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Water Body No. WA-07-0010
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June 29, 1990

TO: Don Nelson

FROM: Marc Heffner

SUBJECT: Scott, Everett Class II Inspection - January 31 and February 1, 1989

INTRODUCTION

An enhanced Class II inspection was conducted at the Scott Everett Pulp and Paper Mill on January 31 and February 1, 1989. The inspection was conducted by Keith Seiders and Marc Heffner of the Ecology Compliance Monitoring Section. Don Nelson of the Ecology Industrial Section and John Williams with the Ecology Everett Harbor Action Team also participated in the inspection. Ann Bailey and Bob Wood represented Scott during the inspection.

Objectives of the inspection included:

1. Assess plant compliance with NPDES permit effluent limits.

2. Characterize toxicity with priority pollutant scans on untreated and treated mill effluent, and bioassays on treated mill effluents.

3. Review lab procedures at the mill to determine conformance with standard techniques. Samples will be split with the permittee to help determine the accuracy of permit parameter analyses.

Because of recent extensive sediment sampling in Everett Harbor, sediment sampling was not conducted as part of the Class II inspection (PTI, 1988).

The Scott Everett Mill includes both pulp and paper production facilities. The mill uses the sulfite process to produce pulp. Tissue paper is the principal paper product. Two treatment facilities are operated; an activated sludge secondary system primarily for treatment of the sulfite wastewater, and a primary system for treatment of other wastewater. Treated wastewater is discharged into Everett Harbor as regulated by NPDES Permit Number WA-000062-1 via three outfalls: one for the secondary system (008), one for a portion of the primary system (001), and one for the remainder of the primary waste plus untreated non-contact boiler cooling water (003).

PROCEDURES

Ecology sample collection included composites and grabs. Ecology Isco composite samplers were set up to collect influent at both treatment facilities and effluent at the three permitted discharges (Table 1). Samplers were set to collect equal volumes of sample every 30 minutes for 24 hours. Sampling quality assurance/quality control steps included priority pollutant cleaning samplers prior to the inspection and collecting a field transfer blank sample (Table 2). Samples collected, sampling times and parameters analyzed are summarized in Table 3.

Scott also collected composite samples of the three discharges. The Scott samplers collected equal volumes of sample every 15 minutes for 24 hours. Ecology and Scott samples were split for analysis of permit parameters by both Ecology and Scott. Scott also collected grab composite samples along with Ecology bioassay grab composite samples for bioassay and organics analysis (Table 3).

Samples for Ecology analysis were placed on ice and delivered to the Ecology Manchester Laboratory. Analytical procedures and the laboratories doing the analyses are summarized in Table 4.

Exact duplication of samples by Scott and Ecology, and some field measurements were disrupted by the unfavorable weather conditions occurring during the inspection. Conditions included high winds, heavy snowfall, and cold temperatures.

RESULTS AND DISCUSSION

Flow Measurements

Flow measurements were provided by Scott. Flow rates were: 001 - 6.0 MGD, 003 - 7.0 MGD, and 008 - 15.7 MGD. The flow measurements could not be confirmed during the inspection. Meter calibration records should be reviewed during the next inspection.

NPDES Permit and General Chemistry Parameters

The facility was operating well within NPDES Permit limits during the inspection (Table 5). Most of the BOD_5 discharge load was from the primary treatment system while most of the TSS discharge load was from the secondary treated stream. All three of the effluent streams were not toxic to trout at 65 percent effluent strength.

Other general chemistry parameters of interest include fecal coliforms, and oil and grease (Table 6). Fecal coliform concentrations in all three effluent streams were high, ranging from 2200 to 90000 per 100 mLs. Many background organisms grew on the 001 and 003 sample membrane filtration (MF) test plates suggesting the most probable number (MPN) technique is more suitable for these outfalls. The oil and grease concentration in the 001 sample was 15 mg/L and oil and grease was detected in the 003 and 008 streams (5 and 4 mg/L, respectively). The Scott oil and grease analytical results were similar to the

Ecology results (001 - 18.4 mg/L, 003 - 9.6 mg/L, and 008 - 10.3 mg/L; data from Scott NPDES permit application). Routine monitoring for fecal coliforms and for oil and grease may be appropriate.

Total organic halide (TOX) concentrations ranged from 1700 to 4700 ug/L in the primary system samples and from 23000 to 38000 ug/L in the secondary system samples (Table 6). The extractable organic halide (EOX) concentration in the RAS sample was slightly higher (46000 ug/Kg).

Priority Pollutant Scans - Target Compounds

Several priority pollutant scan parameters were detected in the primary and/or secondary wastewater treatment systems (Table 7). A complete listing of parameters analyzed and detection limits is included in Appendix A.

In the primary treatment system samples, volatile compounds (VOAs), including chloroform, ethylbenzene, and total xylenes, were found in the highest concentrations. Chloroform and ethylbenzene were also found by Scott at similar concentrations (Table 8). Other parameters found in fairly low concentrations, but exceeding one or more toxicity criteria, included cyanide, copper, lead, and zinc (Table 7; EPA, 1986b).

