J	6	5 U	2 J	1 J	5 U
1,2-Dichloroethane	5 U	5 U	5 U	5 U	5 U	5 U
2-Butanone	10 U	10 U	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	3 J	4 J	5 U	5 U	5 U	5 U
Carbon Tetrachloride	5 U	5 U	5 U	5 U	5 U	5 U
Vinyl Acetate	10 U	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane	5 U	5 U	5 U	5 U	5 U	5 U
1,2-Dichloropropane	5 U	5 U	5 U	5 U	5 U	5 U
cis-1,3-Dichloropropene	5 U	5 U	5 U	5 U	5 U	5 U
Trichloroethene	5 U	5 U	5 U	5 U	5 U	5 U
Dibromochloromethane	5 U	5 U	5 U	5 U	5 U	5 U
1,1,2-Trichloroethane	5 U	5 U	5 U	5 U	5 U	5 U
Benzene	5 U	5 U	5 U	5 U	5 U	5 U
trans-1,3-Dichloropropene	5 U	5 U	5 U	5 U	5 U	5 U
Bromoform	5 U	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	3 J	3 J	5 U	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane	5 U	5 U	5 U	5 U	5 U	5 U
Toluene	4 J	21	2 J	2 J	2 J	5 U
Chlorobenzene	5 U	5 U	5 U	5 U	5 U	5 U
Ethylbenzene	7	12	5 U	5 U	5 U	5 U
Styrene	5 U	5 U	5 U	5 U	5 U	5 U
Total Xylenes	30	81	5 U	5 U	5 U	5 U

Appendix D - Continued - Wenatchee - December 1989

Station:	Influent		Effluent		Blank
Type:	Composite		Composite		Grab
Date:	12/13		12/13		12/11
Sample ID #:	508081		508086		508094
BNA Compounds	(ug/L)		(ug/L)		(ug/L)
Phenol	31	U	0.8	J	LAC
Bis(2-Chloroethyl)Ether	31	U	2	U	LAC
2-Chlorophenol	31	U	2	U	LAC
1,3-Dichlorobenzene	31	U	2	U	LAC
1,4-Dichlorobenzene	2	J	2	U	LAC
Benzyl Alcohol		REJ		REJ	LAC
1,2-Dichlorobenzene	31	U	2	U	LAC
2-Methylphenol	31	U	2	U	LAC
Bis(2-chloroisopropyl)ether	31	U	2	U	LAC
4-Methylphenol	43		2	J	LAC
N-Nitroso-Di-n-Propylamine	31	U	2	U	LAC
Hexachloroethane	31	U	2	U	LAC
Nitrobenzene	31	U	2	U	LAC
Isophorone	31	U	2	U	LAC
2-Nitrophenol	31	U	2	U	LAC
2,4-Dimethylphenol	31	U	2	U	LAC
Benzoic Acid		REJ		REJ	LAC
Bis(2-Chloroethoxy)Methane	31	U	2	U	LAC
2,4-Dichlorophenol	31	U	2	U	LAC
1,2,4-Trichlorobenzene	31	U	2	U	LAC
Naphthalene	31	U	2	U	LAC
4-Chloroaniline	31	UJ	2	UJ	LAC
Hexachlorobutadiene	31	U	2	U	LAC
4-Chloro-3-Methylphenol	31	U	2	U	LAC
2-Methylnaphthalene	31	U	2	U	LAC
Hexachlorocyclopentadiene	62	U	4	U	LAC
2,4,6-Trichlorophenol	31	U	2	U	LAC
2,4,5-Trichlorophenol	150	U	11	U	LAC
2-Chloronaphthalene	31	U	2	U	LAC
2-Nitroaniline	150	U	11	U	LAC
Dimethyl Phthalate	31	U	2	U	LAC
Acenaphthylene	31	U	2	U	LAC
3-Nitroaniline		REJ		REJ	LAC
Acenaphthene	31	U	2	U	LAC
2,4-Dinitrophenol		REJ		REJ	LAC

