Prosser Wastewater Treatment Plant Class II Inspection
October 7-9, 1991

by
Guy Hoyle-Dodson and
Marc Heffner

Washington State Department of Ecology
Environmental Investigations and Laboratory Services
Toxics, Compliance and Ground Water Investigations Section
Olympia WA 98504-7710

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ABSTRACT

A Class II Inspection was conducted in October 1991 at the City of Prosser Industrial/Domestic Wastewater Treatment Plant in Benton County, Washington. The Prosser facility is a single stage recirculating trickling filter plant followed by a sequential batch reactor (SBR). Inspection data found the Prosser STP was producing a fairly good effluent quality. Effluent concentrations were within NPDES permit limits with the exception of one fecal coliform sample. Inspection BOD_5 and TSS loadings approached or exceeded design capacities included in the NPDES permit. Approximately 10% of the BOD_5 and TSS loadings were from domestic sewage, with the balance from three principal industries. Effluent priority pollutant organics and metals concentrations were less than EPA acute and chronic water quality toxicity criteria for freshwater. Bioassays found no toxic effects due to the effluent.

INTRODUCTION

A Class II Inspection was conducted at the City of Prosser Industrial/Domestic Wastewater Sewage Treatment Plant (STP) in Benton County, Washington, on October 7-9, 1991 (Figure 1). Phelps Freeborn of the Department of Ecology's Central Regional Office and Marc Heffner of Ecology's Toxic, Compliance, and Groundwater Investigations Section conducted the inspection. Greg Pietz, Perry Harris, Gene Finn, Tim Stewart, and John Beck, the treatment plant operators provided assistance on site.

The Prosser STP serves a community with a population of 4,170 and three significant food processing industries: Twin City Foods (TCF), a frozen potato products processor; and Milne Fruit Products (MFP) and Washington Frontier Juice (WFJ), two fruit juice processors. The facility discharges effluent to the Yakima River and to nearby groundwater through sprayfield application. The NPDES permit (No. Wa-002080-0) was issued to the Prosser facility on May 13, 1987. It expired May 13, 1992.

Specific objectives of the inspection included:

1. verify NPDES permit self-monitoring,

2. assess wastewater treatment plant loading and plant performance, and

3. assess water toxicity with priority pollutant scans and effluent bioassays.

SETTING

The Prosser facility is a single stage recirculating trickling filter plant followed by a sequential batch reactor (SBR). The trickling filter serves as a secondary treatment process, while the SBR's primary function is nitrification of ammonia. The plant has separate influent lines for domestic and industrial wastewater. TCF and MFP wastewater constitutes the industrial flow. WFJ is a more recent contributor and their wastewater enters the plant along with the domestic flow. Industrial influent is pretreated to varying degrees by the contributing industries.

The Prosser facility began operation as a secondary treatment plant in 1948 with the construction of a trickling filter to treat domestic wastewater. In 1958 capacity to treat food processing wastewater capacity was added. In 1967 a larger trickling filter, primary clarifier, secondary clarifier, vacuum filter, and anaerobic digester were added. Operational difficulties necessitated extensive modifications in plant design in 1968 and 1969. Additional capacity was added in 1970 and domestic and industrial influent were separated. Primary clarification of domestic influent was performed during the initial treatment stage at the plant, while the industrial wastewater was pretreated at each respective food processing facility. The domestic and

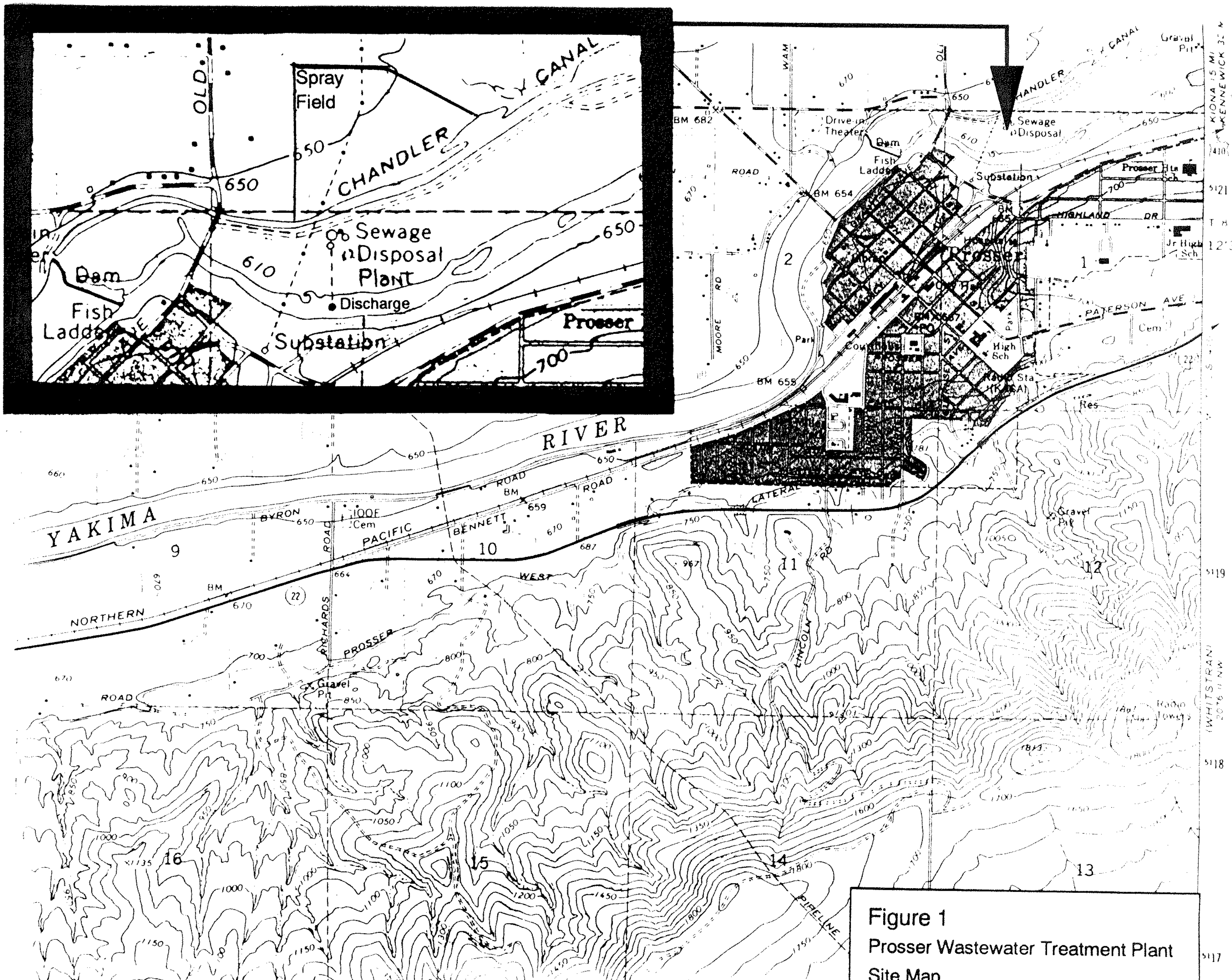


Figure 1
Prosser Wastewater Treatment Plant
Site Map

industrial wastewaters were then combined prior to entry into the trickling filter. The modifications also included the addition of a 56 acre sprayfield for wastewater disposal. In 1986 a sequential batch reactor was added for the nitrification of ammonia.

Treatment units operating during the inspection included an air-degritter, primary clarifier, trickling filter, secondary clarifier, sequencing batch reactor, and chlorine contact basin (Figure 2). Domestic wastewater and WFJ wastewater are routed through the air-degritter to the primary clarifier. The clarified wastewater is sent to the trickling filter pump station where it is joined by the industrial wastewater from TCF and MFP. The combined wastewater is repeatedly percolated through the trickling filter for secondary treatment. The treated effluent is next pumped to a secondary clarifier and finally flows to the SBR system.

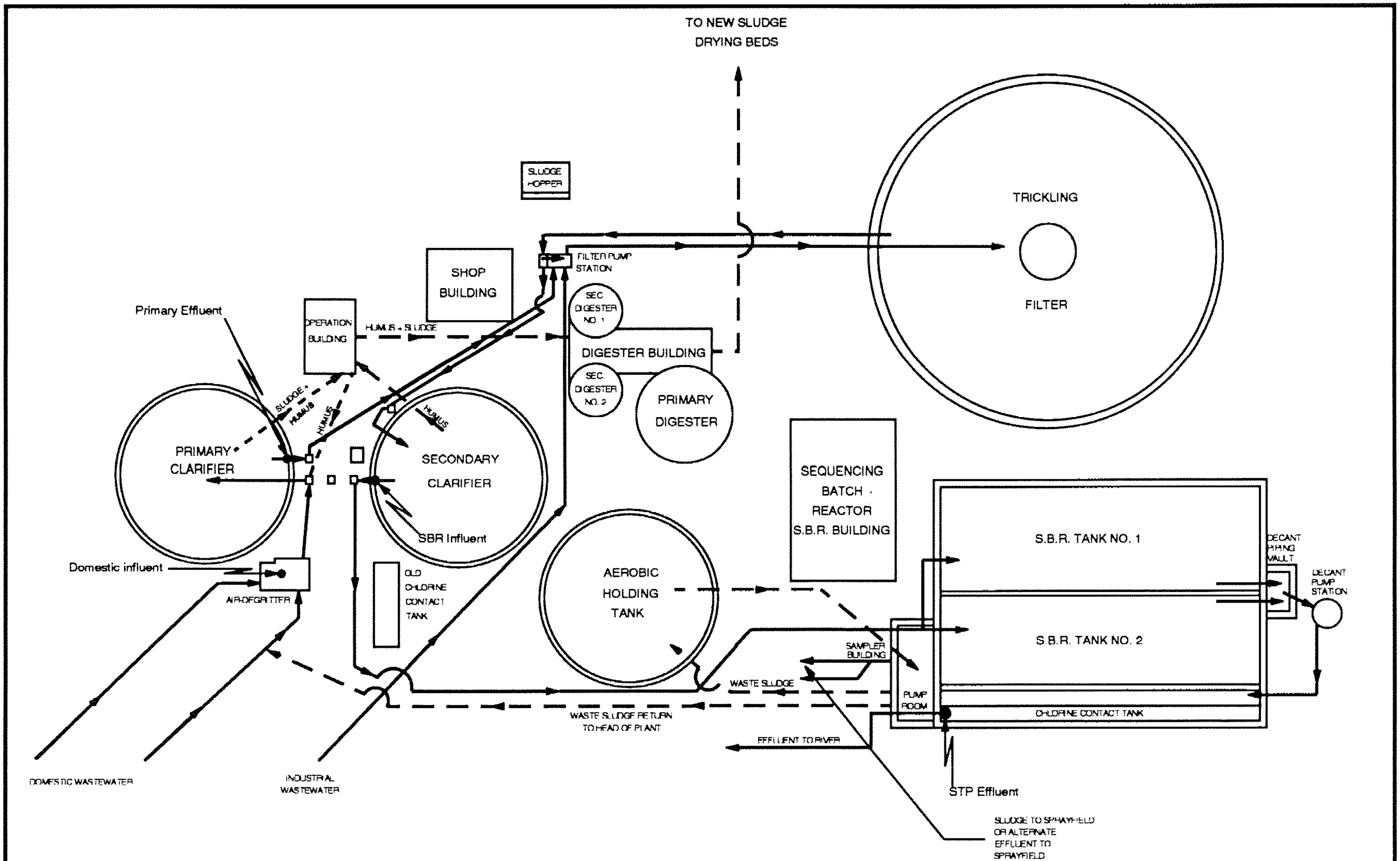
The SBR system consists of two reactor tanks and a chlorine contact tank. Each reactor tank combines activated sludge treatment and secondary clarification. The reactor tanks cycle in a sequence of fill, react, settle, and decant functions. As one tank fills, the react, settle, and decant functions occur in the other SBR tank, so continuous treatment is provided. Times for each treatment function can be varied as needed. The decant is chlorinated and sent to the chlorine contact chamber.

Effluent can be discharged to either the Yakima River or to the sprayfield. When discharge is to the river, the chlorinated wastewater is held for 30 minutes in the chlorine contact chamber. The discharge gate is opened and the flow is dechlorinated with SO_2 prior to discharge. Discharge occurs for 45 minutes to one hour every two to two and one-half hours. With this system of discharge, the size of the chlorine contact basin governs the volume of water that can be decanted from a SBR reactor at any one time. This can limit the hydraulic capacity of the SBR system. Decreasing the cycle time in the SBRs so decant volumes are less than the chlorine contact basin volume becomes necessary to increase SBR hydraulic capacity. When the SBR reactors are not being used, the chlorine contact basin can be used as a conventional chlorine contact basin to disinfect the trickling filter effluent.

Primary sludge generated in the trickling filter/primary clarifier (TC/PC) process is anaerobically digested and sent to drying beds. The beds provide an estimated year of storage capacity. The dried sludge is occasionally land applied.

The SBR waste activated sludge is sent to the aerobic holding tank along with anaerobic digester supernatant. The aerobic holding tank contents are land applied on the sprayfield.

Secondary clarifier sludge design options allowed wasting to the primary clarifier or to the SBR units. The operator modified the system to allow the sludge to be passed over the trickling filter before being resettled and sent to the SBR units. The modification allows wasting sludge to the SBRs with less negative impact on nitrification in the SBRs than by wasting sludge directly into the SBRs. The operator prefers wasting the secondary clarifier sludge along with the SBR sludge to the aerobic holding tank. This wasting scheme allows for easier final disposal of the



● -- Sample Stations
(See Appendix A for descriptions)

FIGURE #2
PROSSER WASTWATER TREATMENT FACILITY
PROCESS SCHEMATIC - 1991

sludge. Just prior to the inspection, the piping modification the operator installed for passing the sludge over the trickling filter was damaged. Secondary clarifier waste sludge was sent to the primary clarifier during the inspection.

When discharge is to the sprayfield, level sensors in the contact basin are used to control irrigation pumps. The pumps turn on when water in the chlorine contact basin is 7.0 feet deep and off when water in the basin is 6.8 feet deep. The sprayfield is roughly 56 acres. Presently, approximately one-half of the land designated for sprayfield application is used for spray irrigation. The city recently acquired an additional 60 acres adjacent to the sprayfield for possible future sprayfield use.