Secondary treatment system data indicated most compounds found in the influent were removed from the liquid stream during the treatment process (Table 7). Several of these parameters, such as phenol, 4-methylphenol, and benzoic acid were detected at much higher concentrations in the RAS sample suggesting the parameters were held in the sludge. Chloroform was the organic detected in the highest concentration in the effluent (51 ug/L). Effluent copper and cyanide concentrations exceeded one or more toxicity criteria (Table 7; EPA, 1986b).

Priority Pollutant Scans - Tentatively Identified Compounds

Numerous tentatively identified compounds were detected during the scan (Table 9). The secondary influent sample had the largest number of compounds detected. The compounds found in the effluent were in fairly low concentrations, so further investigation to make positive identifications was not requested.

Resin Acids/Fatty Acids and Guaiacols/Catechols Scans

Dehydroabietic acid in the primary treatment samples was the resin acid/fatty acid compound detected at the highest concentration (30-40 ug/L - Table 10). An LC_{50} of 500 ug/L for sockeye salmon has been reported for dehydroabietic acid (Verschueren, 1983). Other resin acids/fatty acids and tentatively identified compounds were found at low concentrations in the water samples when detected. Several compounds were identified or tentatively identified in the sludge samples at concentrations in the 100,000-1,000,000 ug/Kg dry weight range. The accuracy of the sludge results is questionable due to the high surrogate recoveries (640% and 1820%).

Guaiacols/catechols scans found low concentrations of the target and tentatively identified compounds in the water samples (Table 10). Fairly high concentrations (4,000,000 to 20,000,000 ug/Kg dry wt) of compounds tentatively identified as decane related were detected in the RAS solids.

Bioassays

Trout bioassay results, run at 65% effluent concentration as specified in the NPDES permit, found no acute toxicity in any of the discharges (Table 11). Scott trout bioassay tests yielded similar results (Table 5).

Varying degrees of toxicity were noted with the other tests (Table 11). The Pacific oyster chronic test was the most sensitive with EC_{50}s ranging from 0.3 to 8.5 percent effluent for the three effluents. Acute test LC_{50}s were all greater than 10 percent effluent; the highest effluent concentration tested. The bivalve larvae bioassays (oyster and mussel) have been the most sensitive used to test Ecology class II inspection samples (Reif, 1989).

The Microtox EC_{50}s were much higher; no toxic effects were observed in the 001 and 003 samples and the 008 sample EC_{50} was 34.8 percent effluent. The RAS water fraction toxicity (EC_{50} - 51.0 percent sample) was similar to the 008 sample.

Daphnia magna chronic toxicity was low with LOECs of 100 percent effluent or greater. Some acute toxicity was observed in the 008 sample (LC_{50} = 54% effluent). All deaths occurred during the last three days of the seven day test.

Chemicals found in concentrations exceeding toxicity criteria are noted in the "Priority Pollutant Scans - Target Compounds" section of the discussion.

Laboratory Discussion

Samples split for analysis of permit parameters showed acceptable comparison between Ecology and Scott laboratory results. The only concern was the disparity in TSS concentration between the Ecology (48 mg/L) and Scott (100 mg/L) 008 effluent composite samples. The Scott 008 sampler and sampling location should be inspected to assure a representative sample is being collected.

A BOD_5 and TSS "Laboratory Procedure Review Sheet" for Scott is included in Appendix B. Procedures were good with only minor suggestions noted on the review sheet.

RECOMMENDATIONS AND CONCLUSIONS

The Scott wastewater treatment system was operating adequately during the inspection; the discharge was within all NPDES permit limits. Specific observations/recommendations include:

- Permit parameter laboratory procedures were good with only minor recommendations for modification included in Appendix B.

- A check of the Scott 008 effluent sampler location and performance is recommended to assure that the higher TSS concentration found in the Scott composite sample, compared to the Ecology composite sample, is not an indication of a non-representative sample.

- Calibration records of the plant flow meters should be reviewed during the next inspection.

- Fecal coliforms, and oil and grease were observed in the effluents and should be considered as parameters required by permit monitoring.

- Bioassay results found Pacific Oyster the most sensitive chronic toxicity test. Some acute toxicity was observed in the *Daphnia magna* test (LC_{50} for outfall 008 - 54% effluent).

REFERENCES

APHA-AWWA-WPCF, 1985. Standard Methods for the Examination of Water and Wastewater, 16th ed.

ASTM, 1986. Annual Book of ASTM Standards, Water and Environmental Technology, Volume 11.04, American Society for Testing and Materials, Philadelphia, PA.

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

Ecology, 1981. Static Acute Fish Toxicity Test, DOE 80-12, revised July 1981.

Ecology, 1988. Department of Ecology Laboratory Users Manual.

Ecology, 1989. Manchester Laboratory Price List, 6/15/89.

EPA, 1980. Level 1 Biological Testing Assessment and Data Formatting, EPA-600/7-80-079. April 1980.

EPA, 1983. Methods for Chemical Analysis of Water and Wastes, 600/4-79-020, revised March 1983.

EPA, 1984. 40 CFR Part 136, October 26, 1984.

