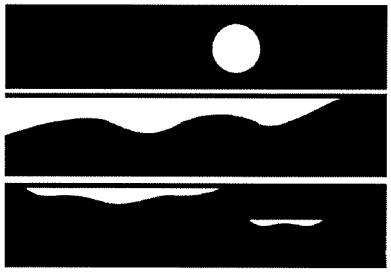


TOWN OF NACHES
SEWAGE TREATMENT PLANT
CLASS II INSPECTION, JULY 1993

October 1994

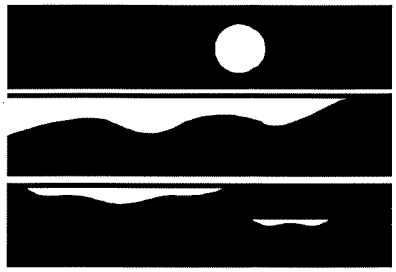
Water Body No. WA-38-1010
Publication No. 94-163
printed on recycled paper

The Department of Ecology is an Equal Opportunity and Affirmative Action employer and shall not discriminate on the basis of race, creed, color, national origin, sex, marital status, sexual orientation, age, religion, or disability as defined by applicable state and/or federal regulations or statutes.

If you have special accommodation needs, please contact the Environmental Investigations and Laboratory Services Program, Toxics Investigations Section, Kelly Carruth at (206) 407-6764 (voice). Ecology's telecommunications device for the deaf (TDD) number at Ecology Headquarters is (206) 407-6006.

For additional copies of this publication, please contact:

Department of Ecology
Publications Distributions Office
at P.O. Box 47600
Olympia, Washington 98504-7600
(206) 407-7472
Refer to Publication Number 94-163



Town of Naches
Sewage Treatment Plant
Class II Inspection, July 1993

by
Steven Golding

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

October 1994

Water Body No. WA-38-1010
Publication No. 94-163
printed on recycled paper

Table of Contents

List of Figures and Tables

Page

Figures

Tables

Abstract

A Class II Inspection was conducted at the town of Naches Wastewater Treatment Plant on July 26-28, 1993. The plant was performing well during the inspection. The effluent met all permit limits. Substantial nitrification and denitrification were occurring. Copper was the only effluent organic or metal concentration higher than acute state water quality standards or EPA water quality criteria. Low concentrations of pesticide compounds were detected in the sludge. Sludge metals concentrations were lower than EPA criteria for land application. Receiving water copper, lead, and dissolved oxygen concentrations were outside state water quality criteria for the Naches River. No toxicity was found in the rainbow trout survival test, the *Daphnia magna* survival test, or the fathead minnow survival and growth tests. A very low level of toxicity was exhibited in the Microtox test.

Summary

Flow Measurements

The Parshall flume configuration and plant flow meter accuracy were acceptable although the top of each side of the flume was 1/8 inch off level. Ecology and plant flow meter measurements agreed within 1%.

NPDES Permit Compliance/General Chemistry/Plant Operation

The plant was performing well during the inspection. The conventional parameters of BOD_5, TSS, and fecal coliform indicate a well-treated, high quality effluent. The plant met all permit limits.

The facility was achieving substantial nitrification and denitrification at the time of the inspection. Total phosphorus was reduced 29% through the plant. The ortho-phosphate increased through the plant.

Oxidation ditch velocity was acceptable and no evidence of solids deposition in the ditch was found.

Split Sample Comparison

The Ecology and Naches effluent samples were similar. The Naches influent sample was stronger than the Ecology influent sample; likely due to the Naches sample being collected during working hours only.

Ecology laboratory BOD_5 and TSS results were greater than Naches results for both influent samples. Effluent analytical results for BOD_5 and TSS were near detection limits and agreed closely.

Priority Pollutant Scans

Nine target organic compounds were detected in the influent samples collected. Acetone was detected at the highest concentrations (32 μg/L and 57 μg/L).

Chloroform, the only organic compound detected in the effluent, was found in concentrations well below Environmental Protection Agency (EPA) fresh water quality criteria.

No chlorinated pesticide/PCB compounds were detected in the influent or effluent.

Of the three priority pollutant metals detected in the effluent samples, copper exceeded State Ecology acute fresh water quality criteria by a factor of 4.

Organophosphorous Pesticides and Herbicides

One organophosphorous pesticide (Dimethoate) and one herbicide, (2,4-D) were both detected at concentrations lower than published LC_{50}s.

Bioassays

No toxicity to the Naches effluent was found in the rainbow trout survival test, the *Daphnia magna* survival test, or the fathead minnow survival and growth tests. A low level of toxicity was exhibited in the Microtox bioassay test.

Sludge

Eleven VOA or BNA compounds were found in the sludge sample. Eight BNA compounds were found in the sludge. Many were PAHs. Fluoranthene (980 μg/kg-dr - est.) was found in the highest concentration. Ten chlorinated pesticide compounds were detected in low concentrations in the sludge.

Ten priority pollutant metals were detected in the sludge, all at concentrations below EPA limits for land application of sludge.

Receiving Water

Receiving water data were collected to support permit development. Dissolved oxygen in the abandoned channel upstream of the outfall was 7.40 mg/L; less than the 8.0 mg/L minimum required by Water Quality Standards for Class A waters. Copper was found in estimated concentrations of 20 μg/L est., greater than State acute and chronic toxicity criteria. Lead was found in concentrations greater than the State chronic toxic criteria.

Recommendations

- Copper concentrations in the effluent should be addressed in the permitting process.
- The receiving water dissolved oxygen, lead, and copper concentrations should be addressed in the permitting process.

- Naches should be required to collect representative 24-hour composite samples for BOD_5 and TSS so that influent strength and removal efficiency will be better represented.

Introduction

A Class II Inspection was conducted at the town of Naches Sewage Treatment Plant (Naches) on July 26-28, 1993. Conducting the Inspection of the Wastewater Treatment Plant (WWTP) were Phelps Freeborn from the Washington State Department of Ecology (Ecology) Central Regional Office, and Steven Golding from the Ecology Toxics Investigations Section. Donald (Buzz) Gosnell, Jr. (Plant Operator) assisted during the inspection. Rick Frye of the Ecology Central Regional Office requested the inspection.

Located in the town of Naches (Figure 1), the plant provides treatment for the town of approximately 605 population and for sanitary wastes from a Snokist food processing plant. The Snokist plant also contributes coolant water overflow at infrequent intervals. Russ De Fields, Town Superintendent, stated that there are no other major industrial contributors.

The Naches WWTP is a secondary treatment facility discharging to an abandoned channel of the Naches River which flows into the River (Figure 1). A flood levee blocks the channel upstream of the Naches discharge. Ground water recharge to the Naches River, a small stream and irrigation return flows are possible sources of water flowing in the abandoned channel.

The plant consists of headworks, an oxidation ditch, a secondary clarifier, a chlorine contact basin, and sludge drying beds (Figure 2). There was one aeration rotor in the oxidation ditch which is operated continuously. An upgrade to improve the headworks and chlorine contact chamber was completed several years ago. There is a sprayfield adjacent to the plant, which is covered by the permit but has not been used for years. Mr. De Fields reports there are no plans to put it into use. At the time of the inspection, the application of sludge to land at the Oak Creek Game Farm had been halted. The Yakima Disposal Service has agreed to take the sludge at the Terrace Heights landfill, but no sludge had been transported there at the time of the inspection.

The WWTP discharges into a side channel of the Naches River is regulated by NPDES discharge permit #WA-002258-6. The permit was issued on February 3, 1989, and expired February 3, 1994.

Objectives of the inspection included:

1. Verify compliance with NPDES permit parameters.

2. Determine WWTP performance.

3. Characterize wastewater toxicity with priority pollutant scans and bioassays.

4. Assess permittee's self-monitoring by reviewing split samples and verifying flow measurement.

5. Collect receiving water data to support permit development.

Procedures

Composite samples were taken at influent (Inf-E) and effluent (Eff-E) locations. Influent, effluent, return activated sludge, and sludge grab samples, effluent grab-composite samples, and dried sludge samples were taken. Receiving water monitoring was carried out in the abandoned channel of the Naches River upstream of the plant.

Naches collected grab-composite samples and grab influent and effluent samples.

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.

Results and Discussion

Flow Measurements

Flow is measured by a 3-inch Parshall flume located just upstream of the bar screen. Naches influent flow measurements were used to calculate permitted parameters in lbs/day. The Parshall flume was inspected and flume dimensions were verified to be acceptable. The flume was slightly twisted, but not to the extent that a significant effect on the flow measurement was found.

Ecology made an instantaneous measurement for comparison with the flow meter measurement. With an average depth of flow of 0.296 feet, corresponding to a flow rate of 0.926 MGD, Ecology and plant flow meter measurements agreed within 1%.

NPDES Permit Compliance/General Chemistry/Plant Operation

The plant was performing well during the inspection. The conventional parameters of 5-day biochemical oxygen demand (BOD_5), TSS, and fecal coliform indicate a well-treated, high quality effluent (Table 2). The effluent met National Pollutant Discharge Elimination System

(NPDES) permit limits for BOD_5, total suspended solids (TSS), fecal coliform, and pH (Table 3).

BOD_5 removal was greater than 97%. TSS removal was 98%. The permit specifies that effluent BOD_5 and TSS removal efficiencies be, not less than 85%.

Temperatures of Ecology and Naches influent and effluent composite samples were higher than the recommended 4°C. While the higher temperatures suggest that general chemistry results be regarded with some caution, it should be noted that the cooled samples were left at room temperature for a time before temperature measurements were made.

Permit self-monitoring data from discharge monitoring reports (DMRs) indicate that the influent is weak year round (Ecology, 1993). Summer influent BOD_5 and TSS concentrations (about 70 mg/L) are about 1/3 the concentration in typical sewage (220 mg/L - Metcalf and Eddy, 1991). Winter influent BOD_5 and TSS concentrations (about 140 mg/L) are about 2/3 the concentration found in typical sewage. The weak influent appears to be a result of infiltration. Increased infiltration during the summer is believed to be a result of irrigation in the area, causing the groundwater table to rise. Results of this inspection and of DMRs indicates that adequate treatment is taking place even with the infiltration. DMRs show the plant to be operating within monthly average design flow during winter and summer (Ecology, 1993).

A comparison of influent and effluent ammonia and nitrate-nitrite concentrations indicate that the facility was achieving substantial nitrification and denitrification at the time of the inspection. Ammonia concentrations of approximately 20 mg/L in the influent were reduced to approximately 0.06 mg/L NH_3 in the effluent, while NO_2 + NO_3-N concentrations increased from approximately 0.14 mg/L to approximately 1.4 mg/L (Table 2). The low nitrate-nitrite concentration in the effluent indicates that substantial denitrification occurred. Changes in alkalinity were consistent with nitrification/denitrification (WEF, 1991).

Denitrification has been found to occur in similar systems in which the influent wastewater enters the oxidation ditch upstream of the mechanical brush aerator. When the influent is discharged near the upstream limit of the anoxic zone, some of the wastewater carbon source is used for denitrification (Metcalf and Eddy, 1991). Ecology measured 0.35 mg/L dissolved oxygen in the discharge from the oxidation ditch, downstream of the influent discharge but upstream of the brush aerator. This suggests that an anoxic zone may form upstream of the brush aerator. In conventional non-nitrifying activated sludge processes, a dissolved oxygen concentration of about 1.5 to 4 mg/L is recommended in the aeration tank (Metcalf and Eddy, 1991).