The permit calls for sprayfield application to maintain a viable crop cover and requires all discharge be routed to the sprayfield when flow in the Yakima River is less than 200 cfs. The operator reported the most recent agreement between the Yakima Indian Fisheries and Bureau of Reclamation calls for a minimum flow in the river of 400 cfs. Thus with strict interpretation of the permit, only maintenance spraying of the sprayfield is permitted. This portion of the permit is scheduled for change because the sprayfield is considered more environmentally acceptable than river discharge in many cases. At present, the sprayfield is used primarily for effluent diversion when effluent quality does not meet permit limits for river discharge.

Plant operation during the inspection was in a transitional phase. The prior weekend high flows and an upset in the system results in elevated NH_3-N concentrations in the plant effluent (the operator reported 36 mg/L). The effluent was sent to the sprayfield rather than being discharged into the Yakima River. On October 7 (Monday), effluent solids appeared high and discharge was to the sprayfield. The SBRs were set so each unit completed a treatment cycle in five hours. Because of influent high flow rates the operators were attempting to reduce the cycle time to four or four and a half hours. Flows lessened and treatment improved so on Tuesday morning the cycle time was returned to five hours and by noon the discharge was returned to the river.

One other operational problem occurring during the inspection involved one of the jet pumps used for mixing in the SBRs. One of two pumps in the south SBR was not functioning properly. After investigating the problem the operators concluded that the end cap of the mixing distribution line had blown off and repairs could not be made until the unit was taken out of service, sometime in the fall/winter. The problem might slightly diminish treatment efficiency but not prevent basin use.

PROCEDURES

Ecology collected grab and composite samples from several stations at the plant. Composite samples of the domestic influent (municipal and WFJ), industrial influent (MFP plus TCF), primary clarifier effluent, secondary clarifier effluent, and final effluent were collected. Ecology Isco composite samplers were set up to collect equal volumes of sample every 30 minutes for 24 hours with the exception of the effluent sampler. The effluent sampler was set to collect equal volumes of sample every 2.5 hours, near the end of every discharge cycle, for 24 hours. Also, a grab composite sample of effluent was collected for bioassay analysis. Sampling configurations and locations are summarized in Appendix A and Figure 2.

Prosser collected domestic influent, TCF, MFP, WFJ, and effluent composite samples (Appendix A and Figure 2). The samplers were set to collect equal volumes of sample every hour for 24 hours. Ecology and Prosser samples were split for analysis by both the Ecology and Prosser labs.

Samples collected, sampling times and parameters analyzed are summarized in Appendix B.

Samples for Ecology analysis were placed on ice and delivered to the Ecology Manchester Laboratory. Ecology analytical procedures and the laboratories doing the analysis are summarized in Appendix C.

DATA QUALITY ASSURANCE

Sampling

Field sampling quality assurance control steps included priority pollutant cleaning of samplers and containers prior to the inspection (Appendix D). In addition, field chain of custody procedures were maintained for all samples.

General Chemistry

All data were acceptable without qualification except for solids parameters. The Ecology lab reported that samples exceeded allowable holding times before solids were analyzed. Thus solids data are flagged with the data qualifier "H." Exceeding holding times may result in underreporting the actual solids concentrations.

Metals

Holding times, instrument calibration verification standards, and procedural blanks were acceptable for both water and sludge metals.

For water samples, matrix spike and matrix spike duplicate data were acceptable except for:

1. The relative percent difference (RPD) for the matrix spike and matrix spike duplicate results for lead was higher than acceptable. Lead data are flagged with a "P" qualifier to indicate poor precision.

2. Matrix spike and matrix spike duplicate recoveries were acceptable except for arsenic and lead. Arsenic recoveries were slightly low: arsenic results are flagged with an "N" qualifier. Lead recovery in the matrix spike duplicate was high: lead results are flagged

with an "N" qualifier. The "N" qualifier indicates that spike sample recovery was not within control limits.

For sludge and aerobic holding tank samples, matrix spike recoveries for arsenic, selenium, lead, and silver were lower than acceptable (less than 75%): data are flagged with an "N" qualifier. Matrix spike recovery for mercury and zinc were not applicable since the sample concentration was greater than four times the spike concentration.

Oxygen Demand and Nitrogen Parameters

Holding times, instrument calibration, procedural blanks, spiked sample recoveries, and standard reference material and external verification standards were acceptable for data use without qualifiers.

Organics

Holding times were acceptable for all samples. Most target analytes were undetected in the method blanks. Low levels of some target analytes were detected in water and sludge method blanks. Concentrations of analytes detected in a sample are flagged with a "J" qualifier (estimated value) if the sample concentration was less than five times the method blank concentration. No qualifier is used if the sample concentration is greater than five times the method blank concentration.

Matrix spike and surrogate spike recoveries for the water samples were acceptable for data use without qualifiers.

Surrogate recoveries for the sludge sample were within acceptable limits. Sludge matrix spike recoveries were poor for some compounds: sludge data for analytes affected by the poor recovery are flagged with a "J" qualifier.

Surrogate recoveries for the aerobic holding tank sample BNA scan were acceptable for only three of the six compounds tested. Data for target compounds possibly affected by the poor surrogate recoveries are flagged with an "R" or "REJ" qualifier.

Bioassays

Laboratory control and reference toxicant data were acceptable.

RESULTS AND DISCUSSION

Flow Measurement

Prosser flow measurements were made with in-line meters. Ecology could not practically verify the accuracy of the Prosser measurements. Two concerns were noted by the operator during the inspection:

1. The STP effluent flow meter did not always record zero during periods when the discharge gate was shut and no discharge was occurring. The extent and significance of the observation should be evaluated.

2. The WFJ flow meter may not properly record low flows. The meter size and accuracy should be evaluated.

General Chemistry/NPDES Permit Effluent Limits

Ecology analytical results showed the Prosser STP substantially reduced BOD_5, TSS, and NH_3-N concentrations (Table 1). Plant operation had improved since the upset that had occurred during the previous weekend (see Setting section).

Discharge concentrations were well within NPDES permit effluent limits for most parameters (Table 2). The one exception was one of the two fecal coliform grab sample results. A count of 900/100ml exceeded the monthly and weekly average NPDES permit limits. The corresponding total chlorine residual concentration (0.9 mg/L) should have been adequate for thorough disinfection (Table 1). Ecology design criteria for chlorine contact basin detention time at average flow is one hour (Ecology, 1985). The Prosser operating plan calls for a one-half hour detention time. Longer detention times in the chlorine contact basin or higher chlorine residual concentrations may be necessary if high fecal coliform counts occur frequently.

The effluent flow rate during the inspection (1.444 MGD) was approaching the permit limit (1.555 MGD). It was approximately 93% of the permit limit.

STP Loading

Inspection influent loadings were relatively high in comparison to plant loading capacities included in the NPDES permit (Table 3). The influent BOD_5 load measured from the Ecology composite sample approached the monthly average design capacity. The influent BOD_5 load measured from the Prosser composite sample exceeded the monthly average design capacity. The influent TSS load measured from both the Ecology and Prosser composite samples exceeded the monthly average design capacity.

Table 1 - Ecology Laboratory General Chemistry Results - Prosser 1991.

Parameter Location:	D-Inf-1	D-Inf-2	D-Inf-Eco	D-Inf-P	I-Inf-1	I-Inf-2	I-Inf-Eco	TC-P	Mil-P	WFr-P	Pri-Ef-1	Pri-Ef-2	Pri-Ef-Eco
Type:	grab	grab	E-comp	P-comp	grab	grab	E-comp	P-comp	P-comp	P-comp	grab	grab	E-comp
Date:	10/8	10/8	10/8-9	10/8-9	10/8	10/8	10/8-9	10/8-9	10/8-9	10/8-9	10/8	10/8	10/8-9
Time:	09:00	14:50	@	@	10:00	10:10	@	@	@	@	10:20	15:35	@
Lab Log #:	418230	418231	418232	418233	418234	418235	418236	418237	418238	418239	418240	418241	418242
GENERAL CHEMISTRY													
Conductivity (umhos/cm)	1050	1240	1060	1050	3140	1910	2370	3460	1020	1830	1350	1410	1410
Alkalinity (mg/L CaCO3)			310				869						501
Hardness (mg/L CaCO3)			68.7				20.7 E						83.1 E
TS (mg/L)			1110 H				2440 H						1270 H
TNVS (mg/L)			504 H				1300 H						636 H
TSS (mg/L)	233 H	234 H	227 H	250 H	920 H	660 H	920 H	1440 H	280 H	553 H	240 H	200 H	220 H
TNVSS (mg/L)			9 H				340 H						1 U H
% Solids													
% Volatile Solids													
BOD5 (mg/L)			418	410			495	380	885	1710			280
BOD INH (mg/L)													
COD (mg/L)	1200	1040	1100	970	1870	1390	1780	1450	1450	2740	850	870	830
TOC (mg/L)	280	180	240	190	260	320	390	500	460	800	190	140	160
TOC (mg/L)													
Total Persulfate N (TPN-mg/L)			28.2	26.8			160						47.6
NH3-N (mg/L)			12.8	12.5			94	183	0.44	0.135			28.6
NO2+NO3-N (mg/L)			0.01 U	0.01 U			0.191	0.846	0.333	0.01 U			0.014
NO2-N (mg/L)			0.01 U	0.01 U			0.011						0.01 U
Total-P (mg/L)			6.51	6.79			58.4	84.6	7.22	10.4			19.5
F-Coliform MF (#/100mL)													
Fecal Coliform (#/100mg)													
T-Coliform MF (#/100mL)													
Total Coliform (#/100mg)													
FIELD OBSERVATIONS													
Temp (C)	22.5	23.1			32.9	31.8					23.5	23.9	
Temp-cooled (C)**			2.4				5.4						3.0
pH	7.1	6.8	7.5	7.5	6.3	6.4	7.1	7.9	8.3	7.5	6.9	6.7	7.4
Conductivity (umhos/cm)	940	1170	950	1120	1450	1790	2290	3170	1010	1660	1220	1330	1390
Chlorine (Before S02 -mg/L)													
Chlorine (After S02 -mg/L)													

@ 24 hour composite sample. Collection period: 0800 - 0800.
E Concentration exceeds the known calibration range.
H Exceeded holding time.
J Although the analyte was positively identified, the value is an estimate.
U Analyte was not detected at or above the reported value.
X High background count.

** Temperature of composite sample at the end of the sampling period.
D-Inf Domestic influent samples.
I-Inf Industrial influent samples.
TC-P Prosser sample of Twin City Foods.
Mil-P Prosser sample of Milne Fruit Products.
Wfr-P Prosser sample of WA Frontier Juice.
Pri-Ef Primary clarifier effluent.
SBR-In Sequencing Batch Reactor (SBR) influent.

Ef STP effluent.
River Yakima River upstream of Prosser discharge.
Aer-HT Aerated holding tank.
E-Comp Ecology composite sample.
P-Comp Prosser composite sample.

Table 1 - Ecology Laboratory General Chemistry Results - Prosser 1991

Parameter	Location:	SBR-In-1	SBR-In-2	SBR-In-Eco	Ef-1	Ef-2	Ef-3	Ef-4	Ef-Eco	Ef-GC	Ef-P	River-1	River-2	Sludge	Aer-HT
	Type:	grab	grab	E-comp	grab	grab	grab	grab	E-comp	E-gr/cmp	P-comp	grab	grab	grab	grab
	Date:	10/8	10/8	10/8-9	10/8	10/8	10/9	10/9	10/8-9	10/8	10/8-9	10/8	10/8	10/9	10/9
	Time:	10:35	15:50	@	13:20	15:15	16:05	12:00	@	*	@	14:15	16:55	11:55	12:35
	Lab Log #:	418243	418244	418245	418246	418247	418248	418249	418250	418251	418252	418253	418254	418255	418256
GENERAL CHEMISTRY															
Conductivity (umhos/cm)		1650	1650	1690	1430	1420			1430	1420	1410	344	307		
Alkalinity (mg/L CaCO3)				642					451	461					
Hardness (mg/L CaCO3)				97.5 E					88.5	89.6		141	121		
TS (mg/L)				1290 H					1070 H						
TNVS (mg/L)				723 H					716 H						
TSS (mg/L)		220 H	260 H	220 H	73 H	50 H			71 H	55 H	81 H				
TNVSS (mg/L)				20 H					5 H						
% Solids														95.5	0.74
% Volatile Solids														30.2	0.43
BOD5 (mg/L)				98					31		50 J				
BOD INH (mg/L)				128					12		24				
COD (mg/L)		660	540	600	220	200			150		370				
TOC (mg/L)		110	89	82	24	19			25		23				
TOC (mg/L)														38000	2200
Total Persulfates N (TPN-mg/L)				66.5					22.8		24.4			8300	240
NH3-N (mg/L)				39.4	0.294	0.153			0.211		0.240	0.018	0.019		
NO2+NO3-N (mg/L)				0.022	10.7	13.9			13.4		13.7				
NO2-N (mg/L)				0.013					0.109		0.096				
Total-P (mg/L)				31.7	27.4	26.8			27.1		26.5				
F-Coliform MF (#/100mL)							900	46 J							
Fecal Coliform (sediment) (#/100mg)															1,700,000
T-Coliform MF (#/100ml)							36000 X	1500 X							
Total Coliform (sediment) (#/100mg)															3,000,000
FIELD OBSERVATIONS															
Temp (C)		24.8	25.5		25.1	24.8	25					15.6	15.1		
Temp-cooled (C)**				3.7					4.1		9.3				
pH		7.7	7.4	8.3	7.4	7.4	7.5		8.0		8.1	7.7	8.2		
Conductivity (umhos/cm)		1720	1540	1710	1240	1380	1400		1320		1360	307	430		
Chlorine (Before S02 -mg/L)						0.7	0.9	1.0							
Chlorine (After S02 -mg/L)					0.1 U		0.1 U								

@ 24 hour composite sample. Collection period: 0800 - 0800.
E Concentration exceeds the known calibration range.
H Exceeded holding time.
J Although the analyte was positively identified, the value is an estimate.
U Analyte was not detected at or above the reported value.
X High background count.