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

EPA, 1986b. Quality Criteria for Water, EPA 440/5-86-001, May 1, 1986.

EPA, 1987. A Short-Term Chronic Toxicity Test Using Daphnia magna, EPA/600/D-87/080.

NCASI, 1986a. Procedures for the Analysis of Resin and Fatty Acids in Pulp Mill Effluents, Tech. Bul. no. 501, National Council of the Paper Industry for Air and Stream Improvement, New York, NY.

NCASI, 1986b. Methods for the Analysis of Chlorinated Phenolics in Pulp Industry Wastewater, Tech. Bul. no. 498, National Council of the Paper Industry for Air and Stream Improvement, New York, NY.

PTI Environmental Services and Tetra Tech, Inc., 1988. Everett Harbor Action Program Reports - Puget Sound Estuary Program, September 1988.

Reif, Don, 1989. Biomonitoring Report for FY 1988, Washington State Department of Ecology, June 1989.

Tetra Tech, 1986. Recommended Protocols for Measuring Selected Environmental Variables in Puget Sound, Prepared for Puget Sound Estuary Program.

Verschueren, K., 1983. Handbook of Environmental Data on Organic Chemicals, second edition.

Table 1 - Sampling Stations - Scott Everett, January 1989.

Primary Influent Sampling Station	-	the box just upstream of the primary clarifier where the paper mill, pulp sump, color change, and boilerhouse ash streams to the primary clarifier combine.
Outfall 001 Sampling Station	-	the wetwell in pit alley.
Outfall 003 Sampling Station	-	the vault in the pulp storage area.
Secondary Influent Sampling Station	-	a tap in the building at the head end of the secondary treatment plant.
Outfall 008 Sampling Station	-	near the Parshall flume at the effluent end of the secondary treatment plant.

Table 2 - Priority Pollutant Cleaning and Field Transfer Blank Procedures - Scott Everett, January 1989.

Priority Pollutant Sampling Equipment Cleaning Procedures

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

Field Transfer Blank Procedure

1. Pour organic free water directly into appropriate bottles for parameters to be analyzed from grab samples (VOA).

2. Run approximately 1L of organic free water through a compositor and discard.

3. Run approximately 6L of organic free water through the same compositor and put the water into appropriate bottles for parameters to be analyzed from composite samples (BNA, Pesticide/PCB, and metals).

Table 3 - Samples Collected - Scott Everett, January 1989.

Sample:	Pri-Inf	001	003	Sec-Inf	008	Pri-Inf	001	003	Sec-Inf	008	Blank	RAS
Sampler:	Ecology	Ecology	Ecology	Ecology	Ecology	Ecology	Ecology	Ecology	Ecology	Ecology	Ecology	Ecology
Date:	1/31	1/31	1/31	1/31	1/31	1/31	1/31	1/31	1/31	1/31	1/30	2/1
Time:	1115	1215	1230	0940	1030	1555	1700	1620	1425	1455	1630	1215
Type:	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Lab Log #:	048230	048231	048232	048233	048234	048235	048236	048237	048238	048239	048248	048249
Field Analysis												
pH	E	E S	E S	E	E S	E	E S	E S	E	E S		
Conductivity	E	E	E	E	E	E	E	E	E	E		
Temperature	E	E	E	E	E	E	E	E	E	E S		
Laboratory Analysis												
Conductivity	E	E	E	E	E	E	E	E	E	E		
TSS	E	E	E	E	E	E	E	E	E	E		
COD	E	E	E	E	E	E	E	E	E	E		
Fecal Coliform (MF)		E	E		E		E	E		E		
Fecal Coliform (MPN)		E	E		E		E	E		E		
Oil & Grease		E S	E S		E S		E	E		E		
VOA	E	E S	E S	E	E S	E	E	E	E	E	E	
TOX						E	E	E	E	E		

Laboratory Analysis	
TOC	E
EOX (total sample)	E
EOX (centrifuge solids)	E
EOX (centrifuge liquid)	E
% Solids	E
Resin/Fatty Acids	E
Guaiacols/Catechols	E
VOA	E
BNA	E
Pest/PCB	E
pp metals	E
Microtox	E

E - Ecology laboratory analysis
S - Scott laboratory analysis

Table 3 - (continued) - Scott Everett, January 1989.