The dissolved oxygen from the clarifier was measured to be 0.65 mg/L and 1.12 mg/L after falling over the launder weir. The dissolved oxygen after the chlorination basin was measured

to be 7.8 mg/L, a large increase (Table 2). The measured increase may be erroneous and a result of the functioning of the meter. It has been reported that chlorine interferes with the measurement of oxygen, increasing the resultant oxygen measurement with membrane probes (Cunningham, 1993).

The influent total phosphorus was reduced 29% through the plant. Orthophosphate is the soluble phosphate available for biological metabolism without further breakdown (Metcalf and Eddy, 1991). Forty-five percent of the influent phosphorous and eighty-nine percent of the effluent phosphorous were in the form of orthophosphate.

The velocity of wastewater circulating through the oxidation ditch was measured using a current meter at 20 percent and 80 percent of total depth. The velocities were averaged over a cross section of the oxidation ditch. The average velocity through the ditch was found to be 1.19 fps. This compares with 0.8 to 1.2 fps typically found in oxidation ditches (WEF, 1992). The oxidation ditch bottom was found to be firm and level, without accumulation of solids. This is consistent with the finding of adequate velocity in the oxidation ditch to prevent excessive settling of solids.

Split Sample Comparison

Samples were split to determine the comparability of Ecology and permittee laboratory results and sampling methods (Table 4). The Ecology results of analyses for Naches grab-composite samples were compared with those from Ecology composite samples. The two effluent samples were quite similar (Table 2). The Naches influent sample was stronger for most parameters. A likely explanation is that the Ecology composite sample was taken throughout a 24-hour period including nighttime hours. The Naches sample included samples taken only during the daytime, when infiltration makes up a smaller fraction of the total influent resulting in a stronger expected influent. Naches should be required to collect representative 24-hour composite samples for BOD_5 and TSS analyses so that influent strength and removal efficiency will not continue to be over represented.

Naches influent BOD_5 and TSS analyses yielded lower concentrations than Ecology analyses. The relative difference between Naches and Ecology analyses of influent BOD_5 was 25%. The relative difference for TSS was 32%. In all cases the Naches lab reported lower concentrations than the Ecology lab. Given the small number of samples, the difference in influent analyses for BOD_5 and TSS is not significant at the 95% confidence level using the Student's t-distribution. Effluent analyses for BOD_5 and TSS were near detection limits for both labs. The comparison suggests the low influent strength reported by Naches in their DMRs should be interpreted carefully.

Laboratory Audit

The laboratory was not accredited at the time of the inspection. The laboratory was audited June 9, 1994, and was accredited July 14, 1994.

Priority Pollutant Scans

Nine target priority pollutant organics and three other organic compounds were detected in the influent (Table 5). Acetone was found in the highest concentration (57 μg/L). The other organic compounds detected were at low concentrations (16 μg/L or less).

Chloroform was the only target organic compound found in the effluent. The estimated concentrations, 7 μg/L and 4 μg/L were well below EPA fresh water quality criteria (Table 5 - EPA, 1986).

No chlorinated pesticides/PCB compounds were detected in the influent or effluent.

Of the three priority pollutant metals detected in the effluent samples collected, copper in the effluent exceeded State acute fresh water quality criteria by a factor of four, and the chronic criteria by a factor of seven (Ecology, 1992). Consideration should be given to elevated effluent copper concentrations.

A complete list of parameters analyzed and analytical results is included in Appendix F. A number of tentatively identified compounds (TICs) were detected in the influent sample in concentrations up to 1,700 μg/L (est. - Appendix G). No VOA TICs were found in the effluent sample. BNA TICS were found in the effluent in concentrations up to 16 μg/L (est.).

Organophosphorous Pesticides and Herbicides

One organophosphorous pesticide, Dimethoate (8 μg/L est.), was found in the effluent (Table 6). For Dimethoate the 96-hr LC_{50}s for two aquatic invertebrates have been found to be 200 μg/L for *Gammarus lacustris* and 43 μg/L for *Pteronarcys*, a factor of five or more than the concentration in the effluent. An LC_{50} of 6,200 μg/L for rainbow trout has been reported (Johnson, W. and Finley, M., 1980).

One herbicide, 2,4-D (0.15 μg/L est.), was found in the effluent. The 96-hr LC_{50} for rainbow trout was found to be 2.0 mg/L, fathead minnow: 18 mg/L and *Daphnia magna*: 1.2 mg/L, more than three order of magnitudes greater than the concentration in the effluent (Johnson, W. and Finley, M., 1980).

Bioassays

The effluent sample was tested for chlorine at the Ecology Manchester Laboratory upon receipt. The total chlorine measurement was 0.16 mg/L. The chlorine was neutralized with sodium thiosulfate prior to conducting bioassays.

A low level of toxicity was exhibited in the Microtox test (15 minute EC_{50}: 86.6% effluent). No toxicity was found in the rainbow trout survival test, the *Daphnia magna* survival test, or the fathead minnow survival and growth tests (Table 7).

Sludge

Sludge is dried on drying beds. Prior to the inspection an off-site location had stopped accepting the sludge for land application. The drying beds were effective. Plans are to haul the dried sludge to the Terrace Heights Landfill. The dried sludge sample was 95% solids (Table 2).

The fecal coliform count (13,000/100g) was lower than the 100,000/100g maximum requirement 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.

Three VOA compounds were found in the sludge sample (Table 8) including acetone (520 µg/kg-dr), 2-butanone (MEK -- 210 µg/kg-dr) and toluene (26 µg/kg-dr est.).

Eight BNA compounds were found in the sludge. Most detected were PAH's. Fluoranthene (980 µg/kg-dr est.) was found in the highest concentration.

A number of TICs were found in the sludge sample (Appendix G). The TIC found in the sludge sample in the highest concentration was Hexadecanoic acid (170,000 µg/kg est.). Hexadecanoic acid is a saturated fatty acid which occurs in natural fats and oils and in most commercial grade stearic acid (Sax, 1987).

Ten pesticide compounds were found in the sludge. Concentrations were 6.2 µg/kg-dry wt (est.) or less.

Ten priority pollutant metals were detected in the sludge, all at concentrations below EPA limits for land application of sludge (EPA, 1993).

Receiving Water

Receiving water data were collected to aid in the permitting process. Data are presented in Tables 2 and 5. Water samples were collected in flowing water in the abandoned channel upstream of the plant outfall. Dissolved oxygen upstream of the outfall was 7.40 mg/L (Table 2). The Naches River is a Class A surface water. The dissolved oxygen standard for this is 8.0 mg/L (Ecology, 1992).

Four priority pollutant metals were detected in the receiving water sample upstream of the plant outfall. Of these, copper was found in estimated concentrations 67% greater than State acute and two times that of State chronic freshwater criteria. Lead was found in estimated concentrations of 13% above the chronic criterion (Table 5 -- Ecology, 1992).

References

Cunningham, C., 1993. Personal Communication. YSI Incorporated, Yellow Springs, Ohio.

Ecology, 1993. Daily Monitoring Report. Town of Naches.

Ecology, 1992. Water Quality Standards for Surface Waters of the State of Washington. Chapter 173-201A WAC.

EPA, 1993. Standards for the Use or Disposal of Sewage Sludge; Final Rules, 40 CFR Part 257 *et al.*

Huntamer, D. and Hyre, J., 1991. Ecology Laboratory User's Manual. Washington State Department of Ecology, Olympia, WA.

Johnson, J. and Finley, M., 1980. Handbook of Acute Toxicity of Chemicals to Fish and Aquatic Invertebrates. U.S. Fish and Wildlife Service.

Metcalf and Eddy, 1991. Wastewater Engineering Treatment Disposal Reuse.

Sax, I. and Lewis, R., 1987. Hawley's Condensed Chemical Dictionary, Eleventh Edition.

WEF, 1992. Design of Municipal Wastewater Treatment Plants. Water Environment Federation Manual of Practice No. 8.

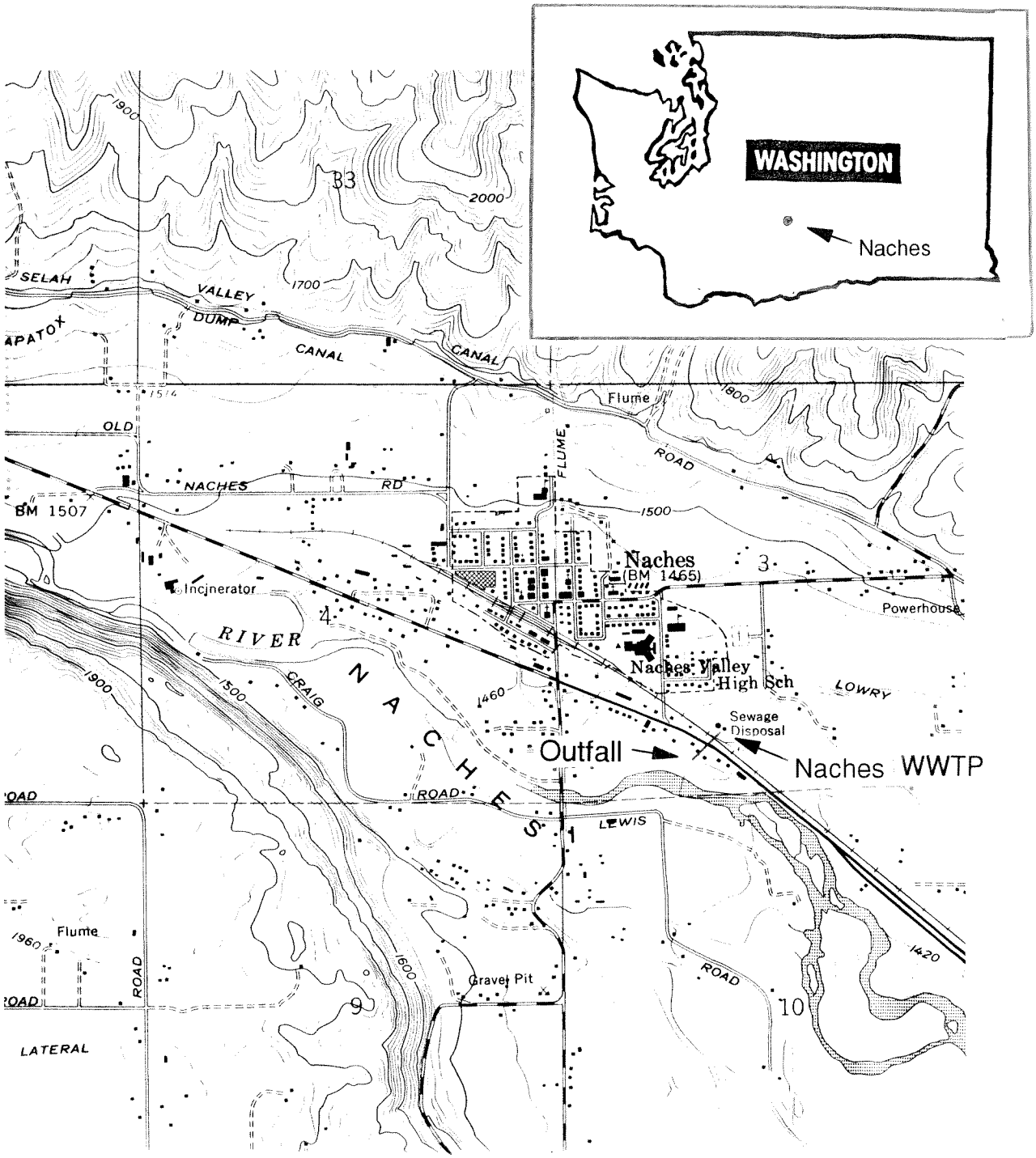


Figure 1 – Location Map – Town of Naches, July 1993.