* Grab composite. Equal volumes collected on 10/8 at 1320 & 1515.
** Temperature of composite sample at the end of the sampling period.
D-Inf Domestic influent samples.
I-Inf Industrial influent samples.
TC-P Prosser sample of Twin City Foods.
Mil-P Prosser sample of Milne Fruit Products.
Wfr-P Prosser sample of WA Frontier Juice.
Pri-Ef Primary clarifier effluent.

SBR-In Sequencing Batch Reactor (SBR) influent.
Ef STP effluent.
River Yakima River upstream of Prosser discharge.
Aer-HT Aerated holding tank.
E-Comp Ecology composite sample.
P-Comp Prosser composite sample.

Table 2 – Effluent NPDES Limits/Inspection Results Comparison (Ecology Labortory Results) – Prosser, 1991

	NPDES Permit Limits					
			Location:	Ef	Ef–Eco	Ef–P
			Type:	grabs	E–comp	P–comp
			Date:	10/8&9	10/8–9	10/8–9
			Lab Log #:	***	418250	418252
	Monthly Average	Weekly Average	Daily Maximum			
Effluent BOD5 (lbs/Day)						
Total	2310	–	4491	–	373	602 J
Effluent TSS (lbs/Day)						
Total	2467	–	4679	–	855 H	976 H
Flow – Effluent (MGD) **						
Total	1.555	–	–	1.444	1.444	1.444
Fecal coliform (colonies/100 ml)	200	400	–	900 ;46	–	–
pH (S.U.)	----- {6.0 < pH < 9.0} -----			7.5	–	–
Total Residual Chlorine –Effluent (mg/l)	---------- 0.34 ----------			0.1 U ;0.	–	–
Total Ammonia as N – Effluent (mg/l)	--------- 36.2*+ ---------			–	0.211	0.24

**	Flows provided by Prosser.	***	Effluent grabs 418246 & 418247.
H	Holding time exceeded.	Ef	STP effluent
J	Value is an estimate.	Aer–HT	Aerobic holding tank
E–Comp	Ecology composite sample.	Total	Combination of Domestic & WFJ, TCF, MFP, & Reserve.
P–Comp	Prosser composite sample.		
*+	Limit calculated with Ecology Yakima River sample data (0.019 mg/L NH3–N).		

Table 3 – Influent NPDES Limits/Inspection Results Comparison (Ecology Laboratory Results) – Prosser, 1991

	NPDES Design Criteria Monthly Average	NPDES Design Criteria Weekly Average	NPDES Design Criteria Daily Maximum	D-Inf-Eco	D-Inf-P	I-Inf-Eco	TC-P	Mil-P	WFr-P	Total Influent***	
Location:				D-Inf-Eco	D-Inf-P	I-Inf-Eco	TC-P	Mil-P	WFr-P	Total Influent***	
Type:				E-comp	P-comp	E-comp	P-comp	P-comp	P-comp	E-comp**	P-comp
Date:				10/8-9	10/8-9	10/8-9	10/8-9	10/8-9	10/8-9	10/8-9	10/8-9
Lab Log #:				418232	418233	418236	418237	418238	418239	Ecology	Prosser
Flow – Influent (MGD) ++											
Domestic *	0.57	0.82	–	0.572	0.572	–	–	–	–	–	–
WFJ #	–	–	–	–	–	–	–	–	0.128	–	–
Domestic & WFJ #	–	–	–	0.700	0.700	–	–	–	–	–	–
TCF	0.62	0.8	1.0	–	–	–	0.414	–	–	–	–
MFP	0.32	0.42	0.6	–	–	–	–	0.399	–	–	–
TCF & MFP	0.94	1.22	1.6	–	–	0.813	–	–	–	–	–
Total	1.61	2.19	–	–	–	–	–	–	–	1.513	1.513
Influent BOD5 (lbs/Day)											
Domestic *	888	–	1800	614	568	–	–	–	–	–	–
WFJ #	–	–	–	–	–	–	–	–	1826	–	–
Domestic & WFJ #	–	–	–	2440	2394	–	–	–	–	–	–
TCF	3105	–	6210	–	–	–	1312	–	–	–	–
MFP	1800	–	3600	–	–	–	–	2945	–	–	–
TCF & MFP	4905	–	9810	–	–	3356	–	–	–	–	–
Total	5925	–	11880	–	–	–	–	–	–	5796	6651
Influent TSS (lbs/Day)											
Domestic *	888	–	–	735 H	870 H	–	–	–	–	–	–
WFJ #	–	–	–	–	–	–	–	–	590 H	–	–
Domestic & WFJ #	–	–	–	1325 H	1460 H	–	–	–	–	–	–
TCF	2115	–	4230	–	–	–	4972 H	–	–	–	–
MFP	3200	–	6400	–	–	–	–	932 H	–	–	–
TCF & MFP	5315	–	10630	–	–	6238 H	–	–	–	–	–
Total	6335	–	–	–	–	–	–	–	–	7563 H	7364 H

*	Calculated by subtraction.
H	Holding time exceeded.
#	Not under permit.
++	Flows provided by Prosser.
**	Sum of TCF & MFP flows.
***	Total influent E-comp is the sum of D-Inf-Eco & I-Inf-Eco. Total influent P-comp is the sum of D-Inf-P, TC-P, and Mil-P.
E-Comp	Ecology composite sample
P-Comp	Prosser composite sample

WFJ	WA. Frontier Juice
TFC	Twin City Foods
MFP	Milne Fruit Products
D-Inf	Domestic influent samples.
I-Inf	Industrial influent samples.
TC-P	Prosser sample of Twin City Foods.
Mil-P	Prosser sample of Milne Fruit Products.
Wfr-P	Prosser sample of WA Frontier Juice.
Total	Design criteria total is the combination of Domestic and WFJ, TCF, MFP, & Reserve.

During the inspection the domestic flow accounted for approximately 10% of the BOD_5 and TSS influent load (Table 3). The bulk of the BOD_5 and TSS loading came from the three industrial discharges.

The nature of the fruit juice and potato processing wastes was quite different relative to each other during the inspection (Table 1). MFP and WFJ had fairly high BOD_5 (885 and 1710 mg/L, respectively), low total inorganic nitrogen (0.773 and 0.145 mg/L), moderate TSS (280 H and 553 H mg/L) and moderate total-P (7.22 and 10.4 mg/L) concentrations. The juice processors contributed 77% of the BOD_5 load to the STP during the inspection (Table 3). The MFP BOD_5 loading and flow rate to the Prosser STP during the inspection were greater than the monthly average design capacity for MFP included in the NPDES permit. The design capacities for WFJ were not included in the NPDES permit.

TCF wastewater had a moderate BOD_5 concentration (380 mg/L). TSS (1440 H mg/L), NH_3-N (183 mg/L), and total-P (84.6 mg/L) concentrations were high (Table 1). The potato processor contributed nearly 66% of the TSS load to the STP during the inspection (Table 3). Twin City TSS loading to the Prosser STP during the inspection exceeded the monthly average design capacity and daily maximum for TCF included in the NPDES permit. The NH_3-N and the total-P concentrations were also high, but loading capacities for these parameters were not included in the NPDES permit.

On October 7, 1991, the influent flow rate (1.513 MGD) approached the permit loading limit for all sources (1.61 MGD). This was approximately 94% of the permit loading limit. It exceeded the 85% criteria at which the permit requires the submission of a plan and schedule for the maintenance of adequate treatment capacity.

Treatment Process Effectiveness

Treatment efficiency during the inspection was calculated for the trickling filter/secondary clarifier and SBR (Table 4). Secondary clarifier sludge return to the primary clarifier during the inspection prevented calculation of the primary clarifier efficiency. TSS concentrations leaving the primary clarifier approximated influent concentrations. The NH_3-N (12.8 mg/L in and 28.5 mg/L out) and total-P (6.5 mg/L in and 19. 5 mg/L out) concentrations increased through the primary clarifier. Sludge wasted from the secondary clarifier to the primary clarifier is the presumed source of this increase. The waste sludge stream was not sampled.

The trickling filter (TF) in combination with the secondary clarifier (SC) provided good treatment during the inspection (Table 4). The TF/SC process removed 63% of the incoming TSS and 75% of the incoming BOD_5. Reduction of NH_3-N was substantial indicating nitrification, however, the relatively small change in NO_2+NO_3-N (0.11 mg/L to 0.022 mg/L) suggests that denitrification was also taking place. During the inspection an alternative to sending TF/SC sludge to the primary clarifier was to send the sludge to the SBR either before or after repassing the sludge through the TF. Since the inspection, the operator reported that

Table 4 – Ecology General Chemistry Results with Percent Removal – Prosser 1991.

Location:	D-Inf-Eco	Pri-Ef-Eco	I-Inf-Eco	TF-Inf	TF/SC	SBR-Inf-Eco	SBR	Ef-Eco	Total	Sludge	Aer-HT
Type:	E-comp	E-comp	E-comp	Weighted	Percent	E-comp	Percent	E-comp	Percent	grab	grab
Date:	10/8-9	10/8-9	10/8-9	Dom. & Ind.	Removal	10/8-9	Removal	10/8-9	Removal	10/9	10/9
Time:	@	@	@	Conc.		@		@		11:55	12:35
Lab Log #	418232	418242	418236	*	**	418245	***	418250	****	418255	418256
GENERAL CHEMISTRY											
Conductivity (umhos/cm)	1060	1410	2370	1928	12	1690	15	1430	26		
Alkalinity (mg/L CaCO3)	310	501	869	700	8	642	30	451	36		
Hardness (mg/L CaCO3)	68.7	83.1	20.7	49	-97	97.5	9	88.5	-79		
TS (mg/L)	1110	1270	2440	1902	32	1290	17	1070	44		
TNVS (mg/L)	504	636	1300	995	27	723	1	716	28		
TSS (mg/L) ▵	227	220	920	598	63	220	68	71	88		
TNVSS (mg/L)	9	1	340	184	89	20	75	5	97		
% Solids										95.5	0.74
% Volatile Solids										30.2	0.43
BOD5 (mg/L)	418	280	495	396	75	98	68	31	92		
BOD INH (mg/L)						128	91	12			
COD (mg/L)	1100	830	1780	1343	55	600	75	150	89		
TOC (mg/L)	240	160	390	284	71	82	70	25	91		
TOC (mg/l)										38000	2200
Total Persulfate N (TPN-mg/L)	28.2	47.6	160	108	39	66.5	66	22.8	79	8300	240
NH3-N (mg/L)	12.8	28.6	94	64	38	39.4	99	0.211	100		
NO2+NO3-N (mg/L) #	0.01 U	0.014	0.191	0.110	80	0.022	-60809	13.4	-12129		
NO2-N (mg/L) #	0.01 U	0.01	0.011	0.011	-23	0.013	-738	0.109	-934		
Total-P (mg/L)	6.51	19.5	58.4	41	22	31.7	15	27.1	33		
TIN (NH3 + NO2 + NO3)	12.8	28.61	94.2	64	38	39.42	65	13.61	79		

* Weighted concentration = .46(Primary Clarifier Effluent) + .54(Industrial Influent).
** Percent removal across the Trickling Filter & Secondary Clarifier.
*** Percent removal across the Sequencing Batch Reactor.
**** Percent removal across the entire STP.
\# Negative numbers indicate that these compounds were formed by nitrification.
▵ Holding times were exceeded for hardness analyses.

D-Inf	Domestic Influent
Pri-Ef	Primary Clarifier Effluent
Ind-Inf	Industrial Influent
TF-Inf	Trickling Filter Influent
SBR-Inf	Sequencing Batch Reator Influent
Ef	Sewage Treatment Plant Effluent
Sludge	Drying bed sample
Aer-HT	Aeration Holding Tank
TF/SC	Trickling Filter/Secondary Clarifier

a system of wasting sludge directly to the aerobic holding tank has been installed. The new system should improve treatment by directly removing the sludge solids and associated TSS and nutrient loads waste stream. Also, the easier sludge handling associated with the aerobic holding tank is realized.

Routing of plant wastewater flow through the SBR completed the treatment process. The SBR reduced BOD_5 and TSS concentrations and brought NH_3-N concentrations within NPDES permit limits (Tables 2 and 4). The SBR removed 68% of both the remaining TSS and BOD_5. The effluent NO_2+NO_3-N concentration was 13.4 mg/L indicating nitrogen removal from the wastestream was not complete. Total-P still remained fairly high. The new secondary clarifier sludge wasting system should help the operator maintain a high sludge age in the SBR for good NH_3-N removal.

Priority Pollutant Organics - VOA, BNA, and Pesticide/PCB Scans

Three priority pollutant organics were detected by the effluent VOA, BNA, and pesticide/PCB scans (Table 5). Chloroform (7-13 μg/L) was present in the effluent at the highest concentration. All three compounds detected were at concentrations less than EPA acute and chronic water quality toxicity criteria for freshwater (EPA, 1986).

Several compounds were detected in the influent samples (Table 5). Chloroform (21-28 μg/L), tetrachloroethene (12-63 μg/L), acetone (22-36 μg/L), 4-methylphenol (33 μg/L), and several phthalate compounds (4-30 μg/L) were present in the highest concentrations in the domestic/WFJ influent sample. Acetone (161-220 μg/L), benzoic acid (59 μg/L), and 4-methylphenol (730 μg/L) were present at the highest concentrations in the industrial influent. Concentrations were reduced through the treatment process.

Several organics were also found in the sludge and aerobic holding tank samples (Table 5). Bis(2-ethylhexyl)phthalate was found in the highest concentration in the sludge sample (estimated concentration 45000 ug/Kg dry wt basis) and the aerobic holding tank sample (estimated concentration 81 μg/L). Also 4,4'-DDE (64 ug/Kg dry wt basis) was detected in the sludge. EPA National Sewage Sludge Survey data were available for four of the organics detected in the Prosser samples (EPA, 1990). The Prosser sludge data were less than the EPA survey geometric mean plus one standard deviation, with most Prosser data less than the geometric mean (Table 6). It should be noted, that the EPA survey was of municipal wastewater treatment plants and that Prosser had a large load from industrial food processors.

A complete list of target compounds and detection limits is included in Appendix E.

Several tentatively identified compounds (TICs) were also detected (Appendix F). Concentrations of the TICs generally decreased through the treatment plant.

Table 5 - VOA, BNA, Pesticide/PCB, and Metals Detected - Prosser, 1991.