Sample:	Pri-Inf	001	001	003	003	Sec-Inf	008	008	Blank
Sampler:	Ecology	Ecology	Scott	Ecology	Scott	Ecology	Ecology	Scott	Ecology
Date:	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	1/30
Time:	0845-0800	0800-0800	0800-0800	0800-0800	0800-0800	0800-0800	0800-0800	0800-0800	1630
Type:	Composite	Composite	Composite	Composite	Composite	Composite	Composite	Composite	Grab
Lab Log#:	048240	048241	048242	048243	048244	048245	048246	048247	048250
Field Analysis									
Conductivity		E		E		E	E		
Laboratory Analysis									
Turbidity		E		E			E		
Conductivity	E	E	E	E	E	E	E	E	
Alkalinity	E	E		E		E	E		
Hardness	E	E		E		E	E		
NH_3-N	E	E		E		E	E		
NO_3+NO_2-N	E	E		E		E	E		
Total-P	E	E		E		E	E		
TS	E	E		E		E	E		
TNVS	E	E		E		E	E		
TSS	E	E S	E S	E S	E S	E	E S	E S	
TNVSS	E	E		E		E	E		
COD	E	E	E	E	E	E	E	E	
BOD_5	E	E S	E S	E S	E S	E	E S	E S	
Resin Acids/Fatty Acids	E	E		E		E	E		
Guaiacols/Catechols	E	E		E		E	E		
Cyanide	E	E		E		E	E		
BNA	E	E S*		E S*		E	E S*		E
Pest/PCB	E	E		E		E	E		E
pp metals	E	E		E		E	E		E
Trout		E*		E*			E*		
Daphnia Magna		E*		E*			E*		
Microtox		E*		E*			E*		
Pacific Oyster		E*		E*			E*		

E - Ecology laboratory analysis
S - Scott laboratory analysis
* - Ecology bioassay samples and Scott BNA samples were collected as grab composites. Equal volumes were collected as noted on the schedule to the right:

	Sampling Times		
Sample	1/31	1/31	2/01
001	1215	1700	0930
003	1230	1620	0955
008	1030	1455	1125

Table 4 - Ecology Analytical Methods - Scott Everett, January 1989.

	Method Used for Ecology Analysis (Ecology, 1988&89)	Laboratory Performing Analysis
Laboratory Analyses		
Turbidity	EPA #180.1	Ecology
Conductivity	EPA #120.1	Ecology
Alkalinity	EPA #310.1	Ecology
Hardness	EPA #130.2	Ecology
NH_3-N	EPA #350.1	Ecology
NO_3+NO_2-N	EPA #353.2	Ecology
Total-P	EPA #365.1	Ecology
TS	EPA #160.3	Ecology
TNVS	EPA #160.4	Ecology
TSS	EPA #160.2	Ecology
TNVSS	EPA #160.4	Ecology
COD	EPA #410.1	Ecology
BOD_5	EPA #405.1	Ecology
Fecal Coliform (MF)	APHA, 1985: #909C	Ecology
Fecal Coliform (MPN)	APHA, 1985: #908C	Ecology
Oil and Grease	EPA #413.1	Ecology
TOC (sed/sludge)	Tetra Tech, 1986	Laucks
% Solids	EPA #160.3	Laucks
Cyanide	EPA #335.3	Ecology
VOA (water)	EPA #624	Weyerhaeuser
VOA (sed/sludge)	EPA #8240	Weyerhaeuser
BNA (water)	EPA #625	Weyerhaeuser
BNA (sed/sludge)	EPA #8270	Weyerhaeuser
Pest/PCB (water)	EPA #608	Weyerhaeuser
Pest/PCB (sed/sludge)	EPA #8080	Weyerhaeuser
TOX	EPA #9020	Ecology
EOX		Ecology
Resin/Fatty Acid (water)	NCASI, 1986a	Ecology
Resin/Fatty Acid (sed/sludge)	NCASI, 1986a*	Ecology
Guaiacol/Catechol (water)	NCASI, 1986b	Ecology
Guaiacol/Catechol (sed/sludge)	NCASI, 1986b*	Ecology
pp metals	EPA #200	ARI
Trout	Ecology, 1981	Ecology
Daphnia Magna	EPA, 1987	EVS
Microtox (water)	Beckman, 1982	ECOVA
Oyster Larvae	ASTM, 1986: #E724-80	EVS
Microtox (sed/sludge)	Tetra Tech, 1986	ECOVA
Field Analyses		
pH	APHA, 1985: #423	Ecology
Conductivity	APHA, 1985: #205	Ecology
Temperature	APHA, 1985: #212	Ecology

* modified acetone extraction prior to analysis

ARI - Analytical Resources Inc.
ECOVA - ECOVA
EVS - EVS Consultants
Laucks - Laucks Testing Laboratories, Inc.
Weyerhaeuser - Weyerhaeuser Analytical and Testing Services

Table 5 - NPDES Permit Parameter Laboratory Results and Permit Limits Comparison - Scott Everett, January 1989.

Parameter	NPDES Permit Limits Daily Average	Daily Maximum	Sampler: Lab: Outfall:	Ecology Ecology Total	Ecology Scott Total	Scott Ecology Total	Scott Scott Total	Ecology Ecology 001	Ecology Scott 001	Scott Ecology 001	Scott Scott 001	Ecology Ecology 003	Ecology Scott 003	Scott Ecology 003	Scott Scott 003	Ecology Ecology 008	Ecology Scott 008	Scott Ecology 008	Scott Scott 008
Influent BOD_5 (mg/L)								140				140				450			
BOD_5																			
(mg/L)								74	73	43	58	62	83	58	72	10	11	14	22
(lbs/D)	16800	32200		8632	9939	7371	9986	3703	3653	2152	2902	3620	4846	3386	4203	1309	1440	1833	2881
(% removal)								47				56				98			
Influent TSS (mg/L)								310				310				10			
TSS																			
(mg/L)								48	35	56	46	52	42	60	51	48	42	100	94
(lbs/D)	25300	47100		11723	9703	19399	17587	2402	1751	2802	2302	3036	2452	3503	2977	6285	5499	13094	12308
(% removal)								85				83				-380			
pH (S.U.)	within range of 5.0 to 9.0							7.0			6.5	6.5			6.3	6.8			7.0
								6.8			6.6	6.6			6.7	6.6			7.0
Flow (MGD) *								6.0	6.0	6.0	6.0	7.0	7.0	7.0	7.0	15.7	15.7	15.7	15.7
Trout Bioassay (% survival)	80% survival after 96-hours in 65% effluent							100%			100%	100%			90%	97%			100%