Figure 2 – Flow Schematic – Naches, July 1993.

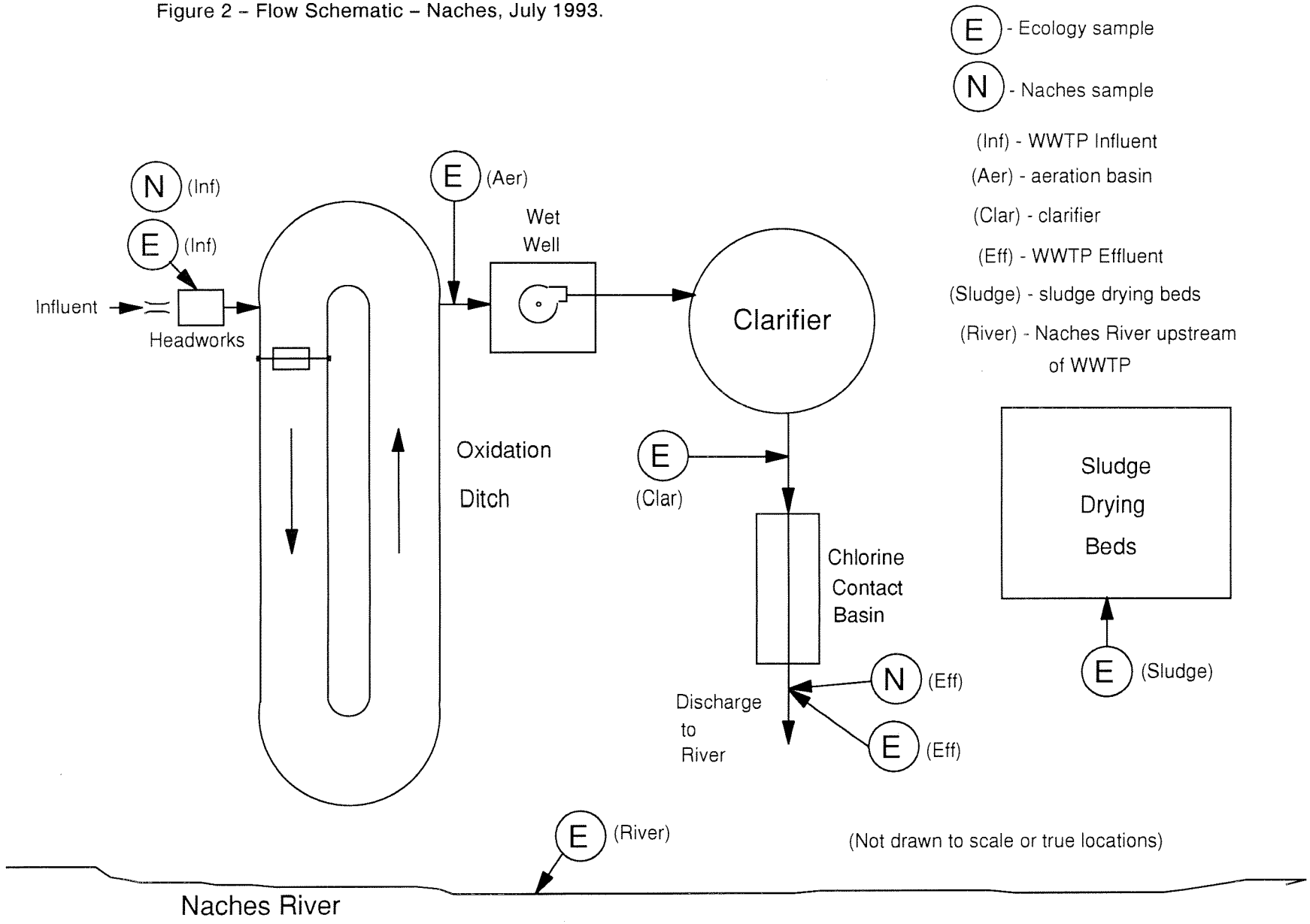


Table 1 - Sampling Station Descriptions - Naches, July 1993.

Ecology and Naches STP influent grab samples (Inf-1,2)

Influent grab samples were taken from the influent channel downstream of the Parshall flume.

Ecology and Naches influent composite sample (Inf-E, Inf-N)

Influent sampler intake was located in a well mixed portion of the influent channel downstream of the Parshall flume.

Ecology clarifier effluent samples (Clar-1,2,3,4)

Clarified effluent grab samples were taken just before passing over the clarifier effluent weir.

Ecology and Naches effluent grab samples (Eff-1,2,3,4,5; Eff-GC)

Effluent grab samples were taken from the chlorine contact basin overflow box, as the effluent spilled over the weir.

Ecology and Naches effluent composite sample (Eff-E, Eff-N)

The effluent sampler intake was located in the chlorine contact basin overflow box, just beneath the surface of the effluent, just upstream of the overflow weir.

Ecology return activated sludge sample (Rtn)

The grab samples were taken as the return activated sludge falls from box into oxidation ditch.

Ecology sludge sample (Sludge)

The sludge grab sample was sampled from the driest of eight drying beds. The sludge was ready to be hauled to a landfill for disposal.

Ecology receiving water sample (abandoned channel)

The slough grab samples were taken approximately 30 to 50 feet upstream of the Naches outfall in an abandoned channel of the Naches River in an area of free flow.

Table 2 – General Chemistry Results – Naches, July 1993.

Parameter	Location:	Inf–1	Inf–2	Inf–E	Inf–N	Rtn –1	Rtn – 2	Clar–3	Clar–4	Clar–1	Clar–2
	Type:	grab	grab	comp	grab–comp	grab	grab	grab	grab	grab	grab
	Date:	7/27	7/27	7/27–28	7/27	7/27	7/27	7/26	7/26	7/27	7/27
	Time:	1005	1440	0800–0800	0800–1700	1215	1550	1740	1745	1225	1600
	Lab Log #:	318180	318181	318182	318183	318184	318185	318203	318204	318186	318187
GENERAL CHEMISTRY											
Conductivity (umhos/cm)		1043	1600	621	822						
Alkalinity (mg/L CaCO3)				169	192						
Hardness (mg/L CaCO3)				77	87						
TS (mg/L)				522	653						
TNVS (mg/L)				321	384						
TSS (mg/L)		130	123	113	141	3900	5200			4	2
TNVSS (mg/L)				21	19	933	1300				
% Solids											
% Volatile Solids											
BOD5 (mg/L)				142	160						
BOD INH (mg/L)				110	160						
COD (mg/L)				230	300						
TOC (water mg/L)		67.5	69.0	59.9	48.2					5.4	7.3
TOC (soil/sed % dry wt)											
Total Kjeldahl N (mg/L)				23.0	33.7						
Total Persulfate N (mg/L)											
NH3–N (mg/L)		23.2	16.9	16.6	24.7					0.064	0.034
NO2+NO3–N (mg/L)		0.167	0.149	0.141	0.086					1.90	1.71
Total–P (mg/L)		4.49	4.48	3.57	4.81					2.77	2.72
Ortho–PO4–P (mg/L)				1.60	0.781						
F–Coliform MF (#/100 mL)											
F–Coliform (soil/sed #/100g)											
T–Coliform (soil/sed #/100g)											
FIELD OBSERVATIONS											
Temperature (C)		21.2	22.5			20.7	21.6	21.3	21.5	21.5	22.2
Temp–cooled (C)				7.1	7.7						
pH (S.U.)		7.53	7.0	7.6	7.6	6.6	6.7			6.7	6.9
Conductivity (umhos/cm)		>1000	>1000	660	910	370	370			390	420
Chlorine (mg/L)											
Free											
Total											
Dissolved Oxygen (mg/L)								0.65	1.12		

Inf – influent
Eff – effluent
Rtn – return activated sludge
Clar – clarifier effluent

E – Ecology sample
N – Naches sample

grab – grab sample
comp – composite sample
grab comp – grab–composite sample

Table 2 – (cont'd) – Naches WTP, July 1993.

Parameter	Location:	Eff–5	Eff–1	Eff–2	Eff–3	Eff–4	Eff–E	Eff–N	Eff–GC
	Type:	grab	grab	grab	grab	grab	comp	grab–comp	grab–comp
	Date:	7/26	7/27	7/27	7/28	7/28	7/27–28	7/27	7/27–28
	Time:	1750	1115	1515	0900	1345	0800–0800	0800–1700	*
	Lab Log #:	318201	318188	318189	318198	318199	318190	318191	318192
GENERAL CHEMISTRY									
Conductivity (umhos/cm)			360	375			412	368	382
Alkalinity (mg/L CaCO3)							104	101	102
Hardness (mg/L CaCO3)							74	74	75
TS (mg/L)							360	300	
TNVS (mg/L)							236	236	
TSS (mg/L)			1	2			4	4	4
TNVSS (mg/L)							1	1	
% Solids									
% Volatile Solids									
BOD5 (mg/L)							<4	<4	
BOD INH (mg/L)							<3	<3	
COD (mg/L)							15	14	
TOC (water mg/L)			5.9	5.1			5.1	4.8	
TOC (soil/sed % dry wt)									
Total Kjeldahl N (mg/L)							0.88	0.96	
Total Persulfate N (mg/L)									
NH3–N (mg/L)			0.051	0.057			0.062	0.063	0.063
NO2+NO3–N (mg/L)			1.50	1.60			1.19	1.54	1.35
Total–P (mg/L)			2.58	2.60			2.53	2.61	2.54
Ortho–PO4–P (mg/L)							2.26	1.95	
F–Coliform MF (#/100 mL)					61	83			
F–Coliform (soil/sed #/100g)									
T–Coliform (soil/sed #/100g)									
FIELD OBSERVATIONS									
Temperature (C)		20.0	21.3	22.0					
Temp–cooled (C)							9.1	11.1	
pH (S.U.)			6.9	7.1			7.5	7.7	
Conductivity (umhos/cm)			350	370			430	400	
Chlorine (mg/L)									
Free						<0.1			
Total						<0.1			
Dissolved Oxygen (mg/L)		7.8							

* – grab composite consists of grab samples taken 1055 and 1530 on 7/27 and 0805 on 7/28.

Eff – effluent sample
E – Ecology sample
N – Naches sample

grab – grab sample
grab–comp – grab–composite sample
GC – grab–composite sample

Table 2 – (cont'd) – Naches WTP, July 1993.