Parameter	D-Inf-1	D-Inf-2	D-Inf-Eco	I-Inf-1	I-Inf-2	I-Inf-Eco	Ef-1	Ef-2	Ef-Eco	Sludge	Aer-HT	EPA Water Quality Criteria Summary (EPA; 1986) Acute Fresh	Chronic Fresh
Location:	D-Inf-1	D-Inf-2	D-Inf-Eco	I-Inf-1	I-Inf-2	I-Inf-Eco	Ef-1	Ef-2	Ef-Eco	Sludge	Aer-HT		
Type:	grab	grab	E-comp	grab	grab	E-comp	grab	grab	E-comp	grab	grab		
Date:	10/8	10/8	10/8-9	10/8	10/8	10/8-9	10/8	10/8	10/8-9	10/9	10/9		
Time:	09:00	14:50	@	10:00	10:10	@	13:20	15:15	@	11:55	12:35		
Lab Log#:	418230	418231	418232	418234	418235	418236	418246	418247	418250	418255	418256		
VOA Compounds										dry weight			
(UNITS:)	(ug/L)	(ug/L)		(ug/L)	(ug/L)		(ug/L)	(ug/L)		(ug/Kg)		(ug/L)	(ug/L)
Chloroform	28	21		-	-		7	13		-		28,900 #	1,240 #
Bromodichloromethane	0.3 J	-		-	-		0.5 J	0.9 J		-		11,000 #(a)	
Dibromochloromethane	0.5 J	0.7 J		-	-		-	-		-		11,000 #(a)	
Bromoform	0.2 J	0.3 J		-	-		-	-		-		11,000 #(a)	
Dichlorodifluoromethane	-	-		-	-		-	-		19 J		11,000 #(a)	
cis-1,2-Dichloroethene	0.2 J	0.3 J		-	-		-	-		-		11,600 #(b)	
Tetrachloroethene	63	12		-	-		-	-		-		5,280 #	840 #
Acetone	22	36		220	161		-	-		150 J			
2-Butanone (MEK)	-	-		-	-		-	-		56 J			
Carbon Disulfide	-	-		-	-		-	-		3 J			
Benzene	-	-		-	-		-	-		3 J		5,300 #	
Toluene	-	-		13	7		-	-		7 J		17,500 #	
1,3,5-Trimethylbenzene	-	0.8 J		-	-		-	-		-			
1,2,4-Trimethylbenzene	-	4 J		-	-		-	-		-			
1,4-Dichlorobenzene	2 J	2 J		-	-		-	-		-		1,120 #(h)	763 #(h)
BNA Compounds										dry weight			
(UNITS:)			(ug/L)			(ug/L)			(ug/L)	(ug/Kg)	(ug/L)	(ug/L)	(ug/L)
Hexachlorocyclopentadiene			-			-			-	5300 J	-	7 #	5.2 #
Isophorone			-			-			-	1200	-	117,000 #	
Pyrene			-			-			-	1300	-		
Benzo(a)Anthracene			-			-			-	-	3 J		
Chrysene			-			-			-	-	3 J		
Benzo(b)Fluoranthene			-			-			-	-	2 J		
Diethyl Phthalate			8			-			-	-	-	940 #(i)	3 #(i)
Di-n-Butyl Phthalate			4			-			-	-	-	940 #(i)	3 #(i)
Butylbenzyl Phthalate			19			-			-	-	-	940 #(i)	3 #(i)
Bis(2-Ethylhexyl)Phthalate			30			8			-	45000 J	81 J	940 #(i)	3 #(i)
Phenol			10			14			-	-	15 J	10,200 #	2,560 #
4-Methylphenol			33			730			-	-	-		
Benzyl Alcohol			8 J			12 J			-	-	-		
Benzoic Acid			13 J			59			2 J*	-	12 J		
Pesticide/PCB Compounds										dry weight			
(UNITS:)			(ug/l)			(ug/l)			(ug/l)	(ug/kg)	(ug/l)	(ug/L)	(ug/L)
4,4'-DDE			-			-			-	64	-	1,050 #	0.001 (u)
Aroclor-1254			-			-			-	-	2.7 J	2.0 (w)	0.014 (w)

Table 5 – VOA, BNA, Pesticide/PCB, and Metals Detected (Cont.) – Prosser, 1991.

Parameter	D-Inf-1	D-Inf-2	D-Inf-Eco	I-Inf-1	I-Inf-2	I-Inf-Eco	Ef-1	Ef-2	Ef-Eco	Sludge	Aer-HT	EPA Water Quality Criteria Summary (EPA; 1986) Acute Fresh	Chronic Fresh
Type:	grab	grab	E-comp	grab	grab	E-comp	grab	grab	E-comp	grab	grab		
Date:	10/8	10/8	10/8-9	10/8	10/8	10/8-9	10/8	10/8	10/8-9	10/9	10/9		
Time:	09:00	14:50	@	10:00	10:10	@	13:20	15:15	@	11:55	12:35		
Lab Log#:	418230	418231	418232	418234	418235	418236	418246	418247	418250	418255	418256		
Metals			TR			TR			TR	T-Dry wt.	T-Dry wt.		
(UNITS:)			(ug/L)			(ug/L)			(ug/L)	(mg/Kg)	(mg/Kg)	(ug/L)	(ug/L)
Arsenic			3.4 ENP			4.3 NP			2.8 P	1.84 N	1.51 EN		
Pentavalent												850 #	48 #
Trivalent												360	190
Beryllium			–			–			– –	0.47 P	0.28 P	130 #	5.3 #
Cadmium			–			2.3 P			– –	2.25	1.8	3.9 +	1.1 +
Chromium			–			13 P			– –	38.4	15.8		
Hexavalent												16	11
Trivalent												1,737 +	207 +
Copper			21			79.1			8.9 P	127	94	18 +	12 +
Lead			3.7 PN			12.7 N			1.9 N	29.5 N	14 N	82 +	3.2 +
Mercury			0.13 P			0.058 P			– –	3.69	3.92 P	2.4	0.012
Nickel			–			19 P			7.6 P	15	10.7	1,418 +	158 +
Selenium			2.9 P			–			– –	0.75 N	0.34 PN	260	35
Silver			5 P			–			– –	6.10 N	2 N	4.1 +	0.12
Zinc			171			515			87.6	854	700	117 +	106 +

E This qualifier is used when the concentration of the associated value exceeds the known calibration range.
J The analyte was positively identified. The associated numerical result is an estimate.
N For metals analytes the spike sample recovery is not within control limits.
P Analyte was detected above the instrument detection limits, but below the minimum qualification limits.
* The analyte was present in the sample.
# Insufficient data to develop criteria. Value presented is the LOEL – Lowest Observable Effect Limit.
+ Hardness dependent criteria (90 mg/L used).
a Total Halomethanes criteria
b Total Dichloroethenes criteria
h Total Dichlorobenzenes criteria
i Total Phthalate Esters criteria
u DDT plus metabolites criteria
w Total Aroclors (PCBs) criteria

@ 24 hour composite. Collection period: 0800 – 0800.
D-Inf Domestic influent samples.
I-Inf Industrial influent samples.
TC-P Prosser sample of Twin City Foods.
Mil-P Prosser sample of Milne Fruit Products.
Wfr-P Prosser sample of WA Frontier Juice.
TR Total Recoverable
T Total
– Undetected

Pri-Ef Primary clarifier effluent.
SBR-In Sequencing Batch Reactor (SBR) influent.
Ef STP effluent.
River Yakima River upstream of Prosser discharge.
Aer-HT Aerated holding tank.
E-Comp Ecology composite sample.
P-Comp Prosser composite sample.

Table 6 – Comparison of Detected Compounds in Digested Sludge with the National Sewage Sludge Survey – Prosser 1991

			Data from EPA Sludge Survey (EPA; 1990)*			
Parameter	Sludge @ (mg/Kg) dry wt.	Aerobic Holding Tank + (mg/Kg) dry wt.	Geometric Mean** (mg/Kg) dry wt.	Geometric Mean + 1 S.D. (mg/Kg) dry wt.	Number of Samples	Percent Detected %
VOA COMPOUNDS						
Benzene	0.003 J		0.0005 ##	0.025 ##	87 ##	11.5 ##
BNA COMPOUNDS						
Bis(2-ethylhexyl) Phthalate	45 J	0.08 J	74.7	673	200	62
PESTICIDE/PCB						
4,4-DDE	0.064		0.065 ++	0.13 ++	69 ++	3 ++
Aroclor-1254		0.003	118.8	8.15E6	198	8
METALS						
Arsenic	1.84 N	1.51 EN	9.93	28.7	199	80
Beryllium	0.47 P	0.28 P	0.37	0.71	199	23
Cadmium	2.25	1.8	6.9	18.7	198	69
Chromium	38.4	15.2	118.6	458	199	91
Copper	127	94	741.0	1703	199	100
Lead	29.5 N	14 N	134.0	332	199	80
Mercury	3.69	3.92 P	5.22	20.8	199	63
Nickel	15	10.7	42.7	137.5	199	66
Selenium	0.75 PN	0.34 PN	5.16	12.5	199	65
Zinc	854	700	1202	2756	199	100

* Geometric mean and variance are exponential conversions of arithmetic mean and variance for log-normal distributions which were derived utilizing the Method of Maximum Likelihood.

@ Drying Bed grab – Lab no. 418255
+ Aerobic H.T. grab – Lab no. 418256
E Qualifier is used when the concentration exceeds the known calibration range.
J Result is an estimate.
N For metals analytes the spike sample recovery is not within control limits.
P Analyte was detected above the instrument detection limits, but below the minimum qualification limits.

++ Estimate from one flow group – 1<flow<10
Weighted combination of only two flow groups, which are flow > 100 MGD and 10<flow<+100 MGD.
** Estimates of national pollutant concentrations are a weighted combination of flow rate group estimates.

Priority Pollutant Metals

Inspection data show some metals removal through the plant, particularly copper and zinc (Table 5). Effluent metals concentrations were all less than EPA acute and chronic water quality toxicity criteria for freshwater (EPA, 1986).

Metals concentrations were generally comparable in the sludge and aerobic holding tank samples. The concentrations were compared to the EPA National Sewage Sludge Survey (Table 6 - EPA, 1990). The Prosser sludge data were less than EPA survey geometric mean plus one standard deviation, with most Prosser data less than the geometric mean. It should be noted, that the EPA survey was of municipal wastewater treatment plants and that Prosser had a large load from industrial food processors.

Bioassays

The Rainbow trout (*Oncorhynchus mykiss*) 96 hour survival test found no acute toxicity, with 100% survival in 100% effluent (Table 7). *Daphnia magna* survival and reproduction tests and the fathead minnow (*Pimephales promelas*) survival and growth tests likewise demonstrated no acute or chronic toxicity.

Daphnia magna reproduction in effluent concentrations less than 50% effluent was greater than in the control. Also, average fathead minnow growth was greater at all effluent concentrations than it was for the control. Some enhancement due to the effluent is suggested.

Microtox luminescence tests produced a large number of negative gammas. This is indicative of low toxicity.

Split Sample Results/Laboratory Evaluation

Split sample results compared fairly well for most parameters (Table 8). Comparison of Ecology and Prosser samples was generally good, suggesting most Ecology and Prosser samples were representative. One exception was the Ecology analysis of industrial loading for Ecology and Prosser samples (Table 9). Loading from the Ecology combined industrial sample and the sum of the Prosser TCF & MFP samples showed some variability for different parameters. Relative percent differences (RPD's) were 20% or greater for four parameters; Ecology samples for two of the parameters yielded the higher loading while Prosser samples yielded the higher loading for the remaining two parameters. The cause of the variability is unclear.

Ecology and Prosser lab results compared acceptably for BOD_5, TSS, temperature, pH, and total chlorine residual measurements. Prosser NH_3-N analytical results were greater than Ecology analytical results for the influent, effluent, and river samples; the percent difference being greatest at the lower concentrations. The data suggest the Prosser testing technique provides less sensitivity at low NH_3-N concentrations and may indicate a lack of analytical accuracy.

Table 7 – Effluent Bioassay Results – Prosser 1991.

NOTE: all tests were run on the effluent (Ef-GC sample) - lab log # 418251

Daphnia magna - 7 day survival and reproduction test
(Daphnia magna)

Sample	# Tested	Percent Survival	Mean # Young per Original Female
Control	10	80	29.5
6.25 % Effluent	10	70	34.4
12.5 % Effluent	10	90	35.6
25 % Effluent	10	90	28.0
50 % Effluent	10	90	27.4
100 % Effluent	10	90	24.1

Acute
LC50 = >100 % effluent
NOEC = 100 % effluent
LOEC = 100 % effluent

Chronic
NOEC = 100 % effluent
LOEC +> 100% effluent

Fathead Minnow - 7 day survival and growth test
(Pimephales promelas)

Sample	# Tested *	Percent Survival	Average Growth per Fish (mg)
Control	40	84.2	0.18
1.56 % Effluent	40	92.5	0.23
3.12 % Effluent	40	95.0	0.22
6.25 % Effluent	40	92.5	0.22
12.5 % Effluent	40	92.5	0.24
25 % Effluent	40	90.0	0.27
50 % Effluent	40	92.5	0.30
100 % Effluent	40	92.7	0.24

Acute
LOEC = >100 % effluent
LC50 = >100 % effluent
NOEC = 100% effluent

Chronic
NOEC = 100 % effluent
LOEC = >100 % effluent

* four replicates of 10 organisms

Rainbow Trout - 96 hour survival test
(Oncorhynchus mykiss)

Sample	# Tested	Percent Survival
Control	30	100
100% Effluent	30	100

Microtox

	EC50 (%) effluent)
5 minutes	*
15 minutes	*
15 minutes **	*

* large number of negative statistical gammas interpreted as indicating low toxicity.
** color corrected

NOEC – no observable effects concentration
LOEC – lowest observable effects concentration
LC50 – lethal concentration for 50% of the organisms
EC50 – effect concentration for 50% of the organisms

Table 8 – Split Sample Result Comparison – Prosser, 1991

Parameter	Location:	D-Inf-Eco	D-Inf-P	TC-P	Mil-P	WFr-P	Ef-3	Ef-4	Ef-Eco	Ef-P	River-1
	Type:	E-comp	P-comp	P-comp	P-comp	P-comp	grab	grab	E-comp	P-comp	grab
	Date:	10/8-9	10/8-9	10/8-9	10/8-9	10/8-9	10/9	10/9	10/8-9	10/8-9	10/8
	Time:	@	@	@	@	@	16:05	12:00	@	@	14:15
	Lab Log #:	418232	418233	418237	418238	418239	418248	418249	418250	418252	418253
	<u>Laboratory</u>										
TSS (mg/L)	Ecology	227 H	250 H	1440 H	280 H	553 H			71 H	81 H	
	Prosser	222	212	1446	256	586			82	88	
BOD5 (mg/L)	Ecology	418	410	380	885	1710			31	50 J	
	Prosser	480	480	315	731	1483			36	36	
NH3-N (mg/L)	Ecology	12.8	12.5						0.211	0.24	0.018
	Prosser	19.8	19.8						0.46	0.46	0.12
F-Coliform MF	Ecology						900	46 J			
(#/100ml)	Prosser						137	10			
T-Coliform MF	Ecology						36000 X	1500 X			
(#/100ml)	Prosser						43	117			
Temp (C)	Ecology										15.6
	Prosser										17
pH	Ecology										7.7
	Prosser										8.0
Total Residual Chlorine	Ecology							1.0			
(mg/L)	Prosser							1.2			

@ 24 hour composite. Collection period: 0800 – 0800.
H Exceeded Holding Time.
J The analyte was positively identified. The associated value is an estimate.
X High Background Count.