* flow data provided by Scott

Table 6 - Ecology General Chemistry Results - Scott Everett, January 1989.

Sample:	Pri-Inf	001	003	Sec-Inf	008	Pri-Inf	001	003	Sec-Inf	008	RAS
Sampler:	Ecology	Ecology	Ecology	Ecology	Ecology	Ecology	Ecology	Ecology	Ecology	Ecology	Ecology
Date:	1/31	1/31	1/31	1/31	1/31	1/31	1/31	1/31	1/31	1/31	2/1
Time:	1115	1215	1230	0940	1030	1555	1700	1620	1425	1455	1215
Type:	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Lab Log #:	048230	048231	048232	048233	048234	048235	048236	048237	048238	048239	048249
Field Analysis											
pH (S.U.)	10.0	7.0	6.5	1.7	6.8	6.5	6.8	6.6	1.7	6.6	
Conductivity (umhos/cm)	191	310	342	3350	2300	308	409	409	340	2210	
Temperature (^{o}C)	15.1	17.6	18.2	28.8	29.2	21.1	18.8	19.0	24.9	29.7	
Laboratory Analysis											
Conductivity (umhos/cm)	170	340	340	2340	2320	340	430	440	3040	2300	
TSS (mg/L)	86	38	26	54	48	250	48	28	76	38	
COD (mg/L)	170	170	180	1500	720	540	270	310	1200	840	
Fecal Coliform (MF-#/100 mL)		8000 X	14000 X		24000		15000X	12000 X		20000	
Fecal Coliform (MPN-#/100 mL)		90000	24000		7000		90000	30000		2200	
Oil & Grease (mg/L)		LAC	LAC		LAC		15	5		4	
TOX (ug/L)						4700	4300	1700	23000	38000	
EOX (ug/gm)											*
% Solids (%)											1.0
TOC (% dry basis)											30

Sample:	Pri-Inf	001	001	003	003	Sec-Inf	008	008
Sampler:	Ecology	Ecology	Scott	Ecology	Scott	Ecology	Ecology	Scott
Date:	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1
Time:	0845-0800	0800-0800	0800-0800	0800-0800	0800-0800	0800-0800	0800-0800	0800-0800
Type:	Composite	Composite	Composite	Composite	Composite	Composite	Composite	Composite
Lab Log #:	048240	048241	048242	048243	048244	048245	048246	048247
Field Analysis								
Conductivity (umhos/cm)		375		362		3230	2150	
Laboratory Analysis								
Turbidity (NTU)		35		32			1	
Conductivity (umhos/cm)	340	400	400	400	390	3090	2160	2180
Alkalinity (mg/L as $CaCO_3$)	21	33		28		BDL	124	
Hardness (mg/L as $CaCO_3$)	17	45		45		39	770	
NH_3-N (mg/L)	4.3	4.4		5.0		20	1.7	
$NO_3 + NO_2$-N (mg/L)	0.14	0.13		0.15		0.07	0.01	
Total-P (mg/L)	0.58	0.51		0.51		1.1	0.91	
TS (mg/L)	730	430		420		2100	1600	
TNVS (mg/L)	170	170		200		1400	590	
TSS (mg/L)	310	48	56	52	60	10	48	100
TNVSS (mg/L)	20	1 U		1 U		1 U	1 U	
COD (mg/L)	600	300	230	310	270	1500	830	860
BOD_5 (mg/L)	140	74	43	62	58	450	10	14
Cyanide (ug/L)	4	2		4		22	10	

U - less than
X - many background organisms
BDL - below detectable limits
LAC - laboratory accident

* EOX analysis was done on three RAS fractions
EOX - total sample - 46 ug/gm
EOX - centrifuge solids - 48 ug/gm
EOX - centrifuge supernatant - 16 ug/gm

Table 7 - Priority Pollutants Detected - Scott Everett, January 1989.