Parameter	Location:	Sludge-1	Sludge-2	RcvWtr-1	RcvWtr-2	RcvWtr-3	RcvWtr-4
	Type:	grab	grab	grab	grab	grab	grab
	Date:	7/27	7/28	7/27	7/27	7/28	7/28
	Time:	1420	1045	0910	1620	0755	1140
	Lab Log #:	318193	318200	318194	318195	318205	318206
GENERAL CHEMISTRY							
Conductivity (umhos/cm)				132	132		
Alkalinity (mg/L CaCO3)				50.4	50.2		
Hardness (mg/L CaCO3)				51	49		
TS (mg/L)							
TNVS (mg/L)							
TSS (mg/L)							
TNVSS (mg/L)							
% Solids		95					
% Volatile Solids		67					
BOD5 (mg/L)				<2	<2		
BOD INH (mg/L)							
COD (mg/L)							
TOC (water mg/L)				2.0	2.0		
TOC (soil/sed % dry wt)		33.6					
Total Kjeldahl N		4.92 % dry-wt					
Total Persulfate N (mg/L)				0.944	0.937		
NH3-N (mg/L)				0.01U	0.01U		
NO2+NO3-N (mg/L)				0.842	0.841		
Total-P (mg/L)				0.047	0.057		
Ortho-PO4-P (mg/L)						0.021	0.024
F-Coliform MF (#/100 mL)							
F-Coliform (soil/sed #/100g)			13000				
T-Coliform (soil/sed #/100g)			54000				
FIELD OBSERVATIONS							
Temperature (C)				15	20.5		
Temp-cooled (C)							
pH (S.U.)				7.1	6.8		
Conductivity (umhos/cm)				130			
Chlorine (mg/L)							
Free							
Total							
Dissolved Oxygen (mg/L)				7.40			

Sludge – sludge sample
RcvWtr – receiving water sample
grab – grab sample

Table 3 – NPDES Permit Limits and Inspection Results – Naches – July 1993.

	NPDES Limits		Inspection Results	
Parameter	Monthly Average	Weekly Average	Composite Samples	Grab Samples
BOD5 (mg/L)	30	45	<4	
lbs/day	21	32	<3.0	
	85 % removal		>97 % removal	
TSS (mg/L)	30	45	4	
lbs/day	21	32	3.0	
	85 % removal		96 % removal	
Fecal Coliform (#/100mL)	200	400		61; 83
pH		6.0 to 9.0 (continuous)		6.9; 7.1
Flow	--	--	91,000 gpd*	

* 24 hour influent flow measured by Naches.

Table 4 – Split Sample Results Comparison – Naches, July 1993.

Parameter	Analysis by:	Location:	Inf-E	Inf-N	Eff-E	Eff-N
		Type:	E-comp	N-comp	E-comp	N-comp
		Date:	7/27-28	7/27-28	7/27-28	7/27-28
		Time:	0800-0800	0800-0800	0800-0800	0800-0800
		Lab Log #:	318182	318183	318190	318191
		Sampled by:	Ecology	Naches	Ecology	Naches
BOD5 (mg/L)						
	Ecology		142	160	<4	<4
	Naches		111	109	2	2
TSS (mg/L)						
	Ecology		113	141	4	4
	Naches		82	122	1	3

E - Ecology
N - Naches
Eff - final effluent
Inf - influent
E-comp - Ecology composite sample
N-comp - Naches composite sample

Table 5 – Comparison of Organic Compounds and Metals Detected to Toxicity Criteria – Naches, July 1993.

	Location:	Inf-1	Inf-2	Inf-E	Eff-1	Eff-2	Eff-E	RcvWtr-1	EPA Water Quality Criteria Summary		Sludge
	Type:	grab	grab	comp	grab	grab	comp	grab			grab
	Date:	7/27	7/27	7/27-28	7/27	7/27	7/27-28	7/27	Acute Fresh	Chronic Fresh	7/27
	Time:	1005	1440	0800-0800	1115	1515	0800-0800	0910			1420
	Lab Log#:	318180	318181	318182	318188	318189	318190	*****			318193
	VOA Compounds	ug/L	ug/L		ug/L	ug/L	ug/L	ug/L	(ug/L)	(ug/L)	mg/kg-dr
Group)1											
	Acetone	32	57		10 U	10 U					520
a	Chloroform	2 J	5 J		7 J	4 J			28,900 *	1,240 *	53 U
	2-Butanone (MEK)	10 U	16		10 U	10 U					210
	Toluene	2 J	10 U		10 U	10 U			17,500 *		26 J
	BNA Compounds			ug/L			ug/L		(ug/L)	(ug/L)	
	Phenol			4 J			10 U		10,200 *	2,560 *	3500 U
	4-Methylphenol			8 J			10 U				590 J
i	Diethyl Phthalate			9 J			10 U		940 *(i)	3 *(i)	3500 U
n	Fluoranthene			11 U			10 U		3,980 *		980 J
n	Pyrene			11 UJ			10 U				930 J
i	Butylbenzyl Phthalate			2 J			10 U		940 *(i)	3 *(i)	3500 U
n	Benzo(a)Anthracene			11 UJ			10 U				930 J
n	Chrysene			11 UJ			10 U				750 J
i	Bis(2-Ethylhexyl)Phthalate			11 J			10 U		940 *(i)	3 *(i)	2900 U
n	Benzo(b)Fluoranthene			11 U			10 U				850 J
n	Benzo(k)Fluoranthene			11 U			10 U				470 J
n	Benzo(a)Pyrene			11 U			10 U				680 J
	Pesticide/PCB Compounds										
r	Heptachlor Epoxide			0.050 UJ			0.050 U		0.52 (r)	0.0038 (r)	0.90 J
s	Endosulfan I			0.050 UJ			0.050 U		0.22 (s)	0.056 (s)	2.4 J
	Dieldrin			0.10 UJ			0.10 U		2.5	0.0019	0.92 J
u	4,4'-DDE			0.10 UJ			0.10 U		1,050 *	0.001 (u)	5.3 J
t	Endrin			0.10 UJ			0.10 U		0.18 (t)	0.0023 (t)	1.2 J
s	Endosulfan II			0.10 UJ			0.10 U		0.22 (s)	0.056 (s)	5.9 J
u	4,4'-DDD			0.10 UJ			0.10 U		0.6 *	0.001 (u)	1.9 J
u	4,4'-DDT			0.10 UJ			0.10 U		1.1 (u)	0.001 (u)	2.1 J
	Methoxychlor			0.50 UJ			0.50 U			0.03	1.8 J
t	Endrin Ketone			0.10 UJ			0.10 U		0.18 (t)	0.0023 (t)	6.2 J

Inf – influent sample
Eff – effluent sample
RcvWtr – receiving water sample
grab – grab sample
comp – composite sample
E – Ecology sample

U – The analyte was not detected at or above the reported result.
J – The analyte was positively identified. The associated numerical result is an estimate.
UJ – The analyte was not detected at or above the reported estimated result.

– detected analyte

Table 5 – (cont'd) – Naches, July 1993.

Location:	Inf-1	Inf-2	Inf-E	Eff-1	Eff-2	Eff-E	RcvWtr-1	State Water Quality Criteria Summary		Sludge
Type:	grab	grab	comp	grab	grab	comp	grab			grab
Date:	7/27	7/27	7/27-28	7/27	7/27	7/27-28	7/27	Acute Fresh	Chronic Fresh	7/27
Time:	1005	1440	0800-0800	1115	1515	0800-0800	0910			1420
Lab Log#:	318180	318181	318182	318188	318189	318190	*****			318193
Metals ++	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	(ug/L)	(ug/L)	mg/kg-dr
Antimony			30 UJ			30 UJ	30 UJ	9,000 *	1,600 *	
Arsenic			1.7 P			2.0 P	1.5 U	360	190	1.93 N
Beryllium			1 U			1 U	1 U	130 *	5.3 *	0.14 P
Cadmium			0.56 P			0.10 U	0.13 P	2.5 +	0.8 +	11.1
Chromium			5 U			5 U	5 U			31.7
Hexavalent								16	11	
Trivalent								1,372 +	164 +	
Copper			45.2			55.2 ***	20 P ***	12 +	8 +	268
Lead			7.4 P			1.0 U	1.7 P ***	39 +	1.5 +	51
Mercury (total)			0.25 U			0.05 U	0.05 U	2.4	0.012	2.72
Nickel			10 U			10 U	10 U	1,056 +	117 +	16.7
Selenium			2.0 U			2.0 U	2.0 U	20	5	4.97 N
Silver							0.50 U	1.3 +		
Thallium							2.5 U	1,400 *	40 *	
Zinc			99.1			37 P	5.5 P	82 +	74 +	683

[1]NOTE: SOME INDIVIDUAL COMPOUND CRITERIA OR LOELS MAY NOT AGREE WITH GROUP CRITERIA OR LOELS. REFER TO APPROPRIATE EPA DOCUMENT ON AMBIENT WATER QUALITY CRITERIA FOR FULL DISCUSSION.

U – The analyte was not detected at or above the reported result.
UJ – The analyte was not detected at or above the reported estimated result.
J – The analyte was positively identified. The associated numerical result is an estimate.
P – The analyte was detected above the instrument detection limit but below the established quantitation limit.
N – The spike sample recovery is not within control limits.

* – Insufficient data to develop criteria. Value presented is the LOEL – Lowest Observed Effect Level.
\+ – Hardness dependent criteria (74 mg/L used to represent effluent).
++ – total recoverable unless otherwise noted

a – Total Halomethanes
i – Total Phthalate Esters
n – Total Polynuclear Aromatic Hydrocarbons
r – Heptachlor
s – Endosulfan
t – Endrin
u – DDT plus metabolites

[ ] – detected analyte

*** – acute or chronic criteria exceeded

Table 6 – Organophosphorous Pesticides and Herbicides – Naches, July 1993.

Location:	Eff-E
Type:	comp
Date:	7/27-28
Time:	0800-0800
Lab Log#:	318190
	ug/L

Organophosphorous Pesticides

Dichlorvos	0.2	UJ
Mevinphos	2.5	U
Ethoprop	0.05	U
Phorate	0.15	U
Demeton	1.6	U
Diazinon	0.25	U
Disulfoton	0.2	U
Atrazine	1.8	U
Simazine	1	U
Dimethoate	8	NJ
Ronnel	0.1	U
Alachlor	5.0	UJ
Chlorpyrifos	0.12	U
Methyl Parathion	0.28	U
Fenthion	0.12	U
Malathion	0.22	U
Ethyl Parathion	0.2	U
Tokuthion	0.3	U
Tetrachlorvinphos	1.3	U
Bolstar	0.3	U
Fensulfothion	0.75	UJ
EPN	0.4	U
Coumaphos	0.6	U

Herbicides

Dalapon		REJ
Dicamba	0.25	U
Dichloroprop	1.2	U
2,4-D	0.15	J
MCPP	25	U
MCPA	33	U
2,4,5-TP	0.21	U
2,4,5-T	0.46	U
2,4-DB	1	U
Dinoseb	0.25	UJ

Eff – effluent sample
E – Ecology sample
comp – composite sample

[ ] – detected compound

U – The analyte was not detected at or above the reported result.
UJ – The analyte was not detected at or above the reported estimated result.
NJ – There is evidence that the analyte is present. The associated numerical result is an estimate.
REJ – The data are unusable for all purposes.