Appendix D - Continued - Wenatchee - December 1989

Station:	Influent		Effluent		Blank
Type:	Composite		Composite		Grab
Date:	12/13		12/13		12/11
Sample ID #:	508081		508086		508094
BNA Compounds	(ug/L)		(ug/L)		(ug/L)
4-Nitrophenol	150	U	11	U	LAC
Dibenzofuran	31	U	2	U	LAC
2,4-Dinitrotoluene	31	U	2	U	LAC
2,6-Dinitrotoluene	31	U	2	U	LAC
Diethyl Phthalate	6	J	0.2	J	LAC
4-Chlorophenyl-Phenylether	31	U	2	U	LAC
Fluorene	31	U	2	U	LAC
4-Nitroaniline	150	UJ	11	UJ	LAC
4,6-Dinitro-2-Methylphenol	150	U	11	U	LAC
N-Nitrosodiphenylamine	31	U	2	U	LAC
4-Bromophenyl-Phenylether	31	U	2	U	LAC
Hexachlorobenzene	31	U	2	U	LAC
Pentachlorophenol		REJ		REJ	LAC
Phenanthrene	31	U	2	U	LAC
Anthracene	31	U	2	U	LAC
Di-n-Butyl Phthalate	31	U	2	U	LAC
Fluoranthene	31	U	2	U	LAC
Pyrene	31	U	2	U	LAC
Butylbenzylpthalate	8	J	2	U	LAC
3,3'-Dichlorobenzidine	31	U	2	U	LAC
Benzo(a)Anthracene	31	U	2	U	LAC
Chrysene	31	U	2	U	LAC
Bis(2-Ethylhexyl)phthalate	36	U	12	U	LAC
Di-n-Octyl Phthalate	31	U	2	U	LAC
Benzo(b)Fluoranthene	31	U	2	U	LAC
Benzo(k)Fluoranthene	31	U	2	U	LAC
Benzo(a)Pyrene	31	U	2	U	LAC
Indeno(1,2,3-cd)Pyrene	31	U	2	U	LAC
Dibenzo(a,h)Anthracene	31	U	2	U	LAC
Benzo(g,h,i)Perylene	31	U	2	U	LAC

Appendix D - Continued - Wenatchee - December 1989

Station:	Influent		Effluent		Blank
Type:	Composite		Composite		Grab
Date:	12/13		12/13		12/11
Sample ID #:	508081		508086		508094
Pesticide/PCB Compounds	(ug/L)		(ug/L)		(ug/L)
alpha-BHC	0.018		0.010	U	LAC
beta-BHC	0.036		0.010	U	LAC
delta-BHC	0.012	U	0.010	U	LAC
gamma-BHC (Lindane)	0.085		0.093		LAC
Heptachlor	0.012	U	0.010	U	LAC
Aldrin	0.012	U	0.010	U	LAC
Heptachlor Epoxide	0.012	U	0.010	U	LAC
alpha-Endosulfan	0.020		0.010	U	LAC
Dieldrin	0.012	U	0.010	U	LAC
4,4'-DDE	0.019		0.012		LAC
Endrin	0.012	U	0.010	U	LAC
beta-Endosulfan	0.043		0.010	U	LAC
4,4'-DDD	0.012	U	0.010	U	LAC
Endosulfan Sulfate	0.012	U	0.010	U	LAC
4,4'-DDT	0.016		0.010		LAC
Methoxychlor	0.020		0.010	U	LAC
Endrin aldehyde	0.012	U	0.010	U	LAC
Chlordane	0.012	U	0.010	U	LAC
Toxaphene	0.36	U	0.27	U	LAC
Aroclor-1016	0.12	U	0.090	U	LAC
Aroclor-1221	0.12	U	0.090	U	LAC
Aroclor-1232	0.12	U	0.090	U	LAC
Aroclor-1242	0.12	U	0.090	U	LAC
Aroclor-1248	0.12	U	0.090	U	LAC
Aroclor-1254	0.12	U	0.090	U	LAC
Aroclor-1260	0.12	U	0.090	U	LAC

Appendix D - Continued - Wenatchee - December 1989

Station:	Influent		Effluent		Blank		Sludge-D		Sludge-T	
Type:	Composite		Composite		Grab		Grab		Grab	
Date:	12/13		12/13		12/11		12/12		12/12	
Sample ID #:	508081		508086		508094		508092		508096	
Metals	(ug/L)		(ug/L)		(ug/L)		(mg/Kg-dry)		(mg/Kg-dry)	

Antimony	1	U	1	U	1	U	6.0		2.8	
Arsenic	2		2		1	U	9.6	J	3.5	J
Beryllium	1	U	1	U	1	U	1.8	U	2.1	U
Cadmium	2	U	2	U	2	U	7.0		6.5	
Chromium	5	U	5	U	5	U	49.6		34.4	
Copper	51		31		2	U	552		525	
Lead	28		7		1	U	426		305	
Mercury	0.2		0.2		0.1	U	5.55		2.65	
Nickel	10	U	10	U	10	U	18	U	21	U
Selenium	1	U	1	U	1	U	1.8	U	2.1	U
Silver	3	U	5		3	U	72.6		95.4	
Thallium	5	U	5	U	1	U	1.8	U	2.1	U
Zinc	341		174		4	U	1820		1170	