D-Inf Domestic influent samples.
I-Inf Industrial influent samples.
TC-P Prosser sample of Twin City Foods.
Mil-P Prosser sample of Milne Fruit Products.
Wfr-P Prosser sample of WA Frontier Juice.
Pri-Ef Primary clarifier effluent

SBR-In Sequencing Batch Reactor (SBR) influent
Ef STP effluent
River Yakima River upstream of Prosser discharge
Aer-HT Aerated holding tank
E-Comp Ecology composite sample
P-Comp Prosser composite sample

Table 9 – Industrial Influent General Chemistry Results Comparison– Prosser 1991.

Parameter		TC-P	Mil-P	Total*	I-Inf-Eco	Relative
	Location:	TC-P	Mil-P	Total*	I-Inf-Eco	Relative
	Type:	P-comp	P-comp	Ind-P	E-comp	Percent
	Date:	10/8-9	10/8-9		10/8-9	Difference
	Time:	@	@		@	RPD**
	Lab Log #:	418237	418238		418236	
GENERAL CHEMISTRY						
TSS (lb/d)		4972 H	932 H	5904 H	6238 H	6 %
BOD5 (lb/d)		1312	2945	4257	3356	24 %
COD (lb/d)		5007	4825	9832	12069	20 %
TOC (lb/d)		1726	1531	3257	2644	21 %
NH3-N (lb/d)		632	1	633	637	1 %
Total-P (lb/d)		292	24	316	396	22 %

@ 24 hour composite sample.
Collection period: 0800 – 0800.
H Exceeded holding time.
calibration range.
E-Comp Ecology composite sample.
P-Comp Prosser composite sample.

I-Inf Industrial influent samples.
TC-P Prosser sample of Twin City Foods.
Mil-P Prosser sample of Milne Fruit Products.
* Total of TC-P and Mil-P.
** RPD between sample 1 (Total Ind-P) and sample 2 (I-Inf-Eco).
(RPD: Relative Percent Difference – defined as the difference between results divided by their average and expressed as a percentage.)

Ecology fecal coliform results were about five times greater than the Prosser results in the two effluent grab samples. The difference warrants further investigation since one Ecology grab concentration was greater than permitted weekly and monthly concentrations. Additional sample splits for fecal coliform analysis by Ecology and Prosser are recommended. Ecology total coliform results were up to three orders of magnitude greater than the Prosser results in the two effluent grab samples. Improved total coliform analysis appears necessary.

A laboratory audit was conducted on October 18, 1991 by the Ecology Quality Assurance Section in conjunction with the Class II Inspection (Appendix G). The audit report noted deficiencies in the formal (*i.e.*, documented) quality assurance program, and a lack of proper training for the total coliform counting technique. These deficiencies should be corrected as part of a lab accreditation process.

CONCLUSIONS AND RECOMMENDATIONS

Flow Measurement

Flow measurements were made with in-line meters and could not be verified. Two concerns were noted by the operator.

- The STP effluent flow meter measurement when no flow is being discharged should be investigated.

- The accuracy of the WFJ flow meter at low flow rates should be investigated.

General Chemistry/NPDES Effluent Limits

Inspection data found the Prosser STP substantially reduced influent BOD_5, TSS, and NH_3-N concentrations. Effluent concentrations were within NPDES permit limits with the exception of one fecal coliform sample.

- A longer chlorine contact time or higher chlorine residual concentrations are recommended if compliance with fecal coliform limits becomes a problem.

Chlorine contact time can be variable when discharge is sent to the sprayfield.

- Coliform sampling at the sprayfield is recommended to assure the current operational system provides adequate disinfection.

STP Loading

Inspection BOD_5 and TSS loadings approached or exceeded design capacities included in the NPDES permit. During the inspection approximately 10% of the BOD_5 and TSS loads was from domestic sewage, with the balance from the three principal industries. The MFP BOD_5 load to the STP exceeded the monthly average design capacity for MFP. The TCF TSS load to the STP exceeded the monthly average and daily maximum design capacity for TCF. The plant had just recovered from an upset the weekend before the inspection, suggesting the plant cannot consistently handle high loads.

- The STP should either make provision to treat the high influent loads or reduce the loads at the sources. Prosser should submit a plan and a schedule to maintain adequate treatment capacity.

Treatment Process Effectiveness

The trickling filter/secondary clarifier provided good BOD_5 and TSS reduction and some nitrogen removal. The SBR system provided additional BOD_5 and TSS removal, nitrification, and some nitrogen removal.

Priority Pollutant Organics - VOA, BNA, and Pesticide/PCB Scans

Several organics were detected in the influent, while only three compounds were detected in the effluent. All three were at concentrations less than acute and chronic water quality toxicity criteria for freshwater (EPA, 1986).

Organics were also detected in the sludge and aerobic holding tank samples. The Prosser STP sludge data were less than the EPA National Sewage Sludge Survey data geometric mean plus one standard deviation for compounds where EPA data were available (EPA, 1990). The EPA survey data are from municipal plants.

Priority Pollutant Metals

Effluent metals concentrations were all less than EPA acute and chronic water quality toxicity criteria for freshwater (EPA, 1986).

The Prosser sludge data were less than the EPA survey geometric mean plus one standard deviation, with most Prosser data less than the geometric mean (EPA, 1990). The EPA survey data are from municipal plants.

Bioassays

Bioassays found no toxic effects due to the effluent.

Split Samples Results/Laboratory Evaluation

Most Prosser sampling appeared to be representative. Prosser laboratory results were acceptable for most parameters. NH_3-N results suggest the Prosser technique yielded higher results and was less sensitive than the Ecology method. Prosser total coliform results did not compare well with Ecology results.

The laboratory evaluation found a need for a more formal quality assurance program and a need for total coliform test training (Appendix G).

- Additional sample splits for fecal coliform analysis by Ecology and Prosser are recommended.

- Total coliform procedure training is recommended.

- Laboratory evaluation recommendations included in the audit should be implemented.

REFERENCES

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APPENDICES

APPENDIX A - Sampling Station Descriptions - Prosser, October 1991.

D-Inf

Domestic Influent - samples collected at the outlet of the aerated grit channel. Sample includes domestic flow and WA Frontier Juice flow.

I-Inf

Industrial Influent - samples collected just upstream of the industrial Parshall flume. Sample includes the flow from Twin City Foods, Inc. and Milne Fruit Products.

TC-P

Twin City Foods, Inc. sample collected by Prosser.

Mil-P

Milne Fruit Products sample collected by Prosser.

WFr-P

WA Frontier Juice sample collected by Prosser.

Pri-Ef

Primary effluent - composite sample collected between the scum collar and the overflow weir near the overflow channel outlet. Grab samples collected from the overflow channel outlet.

SBR-In

Sequencing Batch Reactior influent - composite sample collected just inside the overflow weir near the overflow channel outlet. Grab samples collected from the overflow channel outlet.

Ef

Effluent - Composite sample and most grab samples collected from the chlorine contact tank. Final chlorine residual measurements taken from the outfall line tap downstream of SO2 addition.

River 1

Yakima River bank sample collected in flowing water approximately 50 yards upstream of the sandy area at the end of the access road near the treatment plant entrance. Location is 100-150 yards upstream of the STP discharge.

River 2

Yakima River bank sample collected at the sandy area at the end of the access road near the treatment plant entrance. Location is 50-100 yards upstream of the STP discharge. This station is the usual permit sampling location.

Sludge

Dried sludge collected as a composite from two of the drying beds.

Aer-HT

Aerobic holding tank - grab sample collected in a well mixed area of the tank.

APPENDIX B – Sampling Schedule – Prosser 1991.

Parameter	Location:	D–Inf–1	D–Inf–2	D–Inf–Eco	D–Inf–P	I–Inf–1	I–Inf–2	I–Inf–Eco	TC–P	Mil–P	WFr–P	Pri–Ef–1	Pri–Ef–2	Pri–Ef–Eco
	Type:	grab	grab	E–comp	P–comp	grab	grab	E–comp	P–comp	P–comp	P–comp	grab	grab	E–comp
	Date:	10/8	10/8	10/8–9	10/8–9	10/8	10/8	10/8–9	10/8–9	10/8–9	10/8–9	10/8	10/8	10/8–9
	Time:	09:00	14:50	@	@	10:00	10:10	@	@	@	@	10:20	15:35	@
	Lab Log #:	418230	418231	418232	418233	418234	418235	418236	418237	418238	418239	418240	418241	418242
GENERAL CHEMISTRY														
Conductivity		E	E	E	E	E	E	E	E	E	E	E	E	E
Alkalinity				E				E						E
Hardness				E				E						E
TS				E				E						E
TNVS				E				E						E
TSS		E	E	EP	EP	E	E	E	EP	EP	EP	E	E	E
TNVSS				E				E						E
% Solids														
% Volatile Solids														
BOD5				EP	EP			E	EP	EP	EP			E
BOD INH														
COD		E	E	E	E	E	E	E	E	E	E	E	E	E
TOC (water)		E	E	E	E	E	E	E	E	E	E	E	E	E
TOC (soil)														
Total Persulfate N (TPN)				E	E			E						E
NH3–N				EP	EP			E	E	E	E			E
NO2+NO3–N				E	E			E	E	E	E			E
NO2–N				E	E			E						E
Total–P				E	E			E	E	E	E			E
F–Coliform MF														
F–Coliform (sediment)														
T–Coliform MF														
T–Coliform (sediment)														
ORGANICS														
VOC (water)		E	E			E	E							
VOC (soil)														
BNAs (water)				E				E						
BNAs (soil)														
Pest/PCB (water)				E				E						
Pest/PCB (soil)														
METALS														
PP Metals **				E				E						
BIOASSAYS														
Salmonid (acute 100%)														
Microtox (acute)														
Daphnia (chronic)														
Fathead Minnow (chronic)														
FIELD OBSERVATIONS														
Temp		E	E	E		E	E	E				E	E	E
pH		E	E	E	E	E	E	E	E	E	E	E	E	E
Conductivity		E	E	E	E	E	E	E	E	E	E	E	E	E
Chlorine														

E – Ecology Lab Analysis
P – Prosser Lab Analysis.

@	24 hour composite. Collection period: 0800 – 0800.
D–Inf	Domestic influent samples.
I–Inf	Industrial influent samples.
TC–P	Prosser sample of Twin City Foods.
Mil–P	Prosser sample of Milne Fruit Products.
Wfr–P	Prosser sample of WA Frontier Juice.
Pri–Ef	Primary clarifier effluent
SBR–In	Sequencing Batch Reactor (SBR) influent
Ef	STP effluent
River	Yakima River upstream of Prosser discharge
Aer–HT	Aerated holding tank
E–Comp	Ecology composite sample
P–Comp	Prosser composite sample

APPENDIX B - Sampling Schedule - Prosser 1991.

Parameter II														
Location:	SBR-In-1	SBR-In-2	SBR-In-Eco	Ef-1	Ef-2	Ef-3	Ef-4	Ef-Eco	Ef-GC	Ef-P	River-1	River-2	Sludge	Aer-HT
Type:	grab	grab	E-comp	grab	grab	grab	grab	E-comp	E-gr/cmp	P-comp	grab	grab	grab	grab
Date:	10/8	10/8	10/8-9	10/8	10/8	10/9	10/9	10/8-9	10/8	10/8-9	10/8	10/8	10/9	10/9
Time:	10:35	15:50	@	13:20	15:15	16:05	12:00	@	**	@	14:15	16:55	11:55	12:35
Lab Log #:	418243	418244	418245	418246	418247	418248	418249	418250	418251	418252	418253	418254	418255	418256
GENERAL CHEMISTRY														
Conductivity	E	E	E	E	E			E	E	E	E	E		
Alkalinity			E					E	E					
Hardness			E					E	E		E	E		
TS			E					E						
TNVS			E					E						
TSS	E	E	E	E	E			EP	E	EP				
TNVSS			E					E						
% Solids													E	E
% Volatile Solids													E	E
BOD5			E					EP		EP				
BOD INH			E					E		E				
COD	E	E	E	E	E			E		E				
TOC (water)	E	E	E	E	E			E		E				
TOC (soil)													E	E
Total Persulfate N (TPN)			E					E		E			E	E
NH3-N			E	E	E			EP		EP	EP	E		
NO2+NO3-N			E	E	E			E		E				
NO2-N			E					E		E				
Total-P			E	E	E			E		E				
F-Coliform MF						EP	EP							
F-Coliform (sediment)														E
T-Coliform MF						EP	EP							
T-Coliform (sediment)														E
ORGANICS														
VOC (water)				E	E									
VOC (soil)													E	
BNAs (water)								E						
BNAs (soil)													E	
Pest/PCB (water)								E						
Pest/PCB (soil)													E	
METALS														
PP Metals								E					E	E
BIOASSAYS														
Salmonid (acute 100%)									E					
Microtox (acute)									E					
Daphnia (chronic)									E					
Fathead Minnow (acute)									E					
FIELD OBSERVATIONS														
Temp	E	E	E	E	E	E		E			EP	E		
pH	E	E	E	E	E	E		E		E	EP	E		
Conductivity	E	E	E	E	E	E		E		E	E	E		
Chlorine				E	E	E	EP							

E - Ecology Lab Analysis
P - Prosser Lab Analysis.