Table 7 - Effluent Bioassay Results** - Naches, July 1993.

Microtox		EC50 (% Effluent)	
Sample	Sample No.	5 minutes	15 minutes
Eff-GC	318192	92.8	86.6

Daphnia magna - 48-hour survival test
(Daphnia magna)
Sample No. 318192

Sample Concentration	# Tested*	Percent Survival
0 % Effluent	20	100
6.25 % Effluent	20	100
12.5 % Effluent	20	100
25 % Effluent	20	100
50 % Effluent	20	100
100 % Effluent	20	100

NOEC = 100% effluent
LC50 > 100% effluent

* four replicates per concentration, five organisms per replicate

Fathead Minnow larval - 7 day survival and reproduction test
(Pimephales promelas)
Sample No. 318192

Sample Conc.	# Tested*	Percent Survival	Average Dry Weight (mg)
Control	35	91.4	0.61
6.25 % Effluent	35	88.6	0.68
12.5 % Effluent	35	85.7	0.61
25 % Effluent	35	91.4	0.61
50 % Effluent	35	100	0.68
100 % Effluent	35	85.7	0.71

NOEC for Weight = 100 %
NOEC for Survival = 100 % effluent
LC50 > 100 % effluent

* five replicates per concentration, seven organisms per replicate

Rainbow Trout - 96 hour survival test
(Oncorhynchus mykiss)
Sample No. 318192

Sample Conc.	Number Tested*	Percent Survival
Control	25	100
100 % Effluent	25	100

NOEC for Survival = 100 % effluent
LC50 > 100 % effluent

* five replicates per concentration, five organisms per replicate
** Total chlorine of 0.16 mg/L was measured at the Ecology Manchester Laboratory. The chlorine was removed with sodium thiosulfate before conducting the bioassay

Table 8 – Detected Organics and Metals in Sludge and Comparison to Metals Criteria* – Naches, July 1993.

Location:	Sludge
Type:	grab
Date:	7/27
Time:	
Lab Log#:	318193

VOA Compounds	ug/kg-dr
Acetone	520
Chloroform	53 U
2-Butanone (MEK)	210
Toluene	26 J

BNA Compounds	
Phenol	3500 U
4-Methylphenol	590 J
Diethyl Phthalate	3500 U
Fluoranthene	980 J
Pyrene	930 J
Butylbenzyl Phthalate	3500 U
Benzo(a)Anthracene	930 J
Chrysene	750 J
Bis(2-Ethylhexyl)Phthalate	2900 U
Benzo(b)Fluoranthene	850 J
Benzo(k)Fluoranthene	470 J
Benzo(a)Pyrene	680 J

Pesticide/PCB Compounds	
Heptachlor Epoxide	0.90 J
Endosulfan I	2.4 J
Dieldrin	0.92 J
4,4'-DDE	5.3 J
Endrin	1.2 J
Endosulfan II	5.9 J
4,4'-DDD	1.9 J
4,4'-DDT	2.1 J
Methoxychlor	1.8 J
Endrin Ketone	6.2 J

Location:	Sludge		
Type:	grab		
Date:	7/27	EPA Sludge	EPA Ceiling
Time:	1420	Application Limits	Concentrations
Lab Log#:	318193		
	mg/kg-dr	mg/kg-dr	mg/kg-dr

Metals			
Arsenic	1.93 N	41	75
Beryllium	0.14 P		
Cadmium	11.1	39	85
Chromium	31.7	1200	3000
Copper	268	1500	4300
Lead	51	300	840
Mercury (total)	2.72	17	57
Nickel	16.7	420	420
Selenium	4.97 N	36	100
Zinc	683	2800	7500

Sludge – sludge sample
grab – grab sample

U – The analyte was not detected at or above the reported result.
J – The analyte was positively identified. The associated numerical result is an estimate.
N – The spike sample recovery is not within control limits.
P – The analyte was detected above the instrument detection limit but below the established minimum quantitation limit.

[ ] – analyte detected

* All analytes listed in this table were detected in influent, effluent, or sludge samples.

Appendices

Appendix A - Sampling Procedures - Naches , July 1993.

Ecology Isco composite samplers were set up to collect equal volumes of sample every 30 minutes for 24 hours. The compositors were iced to keep samples cooled. Samples of chlorinated effluent taken at three times comprised the grab-composite samples for bioassay tests.

Naches grab-composite samples for influent and effluent were comprised of samples collected on the hour from 8 AM to 5 PM. Naches refrigerated the samples after each collection.

All Ecology composite samples and Naches grab-composite samples were split for both Ecology and Naches laboratory analysis. Sampler configurations and locations are summarized in Figure 2 and Table 1.

Appendix B – Sampling Schedule – Naches, July 1993.

Parameter	Location:	Inf–1	Inf–2	Inf–E	Inf–N	Rtn–1	Rtn–2	Ditch–Eff	Clar–3	Clar–4	Clar–1	Clar–2	Eff–1	Eff–2
	Type:	grab	grab	comp	grab–comp	grab	grab	grab	grab	grab	grab	grab	grab	grab
	Date:	7/27	7/27	7/27–28	7/27	7/27	7/27	7/26	7/26	7/26	7/27	7/27	7/27	7/27
	Time:	1005	1440	00–0800	0800–1700	1215	1550	1735	1740	1745	1225	1600	1115	1515
	Lab Log #:	318180	318181	318182	318183	318184	318185	318202	318203	318204	318186	318187	318188	318189
GENERAL CHEMISTRY														
Conductivity		E	E	E	E								E	E
Alkalinity				E	E									
Hardness				E	E									
TS				E	E									
TNVS				E	E									
TSS		E	E	EN	EN	E	E				E	E	E	E
TNVSS				E	E	E	E							
% Solids														
% Volatile Solids														
BOD5				EN	EN									
BOD INH				E	E									
COD				E	E									
TOC (water)		E	E	E	E						E	E	E	E
TOC (soil/sed)														
Total Kjeldahl N				E	E									
Total Persulfate N														
NH3–N		E	E	E	E						E	E	E	E
NO2+NO3–N		E	E	E	E						E	E	E	E
Total–P		E	E	E	E						E	E	E	E
Ortho–PO4–P				E	E									
F–Coliform MF													E	E
F–Coliform (soil/sed)														
T–Coliform (soil/sed)														
ORGANICS														
VOC (water)		E	E										E	E
VOC (soil/sed)														
BNAs (water)				E										
BNAs (soil/sed)														
Pest/PCB (water)				E										
Pest/PCB (soil/sed)														
Organophosphorus Pest														
Herbicides (water)														
METALS														
PP Metals (water)				E										
PP Metals (soil/sed)														
BIOASSAYS														
Salmonid (acute 100%)														
Microtox (acute)														
Daphnia magna (acute)														
Fathead Minnow (chronic)														
FIELD OBSERVATIONS														
Temperature		E	E			E	E	E	E	E	E	E	E	E
Temp–cooled				E	E									
pH		E	E	E	E	E	E				E	E	E	E
Conductivity		E	E	E	E	E	E				E	E	E	E
Chlorine														
Dissolved Oxygen							E	E	E	E				

Inf – influent
Eff – effluent
E – Ecology laboratory analysis
N – Naches laboratory analysis

Rtn – return activated sludge
Clar – clarifier effluent
Ditch–Eff – oxidation ditch effluent

grab – grab sample
comp – composite sample
grab–comp – grab–composite sample

Appendix B – (cont'd) – Naches, July 1993.

Parameter	Location:	Eff–3	Eff–4	Eff–E	Eff–N	Eff–GC	Sludge–1	Sludge–2	RcvWtr–1	RcvWtr–2	RcvWtr–3	RcvWtr–4
	Type:	grab	grab	comp	grab–comp	grab–comp	grab	grab	grab	grab	grab	grab
	Date:	7/28	7/28	7/27–28	7/27	7/28	7/27	7/28	7/27	7/27	7/28	7/28
	Time:	0900	1345	0800–0800	0800–1700	*	1420	1045	0910	1620	0755	1140
	Lab Log #:	318198	318199	318190	318191	318192	318193	318200	318194	318195	318205	318206
GENERAL CHEMISTRY												
Conductivity				E	E	E			E	E		
Alkalinity				E	E	E			E	E		
Hardness				E	E	E			E	E		
TS				E	E							
TNVS				E	E							
TSS				EN	EN	E						
TNVSS				E	E							
% Solids							E					
% Volatile Solids							E					
BOD5				EN	EN				E	E		
BOD INH				E	E							
COD				E	E							
TOC (water)				E	E				E	E		
TOC (soil/sed)							E					
Total Kjeldahl N				E	E		E					
Total Persulfate N									E	E		
NH3–N				E	E	E			E	E		
NO2+NO3–N				E	E	E			E	E		
Total–P				E	E	E			E	E		
Ortho–PO4–P				E	E						E	E
F–Coliform MF		E	E									
F–Coliform (soil/sed)								E				
T–Coliform (soil/sed)								E				
ORGANICS												
VOC (water)												
VOC (soil/sed)							E					
BNAs (water)				E								
BNAs (soil/sed)							E					
Pest/PCB (water)				E								
Pest/PCB (soil/sed)							E					
Organophosphorus Pest				E								
Herbicides (water)				E								
METALS												
PP Metals (water)				E	E				E			
PP Metals (soil/sed)							E					
BIOASSAYS												
Salmonid (acute 100%)						E						
Microtox (acute)						E						
Daphnia magna (acute)						E						
Fathead Minnow (chronic)						E						
FIELD OBSERVATIONS												
Temperature									E	E		
Temp–cooled				E	E							
pH				E	E	E	E		E	E		
Conductivity				E	E				E	E		
Chlorine			E									
Dissolved Oxygen									E			

* – grab–composite consists of two grab samples taken 1055 and 1530 on 7/27 and 0805 on 7–28

Eff – effluent sample
Sludge – sludge sample
RcvWtr – receiving water
E – Ecology laboratory analysis
N – Naches laboratory analysis
grab – grab sample
grab–comp – grab–composite sample

Appendix C – Ecology Analytical Methods – Naches, July 1993.