U indicates compound was analyzed for but not detected at the given detection limit

J indicates an estimated value when result is less than specified detection limit

B this flag is used when the analyte is found in the method blank as well as the sample. Indicates possible/probable blank contamination

D indicates that the result is from a dilution

LAC There was an accident in the laboratory that either destroyed the sample or rendered it not suitable for analysis

REJ The data are unusable (compound may or may not be present).

Appendix E - Results of priority pollutant scan - Centrifuge - Wenatchee December 1989

Station:	CEF-SLD		CEF-SLD		RAS		RAS		BLANK	
Type:			corrected				corrected			
Date:	12/13		to dry		12/13		to dry		12/13	
Time:			weight				weight			
Sample ID #:	508400				508402				508401	
VOA Compounds	(ug/Kg wet)		(ug/Kg dry)		(ug/L)		(ug/Kg dry)		(ug/L)	

Chloromethane	10	U	77	U	10	U	3448	U	10	U
Bromomethane	10	U	77	U	10	U	3448	U	10	U
Vinyl Chloride	10	U	77	U	5	U	1724	U	5	U
Chloroethane	10	U	77	U	10	U	3448	U	10	U
Methylene Chloride	52		400		5	U	1724	U	2	J
Acetone	24000		184615		63	J	21724	J	5	UJ
Carbon Disulfide	4	J	31	J	5	U	1724	U	5	U
1,1-Dichloroethene	5	U	38	U	5	U	1724	U	5	U
1,1-Dichloroethane	5	U	38	U	5	U	1724	U	5	U
Chloroform	32		246		5	U	1724	U	5	U
1,2-Dichloroethane	5	U	38	U	5	U	1724	U	5	U
2-Butanone	4200		32308		10	U	3448	U	10	U
1,1,1-Trichloroethane	5	U	38	U	5	U	1724	U	5	U
Carbon Tetrachloride	5	U	38	U	5	U	1724	U	5	U
Vinyl Acetate	10	U	77	U	10	U	3448	U	10	U
Bromodichloromethane	5	U	38	U	5	U	1724	U	5	U
1,2-Dichloropropane	5	U	38	U	5	U	1724	U	5	U
trans-1,3-Dichloropropene	5	U	38	U	5	U	1724	U	5	U
Trichloroethene	5	U	38	U	5	U	1724	U	5	U
Dibromochloromethane	5	U	38	U	5	U	1724	U	5	U
1,1,2-Trichloroethane	5	U	38	U	5	U	1724	U	5	U
Benzene	5	U	38	U	5	U	1724	U	5	U
cis-1,3-Dichloropropene	5	U	38	U	5	U	1724	U	5	U
Bromoform	5	U	38	U	5	U	1724	U	5	U
4-Methyl-2-Pentanone	10	U	77	U	10	U	3448	U	10	U
2-Hexanone	10	U	77	U	10	U	3448	U	10	U
Tetrachloroethene	2	J	15	J	5	U	1724	U	5	U
1,1,2,2-Tetrachloroethane	5	U	38	U	5	U	1724	U	5	U
Toluene	7		54		5	U	1724	U	5	U
Chlorobenzene	5	U	38	U	5	U	1724	U	5	U
Ethylbenzene	5	U	38	U	5	U	1724	U	5	U
Styrene	5	U	38	U	5	U	1724	U	5	U
Total Xylenes	5	U	38	U	5	U	1724	U	5	U
1,2-Dichloroethene (total)	5	U	38	U	5	U	1724	U	5	U

Station:	CEF-SLD	CEF-SLD
Type:		corrected
Date:	12/13	to dry
Time:		weight
Sample ID #:	508400	
Ethanol	29 J	223 J
Oxirane, 2,2-dimethyl-	13 J	100 J
Butanal, 3-methyl-	66 J	508 J
Butanal, 2-methyl-	23 J	177 J
2-Pentanone	11 J	85 J
1-Butanol, 3-methyl-	45 J	346 J
Octane, 2,5,6-trimethyl-	54 J	415 J
Undecane, 5-methyl-	15 J	115 J