Sample:	Trns Blank	Pri-Inf	Pri-Inf	001	001	003	003	Sec-Inf	Sec-Inf	008	008	RAS	RAS	Toxicity Criteria (ug/L EPA,1986b)	
Lab Log #:	048250	048230	048235	048231	048236	048232	048237	048233	048238RE	048234RE	048239	048249	048249	Freshwater	Saltwater
Type:	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Acute Chronic	Acute Chronic
Date:	1/30	1/31	1/31	1/31	1/31	1/31	1/31	1/31	1/31	1/31	1/31	2/1	2/1		
Time:	1630	1115	1555	1215	1700	1230	1620	0940	1425	1030	1455	1215	1215		
VOA Compounds (ug/L)													(ug/Kg dry wt)		
Methylene Chloride	1 UJ	0.6UJ	2 UJ	1 UJ	10 UJ	33 B	5 BJ	--	14 J	1 J	1 J	2 J	110 J		
Acetone	10 U	11	--	28	--	--	--	33	--	--	- -	25	1300		
Chloroform	5 U	110	230 D	180	220	160	190	1600 D	610	73	51	77	3800	28900*	1240*
2-Butanone	10 U	1 J	--	--	--	23 J	14 J	5 UJ	16 J	--	--	--	--		
Bromodichloromethane	5 U	1 J	2 J	1 J	3 J	--	--	12	--	0.8J	0.6J	--	--		
Toluene	5 U	6	--	13	3 J	13 J	3 J	--	--	--	--	--	--	17500*	6300* 5000*
Ethylbenzene	5 U	67	1 J	150	23 J	170	25	--	--	--	--	--	--	32000*	430*
Total Xylenes	5 U	700	19 X	1700 D	260 X	1900	310 X	--	--	--	--	--	--		
TOX (ug/L)			4700		4300		1700		23000		38000				

Table 7. (continued) - Scott Everett, January 1989.

Sample:	Trns Blank	Pri-Inf	001	003	Sec-Inf	008	RAS	RAS	Toxicity Criteria (ug/L - EPA, 1986b)			
Lab Log #:	048248	048240	048241	048243	048245	048246	048249	048249				
Type:	Grab	ECO-Comp	ECO-Comp	ECO-Comp	Eco-Comp	Eco-Comp	Grab	Grab	Freshwater		Saltwater	
Date:	1/30	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	2/1	2/1	Acute	Chronic	Acute	Chronic
Cyanide (ug/L)		4	2	4	22	10			22	5.2	1	1
BNA Compounds (ug/L)								(ug/Kg dry wt)				
Phenol	10 U	3 J	--	--	7 J	--	380	19000	10200*	2560*	5800*	
Benzyl Alcohol	10 U	6 J	4 J	6 J	8 J	--	--	--				
4-Methylphenol	10 U	--	--	--	3 J	--	1400	68000				
Benzoic Acid	50 U	27 J	--	20 J	61	--	230 J	11000 J				
2,4-Dichlorophenol	10 U	--	--	--	17	--	--	--	2020*	365*		
2,4,6-Trichlorophenol	10 U	--	--	--	39	3 J	--	--		970*		
Pyrene	10 U	3 J	--	--	--	--	--	--				
Chrysene	10 U	3 J	--	--	--	--	--	--				
Priority pollutant metals (ug/L)								(mg/Kg dry wt **)				
Arsenic (TR)	1.0U	--	--	1.3	--	--		--	850(360)*+	48(190)*+	2319(69)*+	13(36)*+
Cadmium (T)	2 U	2	2	2	--	--		--	2.2(27)+	0.8(4.3)+	43	9.3
Chromium (T)	5 U	--	--	--	7	--		409 Hex	16	11	1100	50
								Tri	1100(7000)+	140(840)+	10300*	
Copper (T)	2 U	25	15	14	22	11		25.5	11(88)+	7.6(51)+	2.9	2.9
Lead (T)	2.2	15.1	7.7	10.0	13.0	--		--	43(720)+	1.7(28)+	140	5.6
Nickel (T)	10 U	--	--	--	--	--		70.2	920(6000)+	100(670)+	75	8.3
Zinc (T)	7	118 B	77 B	97 B	63 B	46 B		93.7	76(500)+	69(450)+	95	86

U Indicates compound was analyzed for but not detected at the given detection limit
J Indicates an estimated value when result is less than specified detection limit
B This flag is used when the analyte is found compound in the blank as well as the sample. Indicates possible/probable blank contamination
M Indicates an estimated value of analyte was found and confirmed by analyst but with low spectral match parameters
X Compound information was manually modified
T Total metals digestion
TR Total recoverable metals digestion

+ Criteria dependent on hardness. The trout bioassay hardness measurements were used for calculations. First number is for outfalls 001 and 003 using 60 mg/L hardness as $CaCO_3$. Second number, in (), is for outfall 008 using 550 mg/L hardness as $CaCO_3$.
D Analytical result from diluted sample
* Insufficient data to develop criteria - LOEL (Lowest Observed Effect Level) listed
** All RAS metals results are total
*+ LOEL for penta (criteria for tri)

Table 8 - Priority Pollutant Scan Data Laboratory Comparison - Scott Everett, January 1989.