Laboratory Analysis	Method Used for Ecology Analysis	Laboratory Performing Analysis
Conductivity	EPA, Revised 1983: 120.1	Ecology Manchester Laboratory
Alkalinity	EPA, Revised 1983: 310.1	Ecology Manchester Laboratory
Hardness	EPA, Revised 1983: 130.2	Ecology Manchester Laboratory
TS	EPA, Revised 1983: 160.3	Ecology Manchester Laboratory
TNVS	EPA, Revised 1983: 160.3	Ecology Manchester Laboratory
TSS	EPA, Revised 1983: 160.2	Ecology Manchester Laboratory
TNVSS	EPA, Revised 1983: 160.2	Ecology Manchester Laboratory
% Solids	APHA, 1989: 2540G.	Ecology Manchester Laboratory
% Volatile Solids	EPA, Revised 1983: 160.4	Ecology Manchester Laboratory
BOD5	EPA, Revised 1983: 405.1	Ecology Manchester Laboratory
BOD INH	EPA, Revised 1983: 405.1	Ecology Manchester Laboratory
COD	EPA, Revised 1983: 410.1	Ecology Manchester Laboratory
TOC (water)	EPA, Revised 1983: 415.1	Ecology Manchester Laboratory
TOC (soil/sed)	EPA, Revised 1983: 415.1	Ecology Manchester Laboratory
Total Kjeldahl N	EPA, Revised 1983: 351.3	Ecology Manchester Laboratory
Total Persulfate N	EPA, Revised 1983: 351.3	Ecology Manchester Laboratory
NH3–N	EPA, Revised 1983: 350.1	Ecology Manchester Laboratory
NO2+NO3–N	EPA, Revised 1983: 353.2	Ecology Manchester Laboratory
Total–P	EPA, Revised 1983: 365.3	Ecology Manchester Laboratory
Ortho–PO4–P	EPA, Revised 1983: 365.3	Ecology Manchester Laboratory
F–Coliform MF	APHA, 1989: 9222D.	Ecology Manchester Laboratory
F–Coliform (soil/sed)	APHA, 1989: 9221A.	Ecology Manchester Laboratory
T–Coliform (soil/sed)	APHA, 1989: 9221A.	Ecology Manchester Laboratory
VOC (water)	EPA, 1986: 8260	Weyerhaeuser
VOC (soil/sed)	EPA, 1986: 8240	Weyerhaeuser
BNAs (water)	EPA, 1986: 8270	Weyerhaeuser
BNAs (soil/sed)	EPA, 1986: 8270	Weyerhaeuser
Pest/PCB (water)	EPA, 1986: 8080	Weyerhaeuser
Pest/PCB (soil/sed)	EPA, 1986: 8080	Weyerhaeuser
Organophosphorus Pest	EPA, 1986: 8141	Analytical Resources, Inc.
Herbicides (water)	EPA, 1986: 8150–Mod.	Laucks Testing Laboratories
PP Metals	EPA, Revised 1983: 200–299	Ecology Manchester Laboratory
Salmonid (acute 100%)	Ecology, 1981	Ecology Manchester Laboratory
Microtox (acute)	Beckman, 1982	Ecology Manchester Laboratory
Daphnia magna (acute)	ASTM, 1986	Ecology Manchester Laboratory
Fathead Minnow (chronic)	EPA 1989	Ecology Manchester Laboratory

METHOD BIBLIOGRAPHY

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

ASTM, 1986:E1193. Standard Guide for Conducting Life Cycle Toxicity Tests with Daphnia magna. In: ASTM Standards, Water and Environmental Technology. American Society for Testing and Materials, Philadelphia, Pa.

Beckman Instruments, Inc., 1982. Microtox System Operating Manual.

Ecology, 1981. Static Acute Fish Toxicity Test, WDOE 80–12, revised July 1981.

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

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

EPA, 1989. Short–term Methods for Estimating the Chronic Toxicity of Effluents and Receiving waters to Freshwater Organisms. Second edition. EPA/600/4–89/100.

Appendix D - Quality Assurance/Quality Control (QA/QC) - Naches, July 1993.

SAMPLING QA/QC

Ecology quality assurance procedures for sampling included priority pollutant cleaning of the sampling equipment prior to the inspection to prevent sample contamination (Appendix D). Chain-of-custody procedures were followed to assure the security of the samples (Huntamer and Hyre, 1991).

LABORATORY QA/QC

General Chemistry Analysis

Analyses were performed within holding times. The procedural blanks showed no analytically significant levels of analytes. Low TKN spike recovery may be due to a high sample value versus a low spike level. Precision of results from replicate samples was acceptable.

Temperatures of Ecology and Naches composite samples exceeded the criteria of 4°C. As a result, the reliability of general chemistry results may be reduced.

VOA, BNA, and Pesticide/PCB Priority Pollutant Organics Analysis

Wastewater and sludge VOA samples were analyzed within the recommended holding time. No target analytes were detected in any of the method blanks. Calibration was acceptable. Surrogate recoveries were reasonable, acceptable, and within QC limits.

Metals Analysis

Wastewater and sludge samples were analyzed within the recommended holding times. Calibrations were acceptable. Procedural blanks showed no significant levels of analytes. All spike recoveries for wastewater were within acceptance limits. Spike recoveries for sludge were within acceptance limits with the exception of antimony, arsenic, and selenium. Results for these metals are qualified with an "N".

Organophosphorous Pesticides

The sample was analyzed within the recommended holding times. Dichlorovos, dimethoate, arachlor, and fensulfothion spikes were not within acceptable initial calibration limits. Mevinphos was not within continuing calibration limits. These analytes are qualified with a "UJ".

Herbicides

The sample was analyzed within the recommended holding time. Detection limits for dinoseb are regarded as estimates because of low spike recoveries. Dalapon results were

rejected because dalapon may yield erratic recoveries with the procedure used.

LABORATORY AUDIT

Naches applied for laboratory accreditation in October, 1993. The Ecology deadline for accreditation is July, 1994.

Appendix E - Quality Assurance/Quality Control (QA/QC) - Naches, July 1993.

SAMPLING QA/QC

Ecology quality assurance procedures for sampling included priority pollutant cleaning of the sampling equipment prior to the inspection to prevent sample contamination (Appendix D). Chain-of-custody procedures were followed to assure the security of the samples (Huntamer and Hyre, 1991).

LABORATORY QA/QC

General Chemistry Analysis

Analyses were performed within holding times. The procedural blanks showed no analytically significant levels of analytes. Low TKN spike recovery may be due to a high sample value versus a low spike level. Precision of results from replicate samples was acceptable.

VOA, BNA, and Pesticide/PCB Priority Pollutant Organics Analysis

Wastewater and sludge VOA samples were analyzed within the recommended holding time. No target analytes were detected in any of the method blanks. Calibration was acceptable. Surrogate recoveries were reasonable, acceptable, and within QC limits.

Metals Analysis

Wastewater and sludge samples were analyzed within the recommended holding times. Calibrations were acceptable. Procedural blanks showed no significant levels of analytes. All spike recoveries for wastewater were within acceptance limits. Spike recoveries for sludge were within acceptance limits with the exception of antimony, arsenic, and selenium. Results for these metals are qualified with an "N".

Organophosphorous Pesticides

The sample was analyzed within the recommended holding times. Dichlorovos, dimethoate, arachlor, and fensulfothion spikes were not within acceptable initial calibration limits. Mevinphos was not within continuing calibration limits. These analytes are qualified with a "UJ".

Herbicides

The sample was analyzed within the recommended holding time. Detection limits for dalapon and dinoseb are regarded as estimates because of low spike recoveries. Dalapon may yield erratic recoveries with the procedure used.

LABORATORY AUDIT

Naches applied for laboratory accreditation in October, 1993. The Ecology deadline for accreditation is July, 1994.

Appendix F – VOA, BNA, Pesticide/PCB and Metals Scan Results – Naches, July 1993.

Location:	Inf-1	Inf-2	Inf-E	Eff-1	Eff-2	Eff-E	Sludge	RcvWtr-1
Type:	grab	grab	comp	grab	grab	comp	grab	grab
Date:	7/27	7/27	7/27-28	7/27	7/27	7/27-28	7/27	7/27
Time:	1005	1440	0800-0800	1055	1515	0800-0800	1420	0910
Lab Log#:	318180	318181	318182	318188	318189	318190	318193	318194
VOA Compounds	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/kg-dr	ug/L
Chloromethane	10 U	10 U		10 U	10 U		53 U	
Bromomethane	10 U	10 U		10 U	10 U		53 U	
Vinyl Chloride	10 U	10 U		10 U	10 U		53 U	
Chloroethane	10 U	10 U		10 U	10 U		53 U	
Methylene Chloride	10 U	10 U		10 U	10 U		53 U	
Acetone	32	57		10 U	10 U		520	
Carbon Disulfide	10 U	10 U		10 U	10 U		53 U	
1,1-Dichloroethene	10 U	10 U		10 U	10 U		53 U	
1,1-Dichloroethane	10 U	10 U		10 U	10 U		53 U	
1,2-Dichloroethene (total)	10 U	10 U		10 U	10 U		53 U	
Chloroform	2 J	5 J		7 J	4 J		53 U	
1,2-Dichloroethane	10 U	10 U		10 U	10 U		53 U	
2-Butanone (MEK)	10 U	16		10 U	10 U		210	
1,1,1-Trichloroethane	10 U	10 U		10 U	10 U		53 U	
Carbon Tetrachloride	10 U	10 U		10 U	10 U		53 U	
Vinyl Acetate	10 U	10 U		10 U	10 U		53 U	
Bromodichloromethane	10 U	10 U		10 U	10 U		53 U	
1,2-Dichloropropane	10 U	10 U		10 U	10 U		53 U	
cis-1,3-Dichloropropene	10 U	10 U		10 U	10 U		53 U	
Trichloroethene	10 U	10 U		10 U	10 U		53 U	
Dibromochloromethane	10 U	10 U		10 U	10 U		53 U	
1,1,2-Trichloroethane	10 U	10 U		10 U	10 U		53 U	
Benzene	10 U	10 U		10 U	10 U		53 U	
trans-1,3-Dichloropropene	10 U	10 U		10 U	10 U		53 U	
Bromoform	10 U	10 U		10 U	10 U		53 U	
4-Methyl-2-Pentanone (MIBK)	10 U	10 U		10 U	10 U		53 U	
2-Hexanone	10 U	10 U		10 U	10 U		53 U	
Tetrachloroethene	10 U	10 U		10 U	10 U		53 U	
1,1,2,2-Tetrachloroethane	10 U	10 U		10 U	10 U		53 U	
Toluene	2 J	10 U		10 U	10 U		26 J	
Chlorobenzene	10 U	10 U		10 U	10 U		53 U	
Ethylbenzene	10 U	10 U		10 U	10 U		53 U	
Styrene	10 U	10 U		10 U	10 U		53 U	
Total Xylenes	10 U	10 U		10 U	10 U		53 U	
1,3-Dichlorobenzene	10 U	10 U		10 U	10 U		53 U	
1,4-Dichlorobenzene	10 U	10 U		10 U	10 U		53 U	
1,2-Dichlorobenzene	10 U	10 U		10 U	10 U		53 U	

E – Ecology sample
Inf – influent sample
Eff – effluent sample
grab – grab sample
comp – composite sample
Sludge – sludge sample
RcvWtr – receiving water sample

U – The analyte was not detected at or above the reported result.
J – The associated numerical result is an estimated quantity.

□ – detected analyte

Appendix F (cont'd) – Naches, July 1993.