Station:	CEF-SLD	RAS	RAS	BLANK
Type:			corrected	
Date:	12/13	12/13	to dry	12/13
Sample ID #:	508400	508402	weight	508401
BNA Compounds	(ug/Kg dry)	(ug/L)	(ug/Kg dry)	(ug/L)

Phenol	6700 U	72 U	24828 U	2 U
Bis(2-Chloroethyl)Ether	6700 U	72 U	24828 U	2 U
2-Chlorophenol	6700 U	72 U	24828 U	2 U
1,3-Dichlorobenzene	6700 U	72 U	24828 U	2 U
1,4-Dichlorobenzene	6700 U	72 U	24828 U	2 U
Benzyl Alcohol	REJ	REJ	REJ	REJ
1,2-Dichlorobenzene	6700 U	72 U	24828 U	2 U
2-Methylphenol	6700 U	72 U	24828 U	2 U
Bis(2-chloroisopropyl)ether	6700 U	72 U	24828 U	2 U
4-Methylphenol	6700 U	72 U	24828 U	2 U
N-Nitroso-Di-n-Propylamine	6700 U	72 U	24828 U	2 U
Hexachloroethane	6700 U	72 U	24828 U	2 U
Nitrobenzene	6700 U	72 U	24828 U	2 U
Isophorone	450 J	72 U	24828 U	2 U
2-Nitrophenol	6700 U	72 U	24828 U	2 U
2,4-Dimethylphenol	6700 U	72 U	24828 U	2 U
Benzoic Acid	33000 U	REJ	REJ	REJ
Bis(2-Chloroethoxy)Methane	6700 U	72 U	24828 U	2 U
2,4-Dichlorophenol	6700 U	72 U	24828 U	2 U
1,2,4-Trichlorobenzene	6700 U	72 U	24828 U	2 U
Naphthalene	6700 U	72 U	24828 U	0.2 J
4-Chloroaniline	6700 U	72 U	24828 U	2 U

Station:	CEF-SLD		RAS		RAS		BLANK	
Type:					corrected			
Date:	12/13		12/13		to dry		12/13	
Sample ID #:	508400		508402		weight		508401	
BNA Compounds	(ug/Kg dry)		(ug/L)		(ug/Kg dry)		(ug/L)	
Hexachlorobutadiene	6700	U	72	U	24828	U	2	U
4-Chloro-3-Methylphenol	6700	U	72	U	24828	U	2	U
2-Methylnaphthalene	6700	U	72	U	24828	U	2	U
Hexachlorocyclopentadiene	13000	U	140	U	48276	U	4	U
2,4,6-Trichlorophenol	6700	U	72	U	24828	U	2	U
2,4,5-Trichlorophenol	33000	U	360	U	124138	U	10	U
2-Chloronaphthalene	6700	U	72	U	24828	U	2	U
2-Nitroaniline	33000	U	360	U	124138	U	10	U
Dimethyl Phthalate	6700	U	72	U	24828	U	2	U
Acenaphthylene	6700	U	72	U	24828	U	2	U
3-Nitroaniline		REJ		REJ		REJ		REJ
Acenaphthene	6700	U	72	U	24828	U	2	U
2,4-Dinitrophenol		REJ		REJ		REJ		REJ
4-Nitrophenol	33000	U	360	U	124138	U	10	U
Dibenzofuran	6700	U	72	U	24828	U	2	U
2,4-Dinitrotoluene	6700	U	72	U	24828	U	2	U
2,6-Dinitrotoluene	6700	U	72	U	24828	U	2	U
Diethyl Phthalate	6700	U	72	U	24828	U	0.6	J
4-Chlorophenyl-Phenylether	6700	U	72	U	24828	U	2	U
Fluorene	6700	U	72	U	24828	U	2	U
4-Nitroaniline	REJ	U	360	U	124138	U	10	U
4,6-Dinitro-2-Methylphenol	33000	U	360	U	124138	U	10	U
N-Nitrosodiphenylamine	6700	U	14	U	4828	U	2	U
4-Bromophenyl-Phenylether	6700	U	72	U	24828	U	2	U
Hexachlorobenzene	6700	U	72	U	24828	U	2	U
Pentachlorophenol		REJ		REJ		REJ		REJ
Phenanthrene	6700	U	72	U	24828	U	2	U
Anthracene	6700	U	72	U	24828	U	2	U
Di-n-Butyl Phthalate	6700	U	72	U	24828	U	2	U
Fluoranthene	6700	U	72	U	24828	U	2	U
Pyrene	6700	U	72	U	24828	U	2	U
Butylbenzylpthalate	6700	U	72	U	24828	U	2	U
3,3'-Dichlorobenzidine	6700	U	72	U	24828	U	2	U
Benzo(a)Anthracene	6700	U	72	U	24828	U	2	U
Chrysene	6700	U	72	U	24828	U	2	U
Bis(2-Ethylhexyl)phthalate	35000		170	U	58621	U	10	U
Di-n-Octyl Phthalate	1400	J	72	U	24828	U	2	U
Benzo(b)Fluoranthene	6700	U	72	U	24828	U	2	U