@	24 hour composite. Collection period: 0800 - 0800.
**	Two grab composites. Equal volumes collected on 10/8 at 1320 and 1515.
D-Inf	Domestic influent samples
I-Inf	Industrial influent samples
TC-P	Prosser sample of Twin City Foods
Mil-P	Prosser sample of Milne Fruit Products
Wfr-P	Prosser sample of WA Frontier Juice

Pri-Ef	Primary clarifier effluent
SBR-In	Sequencing Batch Reactor (SBR) influent
Ef	STP effluent
River	Yakima River upstream of Prosser discharge
Aer-HT	Aerated holding tank
E-Comp	Ecology composite sample
P-Comp	Prosser composite sample

APPENDIX C – Ecology Analytical Methods – Prosser, 1991

Parameter	MANCHESTER_METHODS	Lab Used
GENERAL CHEMISTRY		
Conductivity	EPA, Revised 1983: 120.1	ECOLOGY
Alkalinity	EPA, Revised 1983: 310.1	ECOLOGY
Hardness	EPA, Revised 1983: 130.2	ECOLOGY
SOLIDS 4		
TS	EPA, Revised 1983: 160.3	ECOLOGY
TNVS	EPA, Revised 1983: 160.3	ECOLOGY
TSS	EPA, Revised 1983: 160.2	ECOLOGY
TNVSS	EPA, Revised 1983: 160.2	ECOLOGY
% Solids	APHA, 1989: 2540G.	Sound Analytic Services
% Volatile Solids	EPA, Revised 1983: 160.4	Sound Analytic Services
OXYGEN DEMAND		
BOD5	EPA, Revised 1983: 405.1	Water Management Laboratories
BOD INH	EPA, Revised 1983: 405.1	Water Management Laboratories
COD	EPA, Revised 1983: 410.1	Sound Analytic Services
TOC (water)	EPA, Revised 1983: 415.1	Sound Analytic Services
TOC (soil)	EPA, Revised 1983: 415.1	Sound Analytic Services
NUTRIENTS		
Total Persulfate	EPA, Revised 1983: 351.3	Sound Analytic Services
NH3–N	EPA, Revised 1983: 350.1	ECOLOGY
NO2+NO3–N	EPA, Revised 1983: 353.2	ECOLOGY
NO2–N	EPA, Revised 1983: 353.2	ECOLOGY
Phosphorous – Total	EPA, Revised 1983: 365.3	ECOLOGY
MICROBIOLOGY		
F–Coliform MF	APHA, 1989: 9222D.	ECOLOGY
F–Coliform (sediment)	APHA, 1989: 9221C.	ECOLOGY
T–Coliform MF	APHA, 1989: 9222B.	ECOLOGY
T–Coliform (sediment)	APHA, 1989: 9221A.	ECOLOGY
ORGANICS		
VOC (water)	EPA, 1986: 8260	ECOLOGY
VOC (soil)	EPA, 1986: 8240	ECOLOGY
BNAs (water)	EPA, 1986: 8270	ECOLOGY
BNAs (soil)	EPA, 1986: 8270	ECOLOGY
Pest/PCB (water)	EPA, 1986: 8080	ECOLOGY
Pest/PCB (soil)	EPA, 1986: 8080	ECOLOGY
METALS		
PP Metals	EPA, Revised 1983: 200–299	ECOLOGY
BIOASSAYS		
Salmonid (acute 100%)	Ecology, 1981	ECOLOGY
Microtox (acute)	Beckman, 1982	ECOLOGY
Fathead Minnow (chronic)	EPA 1989: 1000.0	ECOLOGY
Daphnia magna (chronic)	ASTM, 1987: E1193	ECOLOGY

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

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APPENDIX D - Cleaning Procedures Prior to Sampling for Priority Pollutant - Prosser, 1991.

1. Wash with laboratory detergent.
2. Rinse several times with tap water.
3. Rinse with 10% HNO_3 solution.
4. Rinse three (3) 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.

Appendix E – VOA, BNA, Pesticide/PCB and Metals Scan Results – Prosser 1991.

Location:	D–Inf–1	D–Inf–2	I–Inf–1	I–Inf–2	Ef–1	Ef–2	Sludge
Type:	grab	grab	grab	grab	grab	grab	grab
Date:	10/8	10/8	10/8	10/8	10/8	10/8	10/9
Time:	09:00	14:50	10:00	10:10	13:20	15:15	11:55
Lab Log#:	418230	418231	418234	418235	418246	418247	418255
VOA Compounds							
	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/kg) dry wt.	(µg/l)
Chloromethane	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
Bromomethane	5 U	5 U	5 U	0.5 J	5 UJ	5 UJ	9 UJ
Methylene Chloride	5 U	5 U	5 U	5 U	5 U	5 U	25 J*
Chloroform	28 *	21 *	5 U	5 U	7 *	13 U	9 UJ
Carbon Tetrachloride	5 U	5 U	5 U	5 U	5 U	5 U	9 U
Bromodichloromethane	0.3 J	5 U	5 U	5 U	0.5 J*	0.9 J*	9 U
Dibromochloromethane	0.5 J*	0.7 J*	5 U	5 U	5 U	5 U	9 U
Bromoform	0.2 J*	0.3 J*	5 U	5 U	5 U	5 U	9 UJ
Bromochloromethane	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
Dibromomethane	5 U	5 U	5 U	5 U	5 U	5 U	9 U
Dichlorodifluoromethane	5 U	5 U	5 U	5 U	5 U	5 U	19 J*
Trichlorofluoromethane	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
Chloroethane	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
Vinyl Chloride	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
1,1–Dichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
1,2–Dichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
1,1–Dichloroethene	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
cis–1,2–Dichloroethene	0.2 J*	0.3 J*	5 U	5 U	5 U	5 U	9 UJ
trans–1,2–Dichloroethene	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
1,1,1–Trichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	9 U
1,1,2–Trichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	9 U
Trichloroethene	5 U	5 U	5 U	5 U	5 U	5 U	9 U
1,1,1,2–Tetrachloroethane	5 U	5 U	5 U	5 U	5 U	5 U	9 U
1,1,2,2–Tetrachloroethane	5 U	5 U	5 U	5 U	5 U	5 U	9 U
Tetrachloroethene	63 *	12 *	5 U	5 U	5 U	5 U	9 U
1,2–Dibromoethane (EDB)	5 U	5 U	5 U	5 U	5 U	5 U	9 U
1,2–Dichloropropane	5	5 U	5 U	5 U	5 U	5 U	9 U
1,3–Dichloropropane	5 U	5 U	5 U	5 U	5 U	5 U	9 U
2,2–Dichloropropane	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
1,2,3–Trichloropropane	5 U	5 UJ	5 U	5 U	5 U	5 U	9 UJ
1,2–Dibromo–3–Chloropropane (DBCP)	5 UJ	5 U	5 UJ	5 UJ	5 UJ	5 UJ	9 UJ
1,1–Dichloropropene	5 U	5 U	5 U	5 U	5 U	5 U	9 U
cis–1,3–Dichloropropene	5 U	5 U	5 U	5 U	5 U	5 U	9 U
trans–1,3–Dichloropropene	5 U	5 U	5 U	5 U	5 U	5 U	9 U
Hexachlorobutadiene	5 UJ	5 UJ	5 UJ	5 UJ	5 U	5 U	9 UJ
Acetone	22 *	36 *	220 *	161 *	5 U	5 U	150 J*
2–Butanone (MEK)	5 U	5 U	650 UJ	5 U	5 U	5 U	56 J*
4–Methyl–2–Pentanone (MIBK)	5 U	5 U	5 U	5 U	5 U	5 U	9 U
2–Hexanone	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	9 U

Location:	D-Inf-1	D-Inf-2	I-Inf-1	I-Inf-2	Ef-1	Ef-2	Sludge
Type:	grab	grab	grab	grab	grab	grab	grab
Date:	10/8	10/8	10/8	10/8	10/8	10/8	10/9
Time:	09:00	14:50	10:00	10:10	13:20	15:15	11:55
Lab Log#:	418230	418231	418234	418235	418246	418247	418255
VOA Compounds							
	(μg/l)	(μg/l)	(μg/l)	(μg/l)	(μg/l)	(μg/kg) dry wt.	(μg/l)
Carbon Disulfide	5 U	5 U	5 U	5 U	5 U	5 U	3 J*
Benzene	5 U	5 U	5 U	5 U	5 U	5 U	3 J*
Toluene	5 U	5 U	13 *	7 *	5 U	5 U	7 J*
Ethylbenzene	5 U	5 U	5 U	5 U	5 U	5 U	9 U
Propylbenzene	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
Isopropylbenzene	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
Butylbenzene	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
sec-Butylbenzene	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
tert-Butylbenzene	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
Styrene	5 U	5 U	5 U	5 U	5 U	5 U	9 U
Total Xylenes	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
p-Isopropyltoluene	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
1,3,5-Trimethylbenzene	5 U	0.8 J*	5 U	5 U	5 U	5 U	9 UJ
1,2,4-Trimethylbenzene	5 U	4 J*	5 U	5 U	5 U	5 U	9 UJ
Chlorobenzene	5 U	5 U	5 U	5 U	5 U	5 U	9 U
Bromobenzene	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
1,2-Dichlorobenzene	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
1,3-Dichlorobenzene	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
1,4-Dichlorobenzene	2 J*	2 J*	5 U	5 U	5 U	5 U	9 UJ
1,2,3-Trichlorobenzene	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	9 UJ
1,2,4-Trichlorobenzene	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
2-Chlorotoluene	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
4-Chlorotoluene	5 U	5 U	5 U	5 U	5 U	5 U	9 UJ
Naphthalene	5 U	5 U	5 U	5 U	5 U	5 UJ	9 UJ

Location:	D-Inf-Eco	I-Inf-Eco	Ef-Eco	Sludge	Aer-HT
Type:	E-comp	E-comp	E-comp	grab	grab
Date:	10/8-9	10/8-9	10/8-9	10/9	10/9
Time:	@	@	@	11:55	12:35
Lab Log#:	418232	418236	418250	418255	418256
BNA Compounds					
	(μg/l)	(μg/l)	(μg/l)	(μg/Kg) dry wt.	(μg/l)
Hexachloroethane	3 U	3 U	1 U	1000 U	7 UR
Hexachlorobutadiene	7 U	6 U	4 U	2600 U	17 UR
Hexachlorocyclopentadiene	14 U	13 UJ	7 U	5300 J*	35 UR
Bis(2-Chloroethyl)Ether	3 U	3 U	1 U	1000 U	7 UR
Bis(2-Chloroisopropyl)Ether	3 U	3 U	1 U	1000 U	7 UR
Bis(2-Chloroethoxy)Methane	3 U	3 U	1 U	1000 U	7 UR
N-Nitroso-di-n-Propylamine	3 U	3 U	1 U	1000 U	7 UR
N-Nitrosodiphenylamine	10 UJ	32 U	1 U	REJ	87 UR

Appendix E – VOA, BNA, Pesticides/PCB and Metals Scan Results (cont'd) – Prosser, 1991.

Location:	D-Inf-Eco		I-Inf-Eco		Ef-Eco		Sludge		Aer-HT	
Type:	E-comp		E-comp		E-comp		grab		grab	
Date:	10/8-9		10/8-9		10/8-9		10/9		10/9	
Time:	@		@		@		11:55		12:35	
Lab Log#:	418232		418236		418250		418255		418256	
BNA Compounds										
	(µg/l)		(µg/l)		(µg/l)		(µg/Kg) dry wt.		(µg/l)	
Isophorone	3	U	3	U	1	U	1200	*	7	UR
Naphthalene	3	U	3	U	1	U	1000	U	7	UR
1-Methylnaphthalene	3	U	3	U	1	U	1000	U	7	UR
2-Methylnaphthalene	3	U	3	U	1	U	1000	U	7	UR
Acenaphthylene	3	U	3	U	1	U	1000	U	7	UR
Acenaphthene	3	U	3	U	1	U	1000	U	7	UR
Fluorene	3	U	3	U	1	U	1000	U	7	UR
Phenanthrene	3	U	3	U	1	U	1000	U	7	UR
Anthracene	3	U	3	U	1	U	1000	U	7	UR
Fluoranthene	3	U	3	U	1	U	1000	U	7	UR
Pyrene	3	U	3	U	1	U	1300	*	7	UR
Benzo(a)Anthracene	3	U	3	U	1	U	1000	U	3	J*
Chrysene	3	U	3	U	1	U	1000	U	3	J*
Benzo(b)Fluoranthene	3	U	3	U	1	U	1000	U	2	J*
Benzo(k)Fluoranthene	3	U	3	U	1	U	1000	U	2	J*
Benzo(a)Pyrene	3	U	3	U	1	U	1000	U	7	UR
Indeno(1,2,3-cd)Pyrene	3	U	3	U	1	U	1000	U	7	UR
Dibenzo(a,h)Anthracene	7	U	6	U	4	U	2600	U	17	UR
Benzo(g,h,i)Perylene	3	U	3	U	1	U	1000	U	7	UR
1,2-Dichlorobenzene	3	U	3	U	1	U	1000	U	7	UR
1,3-Dichlorobenzene	3	U	3	U	1	U	1000	U	7	UR
1,4-Dichlorobenzene	3	U	3	U	1	U	1000	U	7	UR
1,2,4-Trichlorobenzene	3	U	3	U	1	U	1000	U	7	UR
Hexachlorobenzene	3	U	3	U	1	U	1000	U	7	UR
2-Chloronaphthalene	3	U	3	U	1	U	1000	U	7	UR
Dimethyl Phthalate	3	U	3	U	1	U	1000	U	7	UR
Diethyl Phthalate	8	*	3	U	1	U	1000	U	7	UR
Di-n-Butyl Phthalate	4	*	3	U	1	U	1000	U	7	UR
Butylbenzyl Phthalate	19	*	6	U	4	U	2600	U	17	UR
Bis(2-Ethylhexyl)Phthalate	30	*	8	*	1	U	45000	J*	81	J*
Di-n-Octyl Phthalate	3	UJ	3	UJ	1	UJ	1000	UJ	7	UR
Nitrobenzene	3	U	3	UJ	1	U	1000	U	7	UR
2,4-Dinitrotoluene	7	U	6	U	4	U	2600	UJ	17	UR
2,6-Dinitrotoluene	7	U	6	U	4	U	2600	U	17	UR
3,3'-Dichlorobenzidine	REJ		63	UJ	REJ		REJ		170	UR
Phenol	10	*	14	*	1	U	1000	U	15	J*
2-Methylphenol	3	U	3	U	1	U	1000	U	7	UR
4-Methylphenol	33	*	730	*	1	U	1000	U	7	UR
2,4-Dimethylphenol	3	U	3	U	1	U	1000	U	7	UR
2-Nitrophenol	7	U	6	U	4	U	2600	U	17	UR
4-Nitrophenol	18	U	16	UJ	9	U	13000	UJ	43	UR
2,4-Dinitrophenol	36	UJ	32	UJ	18	UJ	13000	U	87	UR
4,6-Dinitro-2-Methylphenol	36	UJ	32	UJ	18	UJ	13000	UJ	87	UR
o-Chlorophenol	3	U	3	U	1	U	1000	U	7	UR
2,4-Dichlorophenol	3	U	3	U	1	U	1000	U	7	UR
4-Chloro-3-Methylphenol	14	U	13	U	7	U	5300	U	35	UR
2,4,5-Trichlorophenol	14	U	13	U	7	U	5200	U	35	UR
2,4,6-Trichlorophenol	7	U	6	U	4	U	2600	U	17	UR
Pentachlorophenol	14	U	13	U	7	U	5300	UJ	35	UR
4-Chlorophenyl Phenylether	3	U	3	U	1	U	1000	U	7	UR

Appendix E – VOA, BNA, Pesticides/PCB and Metals Scan Results (cont'd) – Prosser, 1991.