Location:	Inf-1	Inf-2	Inf-E	Eff-1	Eff-2	Eff-E	Sludge	RcvWtr-1
Type:	grab	grab	comp	grab	grab	comp	grab	grab
Date:	7/27	7/27	7/27-28	7/27	7/27	7/27-28	7/27	7/27
Time:	1005	1440	0800-0800	1055	1515	0800-0800	1420	0910
Lab Log#:	318180	318181	318182	318188	318189	318190	318193	318194
BNA Compounds	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/kg-dr	ug/L
Phenol			4 J			10 U	3500 U	
Bis(2-Chloroethyl)Ether			11 U			10 U	3500 U	
2-Chlorophenol			11 U			10 U	3500 U	
1,3-Dichlorobenzene			11 U			10 U	3500 U	
1,4-Dichlorobenzene			11 U			10 U	3500 U	
1,2-Dichlorobenzene			11 U			10 U	3500 U	
2-Methylphenol			11 U			10 U	3500 U	
2,2-oxybis(1-Chloropropane)			11 U			10 U	3500 U	
4-Methylphenol			8 J			10 U	590 J	
N-Nitroso-di-n-Propylamine			11 U			10 U	3500 U	
Hexachloroethane			11 U			10 U	3500 U	
Nitrobenzene			11 U			10 U	3500 U	
Isophorone			11 U			10 U	3500 U	
2-Nitrophenol			11 U			10 U	3500 U	
2,4-Dimethylphenol			11 U			10 U	3500 U	
Bis(2-Chloroethoxy)Methane			11 U			10 U	3500 U	
2,4-Dichlorophenol			11 U			10 U	3500 U	
1,2,4-Trichlorobenzene			11 U			10 U	3500 U	
Naphthalene			11 U			10 U	3500 U	
4-Chloroaniline			11 U			10 U	3500 U	
Hexachlorobutadiene			11 U			10 U	3500 U	
4-Chloro-3-Methylphenol			11 U			10 U	3500 U	
2-Methylnaphthalene			11 U			10 U	3500 U	
Hexachlorocyclopentadiene			11 U			10 U	3500 U	
2,4,6-Trichlorophenol			11 U			10 U	3500 U	
2,4,5-Trichlorophenol			27 U			25 U	8500 U	
2-Chloronaphthalene			11 U			10 U	3500 U	
2-Nitroaniline			27 U			25 U	8500 U	
Dimethyl Phthalate			11 U			10 U	3500 U	
Acenaphthylene			11 U			10 U	3500 U	
2,6-Dinitrotoluene			11 U			10 U	3500 U	
3-Nitroaniline			27 U			25 U	8500 U	
Acenaphthene			11 U			10 U	3500 U	

E – Ecology sample
Inf – influent sample
Eff – effluent sample
grab – grab sample
comp – composite sample
Sludge – sludge sample
RcvWtr – receiving water sample

U – The analyte was not detected at or above the reported result.
J – The associated numerical result is an estimated quantity.

☐ – detected analyte

Appendix F – (cont'd) – Naches, July 1993.

Location:	Inf–1	Inf–2	Inf–E	Eff–1	Eff–2	Eff–E	Sludge	RcvWtr–1
Type:	grab	grab	comp	grab	grab	comp	grab	grab
Date:	7/27	7/27	7/27–28	7/27	7/27	7/27–28	7/27	7/27
Time:	1005	1440	0800–0800	1055	1515	0800–0800	1420	0910
Lab Log#:	318180	318181	318182	318188	318189	318190	318193	318194
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/kg–dr	ug/L
BNA Compounds (cont'd)								
2,4–Dinitrophenol			27 U			25 U	8500 U	
4–Nitrophenol			27 U			25 U	8500 U	
Dibenzofuran			11 U			10 U	3500 U	
2,4–Dinitrotoluene			11 U			10 U	3500 U	
Diethyl Phthalate			9 J			10 U	3500 U	
4–Chlorophenyl Phenylether			11 U			10 U	3500 U	
Fluorene			11 U			10 U	3500 U	
4–Nitroaniline			27 U			25 U	8500 U	
4,6–Dinitro–2–Methylphenol			27 U			25 U	8500 U	
N–Nitrosodiphenylamine			11 U			10 U	3500 U	
4–Bromophenyl Phenylether			11 U			10 U	3500 U	
Hexachlorobenzene			11 U			10 U	3500 U	
Pentachlorophenol			27 U			25 U	8500 U	
Phenanthrene			11 U			10 U	3500 U	
Anthracene			11 U			10 U	3500 U	
Carbazole			11 U			10 U	3500 U	
Di–n–Butyl Phthalate			11 U			10 U	3500 U	
Fluoranthene			11 U			10 U	980 J	
Pyrene			11 UJ			10 U	930 J	
Butylbenzyl Phthalate			2 J			10 U	3500 U	
3,3'–Dichlorobenzidine			11 UJ			10 U	3500 U	
Benzo(a)Anthracene			11 UJ			10 U	930 J	
Chrysene			11 UJ			10 U	750 J	
Bis(2–Ethylhexyl)Phthalate			11 J			10 U	2900 U	
Di–n–Octyl Phthalate			11 U			10 U	3500 U	
Benzo(b)Fluoranthene			11 U			10 U	850 J	
Benzo(k)Fluoranthene			11 U			10 U	470 J	
Benzo(a)Pyrene			11 U			10 U	680 J	
Indeno(1,2,3–cd)Pyrene			11 U			10 U	3500 U	
Dibenzo(a,h)Anthracene			11 U			10 U	3500 U	
Benzo(g,h,i)Perylene			11 U			10 U	3500 U	

E – Ecology sample
Inf – influent sample
Eff – effluent sample
grab – grab sample
comp – composite sample
Sludge – sludge sample
RcvWtr – receiving water sample

U – The analyte was not detected at or above the reported result.
J – The associated numerical result is an estimated quantity.
UJ – The analyte was not detected at or above the reported estimated result.

☐ – detected analyte

Appendix F – (cont'd) – Naches, July 1993.

Location:	Inf–1	Inf–2	Inf–E	Eff–1	Eff–2	Eff–E	Sludge	RcvWtr–1
Type:	grab	grab	comp	grab	grab	comp	grab	grab
Date:	7/27	7/27	7/27–28	7/27	7/27	7/27–28	7/27	7/27
Time:	1005	1440	0800–0800	1055	1515	0800–0800	1420	0910
Lab Log#:	318180	318181	318182	318188	318189	318190	318193	318194
Pesticide/PCB Compounds	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/kg–dr	ug/L
alpha–BHC			0.050 UJ			0.050 U	1.8 U	
beta–BHC			0.050 UJ			0.050 U	1.8 U	
delta–BHC			0.050 UJ			0.050 U	1.8 U	
gamma–BHC (Lindane)			0.050 UJ			0.050 U	1.8 U	
Heptachlor			0.050 UJ			0.050 U	1.8 U	
Aldrin			0.050 UJ			0.050 U	1.8 U	
Heptachlor Epoxide			0.050 UJ			0.050 U	0.90 J	
Endosulfan I			0.050 UJ			0.050 U	2.4 J	
Dieldrin			0.10 UJ			0.10 U	0.92 J	
4,4'–DDE			0.10 UJ			0.10 U	5.3 J	
Endrin			0.10 UJ			0.10 U	1.2 J	
Endosulfan II			0.10 UJ			0.10 U	5.9 J	
4,4'–DDD			0.10 UJ			0.10 U	1.9 J	
Endosulfan Sulfate			0.10 UJ			0.10 U	3.5 U	
4,4'–DDT			0.10 UJ			0.10 U	2.1 J	
Methoxychlor			0.50 UJ			0.50 U	1.8 J	
Endrin Ketone			0.10 UJ			0.10 U	6.2 J	
Endrin Aldehyde			0.10 UJ			0.10 U	3.5 U	
alpha–Chlordane			0.050 UJ			0.050 U	1.8 U	
gamma–Chlordane			0.050 UJ			0.050 U	1.8 U	
Toxaphene			5.0 UJ			5.0 U	180 U	
Aroclor–1016			1.0 UJ			1.0 UJ	34 U	
Aroclor–1221			2.0 UJ			2.0 UJ	69 U	
Aroclor–1232			1.0 UJ			1.0 UJ	34 U	
Aroclor–1242			1.0 UJ			1.0 UJ	34 U	
Aroclor–1248			1.0 UJ			1.0 UJ	34 U	
Aroclor–1254			1.0 UJ			1.0 UJ	34 U	
Aroclor–1260			1.0 UJ			1.0 UJ	34 U	

E – Ecology sample
Inf – influent sample
Eff – effluent sample
grab – grab sample
comp – composite sample
Sludge – sludge sample
RcvWtr – receiving water sample

U – The analyte was not detected at or above the reported result.
J – The associated numerical result is an estimated quantity.

UJ – The analyte was not detected at or above the reported estimated result.

[ ] – detected analyte

Appendix F – (cont'd) – Naches, July 1993.

Location:	Inf-1	Inf-2	Inf-E	Eff-1	Eff-2	Eff-E	Sludge	RcvWtr-1
Type:	grab	grab	comp	grab	grab	comp	grab	grab
Date:	7/27	7/27	7/27-28	7/27	7/27	7/27-28	7/27	7/27
Time:	1005	1440	0800-0800	1055	1515	0800-0800	1420	0910
Lab Log#:	318180	318181	318182	318188	318189	318190	318193	318194
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/kg-dr	ug/L
Metals*								
Antimony			30 UJ			30 UJ	3 UN	30 UJ
Arsenic			1.7 P			2.0 P	1.93 N	1.5 U
Beryllium			1 U			1 U	0.14 P	1 U
Cadmium			0.56 P			0.10 U	11.1	0.13 P
Chromium			5 U			5 U	31.7	5 U
Copper			45.2			55.2	268	20 P
Lead			7.4 P			1.0 U	51	1.7 P
Mercury (total)			0.25 U			0.05 U	2.58 (wet wt)	0.05 U
Nickel			10 U			10 U	16.7	10 U
Selenium			2.0 U			2.0 U	4.97 N	2.0 U
Silver								0.5 U
Thallium			2.5 U			2.5 U		2.5 U
Zinc			99.1			37 P	683	5.5 P

[1]NOTE: SOME INDIVIDUAL COMPOUND CRITERIA OR LOELS MAY NOT AGREE WITH GROUP CRITERIA OR LOELS. REFER TO APPROPRIATE EPA DOCUMENT ON AMBIENT WATER QUALITY CRITERIA FOR FULL DISCUSSION.

E – Ecology sample
Inf – influent sample
Eff – effluent sample
grab – grab sample
comp – composite sample
Sludge – sludge sample
RcvWtr – receiving water sample

U The analyte was not detected at or above the reported result.
UJ The analyte was not detected at or above the reported estimated result.
N The spike sample recovery is not within control limits.
UN The analyte was not detected at or above the reported result. The spike sample recovery is not within control limits.
P The analyte was detected above the instrument detection limit but below the established minimum quantitation limit.
* Water samples – total recoverable metals except mercury, which is total. Sludge samples – total metals

☐ – detected analyte

Appendix G – VOA and BNA Scan Tentatively Identified Compounds (TICs)– Naches, July 1993.

TIC data are presented on the laboratory report sheets that follow. Fractions are identified as volatile organics (VOAs) or semivolatile organics (BNAs). Locations corresponding to the Lab Log # (called Sample No. on the laboratory report sheet) and data qualifiers are summarized on this page.