Station:	CEF-SLD		RAS		RAS		BLANK	
Type:					corrected			
Date:	12/13		12/13		to dry		12/13	
Sample ID #:	508400		508402		weight		508401	
BNA Compounds	(ug/Kg dry)		(ug/L)		(ug/Kg dry)		(ug/L)	
Benzo(k)Fluoranthene	6700	U	72	U	24828	U	2	U
Benzo(a)Pyrene	6700	U	72	U	24828	U	2	U
Indeno(1,2,3-cd)Pyrene	6700	U	72	U	24828	U	2	U
Dibenzo(a,h)Anthracene	6700	U	72	U	24828	U	2	U
Benzo(g,h,i)Perylene	6700	U	72	U	24828	U	2	U
Pesticide/PCB Compounds	(ug/Kg dry)		(ug/L)		(ug/Kg dry)		(ug/L)	
alpha-BHC	53		0.013		4		0.008	U
beta-BHC	26	U	0.035		12		0.008	U
delta-BHC	26	U	0.072	U	25	U	0.008	U
gamma-BHC (Lindane)	90		0.32		110		0.008	U
Heptachlor	26	U	0.072	U	25	U	0.008	U
Aldrin	26	U	0.007	U	2	U	0.008	U
Heptachlor Epoxide	26	U	0.072	U	25	U	0.008	U
Endosulfan I	26	U	0.041	J	14	J	0.008	U
Dieldrin	26	U	0.007	U	2	U	0.008	U
4,4'-DDE	150		0.13		45		0.008	U
Endrin	26	U	0.007	U	2	U	0.008	U
Endosulfan II	26	U	0.024	J	8	J	0.008	U
4,4'-DDD	57		0.033		11		0.008	U
Endosulfan Sulfate	160		0.14	J	48	J	0.008	U
4,4'-DDT	130		0.12		41		0.008	U
Methoxychlor	26	U	0.044		15		0.008	U
Endrin aldehyde	26	U	0.007	U	2	U	0.008	U
Chlordane	130	U	0.035	U	12	U	0.040	U
Toxaphene	780	U	0.22	U	76	U	0.24	U
Aroclor-1016	260	U	0.072	U	25	U	0.08	U
Aroclor-1221	260	U	0.072	U	25	U	0.08	U
Aroclor-1232	260	U	0.072	U	25	U	0.08	U
Aroclor-1242	260	U	0.072	U	25	U	0.08	U
Aroclor-1248	260	U	0.072	U	25	U	0.08	U
Aroclor-1254	260	U	0.072	U	25	U	0.08	U
Aroclor-1260	260	U	0.072	U	25	U	0.08	U

Appendix E - Continued - Wenatchee December 1989

Station:	CEF-SLD	RAS	RAS corrected to dry weight	BLANK
Type:				
Date:	12/13	12/13		12/13
Sample ID #:	508400	508402		508401
Metals	(mg/Kg dry)	(mg/L)	(mg/Kg dry)	(mg/L)

Antimony	3.7	0.006	2	0.001 U
Arsenic	2.64 U	0.014	5	0.001 U
Beryllium	0.5 U	0.001 U	0.3 U	0.001 U
Cadmium	3.1	0.012	4	0.002 U
Chromium	34.5	0.047	16	0.005 U
Copper	354	1.24	428	0.005
Lead	348	0.76	262	0.001 U
Mercury	2.83	0.0034	1	0.0001U
Nickel	19	0.04	14	0.01 U
Selenium	2.64 U	0.005 U	2 U	0.001 U
Silver	103	0.046	16	0.003 U
Thallium	0.5 U	0.005 U	2 U	0.001 U
Zinc	960	3.27	1128	0.017

U indicates compound was analyzed for but not detected at the given detection limit

J indicates an estimated value when result is less than specified detection limit

B this flag is used when the analyte is found in the method blank as well as the sample. Indicates possible/probable blank contamination

M indicates an estimated value of analyte found and confirmed by analyst but with low spectral match parameters