Location:	D-Inf-Eco	I-Inf-Eco	Ef-Eco	Sludge	Aer-HT
Type:	E-comp	E-comp	E-comp	grab	grab
Date:	10/8-9	10/8-9	10/8-9	10/9	10/9
Time:	@	@	@	11:55	12:35
Lab Log#:	418232	418236	418250	418255	418256
BNA Compounds	(μg/l)	(μg/l)	(μg/l)	(μg/Kg) dry wt.	(μg/l)
4-Bromophenyl Phenylether	3 U	3 U	1 U	1000 U	7 UR
2-Nitroaniline	7 U	6 U	4 U	2600 U	17 UR
3-Nitroaniline	REJ	REJ	REJ	REJ	87 UR
4-Nitroaniline	36 UJ	32 U	18 UJ	13000 UJ	87 UR
4-Chloroaniline	REJ	REJ	REJ	REJ	87 UR
Benzyl Alcohol	8 J*	12 J*	29 UJ	REJ	140 UR
Benzoic Acid	130 *	59 *	2 J*	13000 UJ	12 J*
Retene	3 U	3 U	1 U	1000 U	7 UR
Carbazole	14 UJ	13 UJ	7 UJ	5300 UJ	35 UR
Dibenzofuran	3 U	3 U	1 U	1000 U	7 UR

Location:	D-Inf-Eco	I-Inf-Eco	Ef-Eco	Sludge	Aer-HT
Type:	E-comp	E-comp	E-comp	grab	grab
Date:	10/8-9	10/8-9	10/8-9	10/9	10/9
Time:	@	@	@	11:55	12:35
Lab Log#:	418232	418236	418250	418255	418256
Pesticide/PCB Compounds	(μg/l)	(μg/l)	(μg/l)	(μg/Kg) dry wt.	(μg/Kg) dry wt.
Aldrin	0.13 U	0.07 U	0.036 U	42 U	0.17 UJ
Dieldrin	0.13 U	0.07 U	0.036 U	42 U	0.17 UJ
Chlordane	0.25 U	0.14 U	0.072 U	420 U	1.7 UJ
Endosulfan I	0.13 U	0.07 U	0.036 U	42 U	0.17 UJ
Endosulfan II	0.13 U	0.07 U	0.036 U	42 U	0.17 UJ
Endosulfan Sulfate	0.13 U	0.07 U	0.036 U	42 U	0.17 UJ
Endrin	0.13 U	0.07 U	0.036 U	42 U	0.17 UJ
Endrin Aldehyde	0.13 U	0.07 U	0.036 U	42 U	0.17 UJ
Endrin Ketone	0.13 U	0.07 U	0.036 U	42 U	0.17 J*
Heptachlor	0.13 U	0.07 U	0.036 U	42 U	0.17 UJ
Heptachlor Epoxide	0.13 U	0.07 U	0.036 U	42 U	0.17 UJ
alpha-BHC	0.13 U	0.07 U	0.036 U	42 U	0.17 UJ
beta-BHC	0.13 U	0.07 U	0.036 U	42 U	0.17 UJ
delta-BHC	0.13 U	0.07 U	0.036 U	42 U	0.17 UJ
gamma-BHC (Lindane)	0.13 U	0.07 U	0.036 U	42 U	0.17 UJ
4,4'-DDT	0.13 U	0.07 U	0.036 U	42 U	0.17 UJ
4,4'-DDE	0.13 U	0.07 U	0.036 U	64 *	0.17 UJ
4,4'-DDD	0.13 U	0.07 U	0.036 U	42 U	0.17 UJ
Toxaphene	0.75 U	0.85 U	0.45 U	510 U	2.1 UJ
Methoxychlor	0.13 U	0.07 U	0.036 U	42 U	0.17 UJ
Aroclor-1016	0.25 U	0.28 U	0.15 U	170 U	0.69 UJ
Aroclor-1221	0.25 U	0.28 U	0.15 U	170 U	0.69 UJ
Aroclor-1232	0.25 U	0.28 U	0.15 U	170 U	0.69 UJ
Aroclor-1242	0.25 U	1.32 J	0.69 U	170 U	0.69 UJ
Aroclor-1248	0.25 U	0.28 U	0.15 U	170 U	0.69 UJ
Aroclor-1254	0.25 U	0.28 U	0.15 U	170 U	2.7 J*
Aroclor-1260	0.25 U	0.28 U	0.15 U	170 U	0.69 U

Appendix E – VOA, BNA, Pesticides/PCB and Metals Scan Results (cont'd) – Prosser, 1991.

Location:	D-Inf-Eco		I-Inf-Eco		Ef-Eco		Sludge		Aer-HT	
Type:	E-comp		E-comp		E-comp		grab		grab	
Date:	10/8-9		10/8-9		10/8-9		10/9		10/9	
Time:	@		@		@		11:55		12:35	
Lab Log#:	418232		418236		418250		418255		418256	
Metals (Hardness = 100)	(µg/l)		(µg/l)		(µg/l)		(µg/Kg) dry wt.		(µg/l)	
Antimony	30	U	30	U	30	U	3.0	U	3.0	U
Arsenic	3.4	ENP	4.3	NP*	2.8	NP*	1.84	EN*	1.51	EN*
Beryllium	1.0	U	1.0	U	1.0	U	0.47	P*	0.28	P*
Cadmium	2.0	U	2.3	P*	2.0	U	2.25	*	1.8	*
Chromium	5.0	U	13	P*	5.0	U	38.4	*	15.8	*
Copper	21	*	79.1	*	8.9	P*	127	*	94.0	*
Lead (ICP)	20	U	20	U	20	U				
Lead (PP)	3.7	PN*	12.7	N*	1.9	PN*	29.5	N*	14	N*
Mercury	0.13	P*	0.058	P*	0.05	U	3.52	*	0.029	P*
Nickel	10	U	19	P*	7.6	P*	15.0	*	10.7	*
Selenium	2.9	P*	2.0	U	2.0	U	0.75	N*	0.34	PN*
Silver	5.0	P*	3.0	U	3.0	U	6.1	N*	2.0	N*
Thallium	2.5	U	2.5	U	2.5	U	0.25	U	0.25	U
Zinc	171	*	515	*	87.6	*	854	*	700	*

B Analyte was found in the analytical method blank, indicating the sample may have been contaminated.
E This qualifier is used when the concentration of the associated value exceeds the known calibration range.
J The analyte was positively identified. The associated numerical result is an estimate.
N For metals analytes the spike sample recovery is not within control limits.
P Analyte was detected above the instrument detection limits, but below the minimum qualification limits.
R Poor surrogate performance
REJ Data unsuitable for all purposes.
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.
* The analyte was detected in the sample.

@ 24 hour composite. Collection period: 0800 – 0800.
D-Inf Domestic influent samples.
I-Inf Industrial influent samples.
TC-P Prosser sample of Twin City Foods.
Mil-P Prosser sample of Milne Fruit Products.
Wfr-P Prosser sample of WA Frontier Juice.

Pri-Ef Primary clarifier effluent
SBR-In Sequencing Batch Reactor (SBR) influent
Ef STP effluent
River Yakima River upstream of Prosser discharg
Aer-HT Aerated holding tank
E-Comp Ecology composite sample
P-Comp Prosser composite sample

Appendix F – VOA and BNA Scan Tentatively Identified Compounds (TICs) – Prosser, 1991

Tic data are presented on the laboratory report sheets that follow. Fractions are identified as VOA or ABN (BNA). Locations corresponding to the Lab Log# (called Sample No. on the laboratory report sheet) and data qualifiers are summarized on this page. If sheets are not included for a station, no TICs were detected.

Location:	D–Inf–1	D–Inf–2	D–Inf–E	I–Inf–1	I–Inf–2	I–Inf–E
Type:	grab	grab	E–comp	grab	grab	E–comp
Date:	10/8	10/8	10/8–9	10/8	10/8	10/8–9
Time:	10:35	14:50	@	10:00	10:10	@
Lab Log #:	418230	418231	418232	418234	418235	418236

Location:	EF–Eco	Sludge	Aer–HT
Type:	E–comp	grab	grab
Date:	10/8–9	10/9	10/9
Time:	@	11:55	12:35
Lab Log #:	418250	418255	418256

NJ – indicates there is evidence the analyte is present. The associated numerical value is an estimate.

Inf – influent
Eco – Ecology sample
Eff – effluent
Sludge – sludge sample
Aer–HT – Holding tank
D – domestic wastewater
grab – grab sample
E–comp – Ecology composite sample

@ – Collection Period: 08:00–08:00

Description: D-INF-1

Sample No.: 418230

Tent Ident - VOA Sca	Water-Total Result	Units
ACETIC ACID, METHYL ES+	2.6NJ*	ug/l

Description: D-INF-2

Sample No.: 418231

Tent Ident - VOA Sca	Water-Total Result	Units
ETHANOL	54NJ*	ug/l
Isopropyl alcohol	6.2NJ*	ug/l
Isopropylbenzene (Cume+	1.4NJ*	ug/l
DECANE	8.2NJ*	ug/l
Ethyl Acetate	1.3NJ*	ug/l
CYCLOHEXENE, 4-ETHENYL+	6.6NJ*	ug/l

Description: D-INF-E

Sample No.: 418232

Tent Ident - B/N/Aci	Water-Total Result	Units
OCTADECANOIC ACID	9100NJ*	ug/l
ETHANOL, 2-BUTOXY-, PH+	46NJ*	ug/l
CHOLESTANOL (VAN)	560NJ*	ug/l
.GAMMA.-SITOSTEROL	220NJ*	ug/l
CYCLOHEXANECARBOXYLIC +	15NJ*	ug/l
Phenylacetic Acid	7.3NJ*	ug/l
BUTANOIC ACID	77NJ*	ug/l
ETHANOL, 2-BUTOXY-	53NJ*	ug/l
ETHANOL, 2-(2-BUTOXYET+	98NJ*	ug/l
HEXANOIC ACID (DOT)	98NJ*	ug/l
Decanoic Acid, Di-	150NJ*	ug/l
CHOLESTAN-3-OL, ACETAT+	46NJ*	ug/l
CYCLOHEXENE, 1-METHYL-+	6.2NJ*	ug/l
a-Terpeneol	43NJ*	ug/l
Ethanol, 1-(2-Butoxyet+	59NJ*	ug/l
TETRADECANOIC ACID	180NJ*	ug/l
HEXADECANOIC ACID	3500NJ*	ug/l

Description: I-INF-1

Sample No.: 418234

Tent Ident - VOA Sca	Water-Total Result	Units
ETHANOL	4.0NJ*	ug/l
Isopropyl alcohol	7.7NJ*	ug/l
ACETIC ACID, METHYL ES+	1.8NJ*	ug/l
Ethyl Acetate	69NJ*	ug/l

Appendix F – VOA and BNA Scan Tentatively Identified Compounds (TICs) – Prosser, October, 1991 (cont.)