Location:	Inf–1	Inf–2	Inf–E	Eff–1	Eff–2	Eff–E	Sludge–1
Type:	grab	grab	comp	grab	grab	comp	grab
Date:	7/27	7/27	7/27–28	7/27	7/27	7/27–28	7/27
Time:	1005	1440	0800–0800	1115	1515	0800–0800	1420
Lab Log #:	318180	318181	318182	318188	318189	318190	318193

Inf – influent sample
Eff – effluent sample
Sludge – sludge sample

grab – grab sample
comp – composite sample
E – Ecology sample

J – The associated numerical result is an estimated quantity.
JN – There is evidence that the analyte is present. The associated numerical result is an estimate.

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

318180

Lab Name: WEYERHAEUSER Contract: 046-5751

Lab Code: WEYER Case No.: 12530 SAS No.: SDG No.: 318180

Matrix: (soil/water) WATER Lab Sample ID: 13471

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: B0895

Level: (low/med) LOW Date Received: 07/29/93

% Moisture: not dec. Date Analyzed: 07/29/93

GC Column: CAP ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 12 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	111842	Nonane	26.02	37	JN
2.	2051301	Octane, 2,6-dimethyl-	27.29	33	JN
3.	0	1,3,2-DIOXABOROLANE, 4,4-DIM	27.60	29	JN
4.	53366384	Cyclopentane, (2-methylbutyl	28.53	78	JN
5.	4291796	Cyclohexane, 1-methyl-2-prop	29.29	44	JN
6.	124185	Decane	29.61	250	JN
7.	2847725	Decane, 4-methyl-	30.55	130	JN
8.	1678939	Cyclohexane, butyl-	31.37	41	JN
9.	138863	Limonene	31.53	65	JN
10.	13151354	Decane, 5-methyl-	32.13	35	JN
11.	13151343	Decane, 3-methyl-	32.84	30	JN
12.	4941531	5-Undecene	34.05	23	JN

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
318181

Lab Name: WEYERHAEUSER Contract: 046-5751

Lab Code: WEYER Case No.: 12530 SAS No.: SDG No.: 318180

Matrix: (soil/water) WATER Lab Sample ID: 13472

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: B0909

Level: (low/med) LOW Date Received: 07/29/93

% Moisture: not dec. Date Analyzed: 07/30/93

GC Column: CAP ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 5 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	624920	Disulfide, dimethyl	19.87	7	JN
2.	95498	Benzene, 1-chloro-2-methyl-	28.99	7	JN
3.	124185	Decane	29.60	5	JN
4.	138863	Limonene	31.54	24	JN
5.	99876	Benzene, 1-methyl-4-(1-methy	31.75	10	JN

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

318182

Lab Name: WEYERHAEUSER Contract: 8270

Lab Code: WEYER Case No.: 12530 SAS No.: SDG No.: 318180

Matrix: (soil/water) WATER Lab Sample ID: 13473

Sample wt/vol: 920 (g/mL) ML Lab File ID: BN0816L

Level: (low/med) LOW Date Received: 07/29/93

% Moisture: decanted: (Y/N) Date Extracted: 08/03/93

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 08/16/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.4

Number TICs found: 24

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN	4.93	80	J
2.	112-34-5	ETHANOL, 2-(2-BUTOXYETHOXY)-	10.52	140	JN
3.	10482-56-1	3-CYCLOHEXENE-1-METHANOL, .A	10.64	150	JN
4.	124-17-4	ETHANOL, 2-(2-BUTOXYETHOXY)-	13.60	61	JN
5.	134-62-3	BENZAMIDE, N,N-DIETHYL-3-MET	17.12	86	JN
6.	112-72-1	1-TETRADECANOL	18.65	27	JN
7.	629-76-5	1-PENTADECANOL	20.12	130	JN
8.	544-63-8	TETRADECANOIC ACID	20.24	47	JN
9.	1002-84-2	PENTADECANOIC ACID	21.40	35	JN
10.	36653-82-4	1-HEXADECANOL	21.52	33	JN
11.	57-10-3	HEXADECANOIC ACID	23.40	1500	JN
12.	506-12-7	HEPTADECANOIC ACID	24.10	46	JN
13.	295-65-8	CYCLOHEXADECANE	24.17	33	JN
14.		UNKNOWN	25.61	1700	J
15.		UNKNOWN	25.89	520	J
16.		UNKNOWN	25.96	94	J
17.		UNKNOWN	26.07	30	J
18.		UNKNOWN	26.24	75	J
19.		UNKNOWN	27.27	53	J
20.		UNKNOWN	27.62	170	J
21.		UNKNOWN	29.24	24	J
22.	6006-01-5	3,7,11-TRIDECATRIENENITRILE,	31.91	140	JN
23.		UNKNOWN	34.52	170	J
24.		UNKNOWN	34.86	140	J

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

318188

Lab Name: WEYERHAEUSER Contract: 046-5751

Lab Code: WEYER Case No.: 12530 SAS No.: SDG No.: 318180

Matrix: (soil/water) WATER Lab Sample ID: 13475

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: B0897

Level: (low/med) LOW Date Received: 07/29/93

% Moisture: not dec. Date Analyzed: 07/29/93

GC Column: CAP ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

318189

Lab Name: WEYERHAEUSER Contract: 046-5751

Lab Code: WEYER Case No.: 12530 SAS No.: SDG No.: 318180

Matrix: (soil/water) WATER Lab Sample ID: 13476

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: B0910

Level: (low/med) LOW Date Received: 07/29/93

% Moisture: not dec. Date Analyzed: 07/30/93

GC Column: CAP ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

318190

Lab Name: WEYERHAEUSER Contract: 8270

Lab Code: WEYER Case No.: 12530 SAS No.: SDG No.: 318180

Matrix: (soil/water) WATER Lab Sample ID: 13477

Sample wt/vol: 1000 (g/mL) ML Lab File ID: BN0816M

Level: (low/med) LOW Date Received: 07/29/93

% Moisture: decanted: (Y/N) Date Extracted: 08/02/93

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 08/16/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.9

Number TICs found: 7 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN	4.02	5	J
2.		UNKNOWN	4.12	2	J
3.	62238-31-7	CYCLOHEXANE, 1-ETHYL-1,3-DIM	5.27	3	JN
4.		UNKNOWN	5.37	6	J
5.	112-34-5	ETHANOL, 2-(2-BUTOXYETHOXY)-	10.37	9	JN
6.	124-17-4	ETHANOL, 2-(2-BUTOXYETHOXY)-	13.57	16	JN
7.	57-10-3	HEXADECANOIC ACID	22.50	3	JN

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: 318193

Lab Name: WEYERHAEUSER Contract: 046-5751

Lab Code: WEYER Case No.: 12530 SAS No.: SDG No.: 318180

Matrix: (soil/water) SOIL Lab Sample ID: 13479

Sample wt/vol: 1.0 (g/mL) G Lab File ID: A5315

Level: (low/med) LOW Date Received: 07/29/93

% Moisture: not dec. 6 Date Analyzed: 08/04/93

GC Column: CAP ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 9 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	78842	Propanal, 2-methyl-	8.61	230	JN
2.	123728	Butanal	10.28	27	JN
3.	96173	Butanal, 2-methyl-	13.59	200	JN
4.	110623	Pentanal	15.42	59	JN
5.	66251	Hexanal	20.50	170	JN
6.	111717	Heptanal	25.21	96	JN
7.	124130	Octanal	29.57	90	JN
8.	138863	Limonene	30.18	370	JN
9.	124196	Nonanal	33.63	32	JN

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.: 318193

Lab Name: WEYERHAEUSER Contract: 8270

Lab Code: WEYER Case No.: 12530 SAS No.: SDG No.: 318180

Matrix: (soil/water) SOIL Lab Sample ID: 13479

Sample wt/vol: 30.4 (g/mL) G Lab File ID: 2BN30818B

Level: (low/med) LOW Date Received: 07/29/93

% Moisture: 7 decanted: (Y/N) N Date Extracted: 08/03/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 08/18/93

Injection Volume: 2.0(uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) Y pH: 7.0

Number TICs found: 21 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
~~1.~~	~~123-42-2~~	~~2-PENTANONE, 4-HYDROXY-4-MET~~	~~3.47~~	~~14000~~	~~BJNA~~ KF
2.	120-40-1	DODECANAMIDE, N,N-BIS(2-HYDR	16.67	4400	JN
3.		UNKNOWN	20.45	11000	J
4.		UNKNOWN	20.57	7400	J
5.		UNKNOWN	20.90	4500	J
6.		UNKNOWN	21.25	4200	J
7.	140-03-4	9-OCTADECENOIC ACID, 12-(ACE	21.57	4100	JN
8.	2091-29-4	9-HEXADECENOIC ACID	22.07	56000	JN
9.	57-10-3	HEXADECANOIC ACID	22.50	170000	JN
10.		UNKNOWN	23.00	3100	J
11.		UNKNOWN	23.10	2800	J
12.		UNKNOWN	24.52	160000	J
13.		UNKNOWN	24.77	51000	J
14.		UNKNOWN	24.90	4200	J
15.		UNKNOWN	25.82	4000	J
16.		UNKNOWN	31.22	7900	J
17.		UNKNOWN	32.11	6700	J
18.		UNKNOWN	33.77	14000	J
19.		UNKNOWN	34.11	20000	J
20.		UNKNOWN	35.22	3900	J
21.		UNKNOWN	35.94	9600	J

Appendix H - Nitrogen Balance - Naches, July 1993.

Influent	Effluent	Sludge
TKN = 23.0 mg/L	TKN = 0.88 mg/L	TKN = 4.92 % dry
$NO_2 + NO_3 = 0.141$ mg/L	$NO_2 + NO_3 = 1.19$ mg/L	(.0492-N)(26.9#/d dry)
		= 1.32 lb/d N

QC_{in}	=	QC_{out}	+	QC_{out}	+	ERROR
influent		effluent		sludge (TKN)		

(23.1 mg/L)(8.34)(0.091MGD) = (2.07 mg/L)(8.34)(0.091MGD) + 1.32 lb/d + ERROR
17.5 lb/d-N = 1.57 lb/d-N + 1.32 lb/d-N + ERROR

ERROR = 14.61 lb/day

Appendix I - Glossary of Terms - Naches, July 1993.

BOD - biochemical oxygen demand
BNA - base-neutral acids (semivolatile organics)
Clar - clarifier
COD - chemical oxygen demand
comp - composite sample
E - Department of Ecology
Eff - effluent
EPA - United States Environmental Protection Agency
F-coli - fecal coliform bacteria
fps - feet per second
g - gram
grab - grab sample
grab-comp - grab-composite sample
Inf - influent
LC50 - concentration which is lethal to 50% of the test organisms
MF - membrane filter
mg - milligram
mg/L - milligram per liter
N - Naches
NOEC - no observable effect concentration
NPDES - National Pollutant Discharge Elimination System
pH - hydrogen ion concentration
QA - quality assurance
QC - quality control
T-coli - total coliform bacteria
TIC - tentatively identified compound
TNVS - total nonvolatile solids
TNVSS - total nonvolatile suspended solids
TOC - total organic carbon
TS - total solids
TSS - total suspended solids
μ - microgram
μ/L - microgram per liter
VOA - volatile organic