Sample:	Trns Blank	001	001	001	003	003	003	008	008	008
Laboratory:	Ecology	Ecology	Ecology	Scott *	Ecology	Ecology	Scott *	Ecology	Ecology	Scott *
Lab Log #:	048250	048231	048236		048232	048237		048234RE	048239	
Type:	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Date:	1/30	1/31	1/31	1/31	1/31	1/31	1/31	1/31	1/31	1/31
Time:	1630	1215	1700		1230	1620		1030	1455	
VOA Compounds (ug/L)										
Methylene Chloride	1 UJ	1 UJ	10 UJ	15 BJ	33 B	5 BJ	29 B	1 J	1 J	4.6B
Acetone	10 U	28	--		--	--		--	--	
Chloroform	5 U	180	220	200	160	190	150	73	51	80
2-Butanone	10 U	--	--		23 J	14 J		--	--	
Bromodichloromethane	5 U	1 J	3 J		--	--		0.8J	0.6J	
Toluene	5 U	13	3 J	14 J	13 J	3 J	14 J	--	--	
Ethylbenzene	5 U	150	23 J	150	170	25	140	--	--	
Total Xylenes	5 U	1700 D	260 X		1900	310 X		--	--	
Oil and Grease (mg/L)			15	18.4		5	9.6		4	10.3

Sample:	Trns Blank	001	001	003	003	008	008
Laboratory:	Ecology	Ecology	Scott *	Ecology	Scott *	Ecology	Scott *
Lab Log #:	048248	048241		048243		048246	
Type:	Grab	ECO-Comp	Comp	ECO-Comp	Comp	Eco-Comp	Comp
Date:	1/30	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1
Cyanide (ug/L)		2		4		10	
BNA Compounds (ug/L)							
2,4-Dimethyl Phenol	10 U	--	1.1J	--		--	
Phenol	10 U	--		--	1.5J	--	
Benzyl Alcohol	10 U	4 J		6 J		--	
Benzoic Acid	50 U	--		20 J		--	
2,4,6-Trichlorophenol	10 U	--		--		3 J	1.0J
Diethyl Phthalate	10 U	--	2.0J	--		--	
Bis(2-Ethylhexyl)phthalate	10 U	--		--	2.3	--	2.0J
Priority pollutant metals (ug/L)							
Arsenic (TR)	1.0U	--	2 J	1.3	2 J	--	2 J
Cadmium (T)	2 U	2	4 J	2	4 J	--	3 J
Chromium (T)	5 U	--		--		--	12 J
Copper (T)	2 U	15	17	14	24	11	14
Lead (T)	2.2	7.7		10.0	10	--	3
Zinc (T)	7	77 B	56	97 B	96	46 B	47

U Indicates compound was analyzed for but not detected at the given detection limit
J Indicates an estimated value when result is less than specified detection limit
B This flag is used when the analyte is found in the blank as well as the sample. Indicates possible/probable blank contamination
M Indicates an estimated value of analyte found and confirmed by analyst but with low spectral match parameters
X Compound information was manually modified
D Analytical result from diluted sample
T Total metals digestion
TR Total recoverable metals digestion
* Scott data taken from the NPDES permit application

Table 9 - Tentatively Identified BNA and VOA Scan Compounds - Scott Everett, January 1989.

Retention Time	Tentative Identification	Sample:	Trns Blank	Pri-Inf	Pri-Inf	001	001	003	003	Sec-Inf	Sec-Inf	008	008	RAS	RAS
		Lab Log #:	048250	048230	048235	048231	048236	048232	048237	048233	048238RE	048234RE	048239	048249	048249
		Type:	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
		Date:	1/30	1/31	1/31	1/31	1/31	1/31	1/31	1/31	1/31	1/31	1/31	2/1	2/1
		Time:	1630	1115	1555	1215	1700	1230	1620	0940	1425	1030	1455	1215	1215
VOA Compounds (ug/L)															(ug/Kg dry wt)
1.13	Sulfur dioxide									3100 JX					
3.48	Acetic acid, methyl ester										110 JX				
12.55	Disulfide, dimethyl													42 JX	2100 JX
15.12	Acetic acid									20 JX					
20.72	Benzene, 1-ethyl-2-methyl-					7.0 JX									
21.39	Decane					5.0 JX									
21.42	Undecane				2.0 JX										
22.75-80	Benzene, 1-methyl-3-(1-methy				7.0 JX						40 JX				
24.59	Unknown								50 JX						
24.59-62	Undecane, 4,7-dimethyl-				13 JX	24 JX	35 JX								
24.60	Unknown									6.0 JX					
24.62	Unknown							40 JX							