Description: I-INF-2

Sample No.: 418235

Tent Ident - VOA Sca	Water-Total Result	Units
ETHANOL	130NJ*	ug/l
Isopropyl alcohol	45NJ*	ug/l
1-Propanol	29NJ*	ug/l
METHANE, THIOBIS	4.6NJ*	ug/l
ACETIC ACID, METHYL ES+	17NJ*	ug/l
ACETIC ACID, 1-METHYLE+	10NJ*	ug/l
ACETIC ACID, PROPYL ES+	1.6NJ*	ug/l
FURAN, 2-PROPYL-	3.0NJ*	ug/l
2-BUTENOIC ACID, ETHYL+	0.95NJ*	ug/l

Description: I-INF-E

Sample No.: 418236

Tent Ident - B/N/Aci	Water-Total Result	Units
OCTADECANOIC ACID	6000NJ*	ug/l
BENZENEETHANOL	26NJ*	ug/l
BENZOIC ACID, 3-METHYL-	1.6NJ*	ug/l
Phenylacetic Acid	60NJ*	ug/l
BUTANOIC ACID	82NJ*	ug/l
BENZOIC ACID, 2-AMINO-+	27NJ*	ug/l
HEXANOIC ACID (DOT)	31NJ*	ug/l
BENZENE, PENTYL-	1.5NJ*	ug/l
BUTANOIC ACID, 3-HYDRO+	67NJ*	ug/l
TETRADECANOIC ACID	94NJ*	ug/l
HEXADECANOIC ACID	3800NJ*	ug/l

Description: EF-ECO

Sample No.: 418250

Tent Ident - B/N/Aci	Water-Total Result	Units
OCTADECANOIC ACID	18NJ*	ug/l
ETHANOL, 2-BUTOXY-, PH+	1.2NJ*	ug/l
Heptadecanoic acid	1.5NJ*	ug/l
Decanoic Acid, Penta-	2.0NJ*	ug/l
9-HEXADECENOIC ACID	8.2NJ*	ug/l
TETRADECANOIC ACID, 12+	0.81NJ*	ug/l
TETRADECANOIC ACID	1.8NJ*	ug/l
HEXADECANOIC ACID	23NJ*	ug/l

Description: SLUDGE

Sample No.: 418255

Tent Ident - VOA Sca	Water-Total Result	Units
BENZALDEHYDE (ACN) (DO+	220NJ*	ug/l
2-HEPTANONE	10NJ*	ug/l
5-HEPTEN-2-ONE, 6-METH+	200NJ*	ug/l
HEPTANAL	54NJ*	ug/l
NONANAL	290NJ*	ug/l
BENZENEMETHANOL, .ALPH+	25NJ*	ug/l
2,2'-BI-1,3-DIOXOLANE	59NJ*	ug/l
CYCLOHEXENE, 1-METHYL-+	760NJ*	ug/l
CYCLOBUTENE, 2-PROPENY+	10NJ*	ug/l

Tent Ident - B/N/Aci	Sld/SemiSld Result	Units
Isophorone	7900NJ*	ug/kg
PHENOL, 4-NONYL-	340000NJ*	ug/kg
PHENOL, 4-DODECYL-	270000NJ*	ug/kg
2-PENTANONE, 4-METHOXY+	16000NJ*	ug/kg
PYRIDINE, 2,4,6-TRIMET+	14000NJ*	ug/kg
2-CYCLOHEXEN-1-ONE, 3,+	44000NJ*	ug/kg

Appendix F - VOA and BNA Scan Tentatively Identified Compounds (TICs) - Prosser, October, 1991 (cont.)

Description: AER-HT

Sample No.: 418256

Tent Ident - B/N/Aci	Water-Total Result	Units
OCTADECANOIC ACID	560NJ*	ug/l
Decanoic Acid, Penta-	170NJ*	ug/l
TETRADECANOIC ACID, 12+	58NJ*	ug/l
HEXADECANOIC ACID	2700NJ*	ug/l

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

SYSTEM AUDIT REPORT

LABORATORY: Prosser Wastewater Treatment Plant Laboratory

ADDRESS: 601 Seventh Street
Prosser, WA 99350

DATE OF AUDIT: October 18 and 30, 1991

AUDITORS:	Dale Van Donsel	Microbiology
	Perry Brake	General Chemistry
PERSONNEL INTERVIEWED:	Gene Finn	Lab Analyst

AUTHENTICATION:

Dale J. Van Donsel

Perry F. Brake

GENERAL FINDINGS AND RECOMMENDATIONS

General

1. A system audit was conducted at the Prosser Wastewater Treatment Plant laboratory on October 18 (microbiology) and 30 (chemistry), in conjunction with the Class II Inspection of the treatment plant. The purpose of the audit was to verify laboratory capabilities pertaining to analyses required in the treatment plant discharge permit and to review analytical and quality control data. General audit findings and recommendations are documented below. Significant recommendations for improvement of laboratory operations are highlighted by use of *italics*.

2. A very significant deficiency in the overall lab operation at the Prosser plant lab was the lack of a formal (i.e., documented) quality assurance (QA) program designed to assure reliability of analytical data generated in the lab. *A recommendation was made to the lab analyst and plant superintendent that establishment of such a program and publication of a QA manual be made a high priority.* A model QA manual for a wastewater treatment plant lab had previously been given to the lab and, additionally, Mr. Finn will soon attend a treatment plant QA training session in Oregon where one of the subjects of discussion will be setting up and documenting a lab's QA program. The intent at the Prosser lab is to formalize their QA program and finish writing a QA manual soon after that training session. A commitment was made by the visiting team to assist the lab in development of the QA program and manual.

Personnel

3. Mr. Finn is responsible for all analytical procedures used in the lab and is assisted on occasion by plant operators who are trained under his guidance. Mr. Finn has several years experience in analytical procedures and appeared very knowledgeable in methods and techniques for which the laboratory is responsible.

4. Mr. Finn is doing both fecal and total (M-Endo) coliform testing, but has had no specific training with the total coliform technique. This is a deceptively difficult test and unlike the M-FC test, it is not possible to teach oneself to count sheen colonies. Some outside assistance will help provide confidence in counting. The Benton-Franklin Health District laboratory is certified by the Department of Health for the total coliform membrane filter test with drinking water. A visit to this lab to observe their MF counting will be very beneficial, especially if Mr. Finn takes some of his own plates.

Facility

5. The lab facility consists of one small, conveniently arranged room which is also used for most administrative functions (i.e., as office space). Current floor and bench space is adequate and conveniently arranged to support current lab operations and efficient administrative functions. Significant expansion of lab operations to include any new analytical

capability (e.g., bioassay) would require additional lab space for efficient operations.

6. The were no records available to indicate the fume hood used in the lab had ever been checked for adequacy of air flow. A check was made by the visiting team during the visit and the flow found to be approximately 80 feet per minute with the sash fully open which is within the ASTM-recommended flow range of 75-125 CFM. *A recommendation was made to have the flow checked periodically (e.g., every year) or whenever there is suspicion that flow may have been reduced for some reason.* (NOTE: Air velocity measuring devices are available from several suppliers, but the Prosser plant should consider borrowing a device periodically from another lab or perhaps a fire department.)

Equipment and Supplies

7. *A recommendation was made for the lab to purchase a spill cleanup kit (as a safety matter and not a matter affecting quality of the analytical work done in the lab).* Information on "Kolor-safe" liquid neutralizers, relatively inexpensive spill kits available from Aldrich, was provided to the lab. Those and other similar kits would be sufficient for the Prosser lab.

8. A check of the fecal coliform waterbath thermometer against an NIST certified thermometer showed that the bath thermometer was reading approximately 0.7° high. The lower temperature of the bath would allow more non-fecal coliforms to produce positive-appearing colonies. This was suspected as one contributor to a theoretically impossible set of sample results, where fecal coliform numbers were significantly higher than total coliform. Another possibility was the light source used to count total coliform (M-Endo) membranes, a circular fluorescent magnifier. This test is the only one that has specific requirements for colony counting; the sheen is very difficult to judge under non-ideal conditions. A stereoscopic microscope with magnification of 10-15X is recommended, and an adjustable fluorescent illuminator (preferably with two 4-W tubes) is required. The lack of specific training with the method, as mentioned in paragraph 4, can compound this. Other reasons for the reversed numbers could be inadequate sample mixing, or allowing the sample to settle before filtering.

9. The Millipore type HA 0.45μ membranes used are acceptable, but for chlorinated effluents, the lab should consider ordering Millipore type HC membranes. These have been developed specifically for this purpose; they help prevent heat damage to chlorine-injured coliforms during the critical first few hours at the very high temperature of the test. Choice of medium can also influence recovery of fecal coliforms. The M-FC medium ampoules used are from Millipore. While these are acceptable according to *Standard Methods*, this medium contains rosolic acid which is added to keep down the number of "background" organisms, but it can also suppress growth of fecal coliforms from chlorinated effluents. It is recommended that a small trial order of Gelman M-FC ampoules be obtained. This version does not contain rosolic acid, and together with the type HC membranes will give better recovery. However, the Gelman medium may at times allow growth of too many interfering colonies, so Millipore medium should still be kept available.

Sample Management

10. Formal chain-of-custody procedures had not been documented (as might be expected, given the absence of a documented QA program in the lab) to assure samples were being properly secured and accounted for from time of receipt in the lab to disposal. *A recommendation was made to establish and implement such procedures to preclude potential problems should future analytical results be involved in litigation.* With proper documentation, sample handling procedures currently used in the lab will suffice for chain-of-custody purposes. The lab's QA manual should document the fact that those procedures, which include identification of all plant personnel involved in analyzing a specific sample, constitute the chain-of-custody procedures for the lab. A copy of ASTM Standard D 4840-88, "Sampling Chain of Custody Procedures," was provided to Mr. Finn subsequent to the visit.

Data Management

11. Analytical data was being recorded in pencil rather than in ink at the time of the audit. *A recommendation was made to record all data and observations in ink and to correct any errors by crossing out with a single line, entering the correct data, and signing or initialling the change.* If initials are used for such purposes or any other purpose in the lab, *a permanent record should be retained in the plant matching initials with each employee to assure employee identification should lab data be involved in future legal proceedings.*

12. Analytical data is being archived in the plant for an unlimited time (i.e., virtually forever). While this will apparently not create a storage problem in the short term, eventually it will. *A recommendation was made to selective purge the archives of outdated data (three years retention is required for NPDES monitoring records).*

PE Samples

13. Blind performance evaluation (PE) samples were not provided to the lab prior to the visit because they apparently were not required by the Quality Assurance Project Plan (QAPjP) associated with the Class II Inspection. Because the plant is not a major permitted discharger, the lab does not participate in EPA's DMR-QA studies. Consequently, there were no results of blind PE sample analyses available for review. A recommendation was made for the lab to contact Mr. Dan Baker at EPA Region 10 for the purpose of signing up for WP Study 028 and subsequent studies. For the purposes of this Class II inspection, the lab's performance evaluation should be based on results of analysis of samples split between the Prosser lab and Manchester Environmental Laboratory.

Quality Assurance/Quality Control

14. The most significant deficiency in the quality assurance area is the lack of a formal QA program, already mentioned in paragraph 2 above. Within the QA program, the most significant deficiency is the lack of any protocol to establish data quality objectives (in terms of bias and precision, or, together, accuracy) and track the lab's capability to meet those objectives.

(One exception was the glucose/glutamic acid standard solution test which was being conducted with every BOD batch.) Because of this deficiency, there is no basis for the lab analyst, plant management, or outside evaluators to determine whether or not the lab is "in control" on a continuing basis. The following recommendations were made to assist the lab in setting up a protocol to establish and track data quality objectives:

a. *The lab should establish a schedule for routinely analyzing quality control (QC) samples along with other analyses.*

(1) *First priority should go to analyzing standard solutions (solutions of known concentration) for those parameters where it is appropriate to do so.* The objective in doing this QC test is to discover any bias in the test by comparing the observed value to the known or expected value, and to track precision as the tests are done repetitively .

For the plant performance parameters reported by the Prosser lab, appropriate standard solution tests would be BOD (the glucose-glutamic acid solution being done), and TSS (using a suspension of a suitable material such as Sigma Cell 20, information on which was provided to the lab by the visiting team), and perhaps residual chlorine using Hach ampules.

(2) *Second priority should go to analyzing duplicate samples, preferably from the effluent stream since duplicates taken elsewhere in the plant are likely to vary widely in concentration.* The objective here is to track precision of analysis on real samples (as opposed to the relatively clean standard solutions). For the plant performance parameters reported by the Prosser lab, appropriate duplicate tests (on effluent samples) would BOD, TSS, residual chlorine, and pH. Duplicates are appropriate for virtually any chemistry test. Duplicate tests can also be done on fecal coliforms if time and manpower resources allow.

b. *After running sufficient QC tests to provide statistically significant data (ten tests of a given type are enough but 20 are better), control charts should be constructed and used as a means to check precision as a routine procedure.* Information on how to construct and use control charts for both standard solutions and duplicate analyses can be found in Appendix L of the Procedural Manual for the Environmental Laboratory Accreditation Program. Consistent use of control charts will provide evidence to interested parties, inside and outside the lab, concerning capability of the lab to accurately analyze environmental samples.

15. The lab should be using thermometers for both the fecal coliform and BOD incubators which are NBS (NIST) certified nor traceable to NBS certified thermometers. Such thermometers had recently been ordered by the lab.

16. Microbiology

a. It is important that the lab establish its own credibility with the fecal coliform test. EPA Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act (corrections to 40 CFR Part 136 dated January 4, 1985) state, "Since the membrane filter technique usually yields low and variable recovery from chlorinated wastewaters, the MPN method will be required to resolve any controversies." There are no equivalents of PE samples or other objective measurements for this parameter. The simplest approach for this lab is to do periodic sample splitting. Comparison of fecal coliform MPN results with this lab's membrane filter results is the verification method of choice. MPN's may be done by a laboratory accredited for this procedure by the Department of Ecology or certified by the Department of Health. The object of these comparisons is not to seek an exact comparison of numbers between the two methods, but to watch for MPN results significantly and consistently higher than the MF which would indicate failure to recover some organisms.

b. There are other verification techniques besides the MPN that can be used. Because the lab does total coliform testing, it has a 35° waterbath and should consider periodic use of one of the two-temperature tests listed in *Standard Methods* (17th ed.) 9212 B2. Additional information and guidance can be obtained from the Quality Assurance Section if desired.

Methods

17. Records of BOD determinations indicate Mr. Finn has been very conscientious in following the written method. Glucose/glutamic acid (G/GA) standard solutions were being analyzed with every (weekly) batch. An analysis of the 20 G/GA results prior to July 24, 1991 (which is the date the lab initiated use of artificial seed for the test) reveals a mean BOD value of 191.1 mg/L, and a standard deviation of 28.6 mg/L. The mean is reasonably close to the 200 mg/L guidance in Standard Methods, and the standard deviation is better than the 37 mg/L guidance. The 16 G/GA tests conducted on July 24 and after average only 159.1 with a standard deviation of 22. It appears the artificial seed has biased the G/GA test toward low results, without detrimentally affecting variability, however. If the lab is also using the artificial seed on actual waste samples, the negative bias could be affecting these results as well. *A recommendation was made to consider returning to the practice of using a waste seed (e.g., settled influent which can be refrigerated and kept for a few weeks).*

18. A color comparator (commonly referred to as a "whiz wheel") was being used for the residual chlorine test in lieu of a spectrophotometer as required by the method. *A recommendation was made for the treatment plant to either get approval from the permit writer to deviate from the requirement of 40 CFR 136 to follow an approved method, or to use the colorimeter (Hach DR3000) currently on hand in the lab to do the residual chlorine test.*