Retention Time	Tentative Identification	Sample:	Trns Blank	Pri-Inf	001	003	Sec-Inf	008	RAS	RAS
		Lab Log #:	048248	048240	048241	048243	048245	048246	048249	048249
		Type:	Grab	ECO-Comp	ECO-Comp	ECO-Comp	Eco-Comp	Eco-Comp	Grab	Grab
		Date:	1/30	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	2/1	2/1
BNA Compounds (ug/L) (ug/Kg dry wt)										
5:46	Unknown								60000 J	
7:06	2-Hexanone, 6-(acetyloxy)								4200 JB	
7:59	2-Furancarboxaldehyde, 5-methyl-						170 J			
8:47-48	Decane			6.6 J	6.4 J	8.1 J				
9:17	Unknown						180 J			
10:33	Unknown					1.4 J				
10:39	2-Cyclopenten-1-one,3,4,5-trimethyl-						41 J			
10:54-55	Nonane, 2-methyl-			32 J	30 J					
10:57	2-Cyclohexen-1-one, 3,5-dimethyl-								4400 J	
11:12	Bicyclo(2.2.1)heptan-2-ol,1,3,3-trimethyl-						20 J			
12:16	Bicyclo(2.2.1)heptan-2-ol,1,7,7-trimethyl-, (1s-endo)-						32 J			
12:40-42	Ethanol, 2-(2-butoxyethoxy)-			61 J	33 J	30 J	78 J			
12:54-55	Undecane, 4,6-dimethyl-			30 J	29 J	34 J				
14:01	2-Cyclohexen-1-one,6-methyl-3-(1-methylethyl)-						23 J			
14:46	Undecane, 3,8-dimethyl-					16 J				
14:46-47	Phenol, 2-ethyl-4,5-dimethyl-				13 J		32 J			
14:47	Octane, 2,4,6-trimethyl-			14 J						
16:32-33	Benzaldehyde, 4-hydroxy-3-methoxy-			12 J	14 J	16 J	58 J	24 J		
16:51	Benzoic acid, 3-(1-methylethyl)-						39 J			
17:20	1-Butanone, 1-phenyl-					6.0 J		13 J		
18:05	Unknown						29 J			
18:44	2-Propanone, 1-(4-hydroxy-3-methoxyphenyl)-			6.8 J						
19:06	Unknown							26 J		

Table 9 (cont'd) - Scott Everett, January 1989.

Retention Time	Tentative Identification	Sample: / Lab Log #: / Type: / Date: Trns Blank 048248 Grab 1/30	Pri-Inf 048240 ECO-Comp 1/31-2/1	001 048241 ECO-Comp 1/31-2/1	003 048243 ECO-Comp 1/31-2/1	Sec-Inf 048245 Eco-Comp 1/31-2/1	008 048246 Eco-Comp 1/31-2/1	RAS 048249 Grab 2/1	RAS 048249 Grab 2/1
BNA Compounds (ug/L)									(ug/Kg dry wt)
21:32-33	1,1'-Biphenyl, 2,2'-diethyl-		44 J	43 J	50 J		0.50 J		
21:48-49	Benzoic acid, 2,4,5-trimethyl-, methyl ester		2.1J	3.5J	4.5 J				
22:07	1,1'-Biphenyl, 2,2'-diethyl- (isomer)		30 J	30 J	35 J				
23:12	Tetradecanoic acid, 12-methyl-,(s)-							670 J	
24:22	Unknown (fatty acid)							820 J	
24:28-31	Unknown					17 J*	1.4 J*	1900 J	
24:45	Unknown					17 J*			
24:46	Unknown (fatty acid)							8100 J	
24:49	Unknown						3.0 J*		
24:55	Unknown					5.4 J*			
25:04	Unknown							15000 J	
25:30	Unknown					17 J*			
25:37-39	Unknown		0.86 J	1.0 J	1.2 J				
25:48	1H-Naphtho(2,1-b)pyran,3-ethenyTdodecahydro-3,4a,7,7,10a-pentamethy					14 J			
26:02	Unknown							1300 J	
26:16-19	Phenanthrene,1,2,3,4,4a,9,10,10a-octahydro-1,1,4a-trimethyl-7-(1-met!		6.9 J			13 J		580 J	
26:17-18	Unknown			1.9 J	1.5 J		0.70 J*		
26:38-41	Unknown		1.5 J	6.2 J	1.3 J	8.4 J	0.94 J*	890 J	
27:05	Unknown						2.0 J*		
27:19	Unknown							13000 J	
27:26	Octadecanoic acid							910 J	
27:32	Unknown							780 J	
28:27	Cyclodecane, methyl							4400 J	
28:44	Unknown					19 J*			
29:08	Unknown		1.3 J	1.2 J	1.3 J				
29:37	Unknown (resin acid)							490 J	
31:00	3-Eicosene, (e)-							1300 J	
34:27	Unknown							1300 J	
37:20	Unknown					5.0 J			
39:44-46	Unknown				1.5 J			260 J	

* hydrocarbon

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

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

X compound information was manually modified

Table 10 - Results of Resin Acids/Fatty Acids and Guaiacols/Catechols Scans - January 1989.

Sample:	Pri-Inf	001	003	Sec-Inf	008	RAS-L *	RAS-SS *
Lab Log #:	048240	048241	048243	048245	048246	048249	048249
Type:	ECO-Comp	ECO-Comp	ECO-Comp	Eco-Comp	Eco-Comp	Grab	Grab
Date:	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	2/1	2/1
Resin Acids/Fatty Acids (ug/L)							(ug/Kg dry wt)
Linoleic acid	0.5 U	0.4 J	0.5 U	0.4 U	0.5 U	0.5 U	55000 J
Oleic acid	7	0.5 U	0.5 U	3	0.5 U	0.5 U	4500000 J
Ethanox (preservative)	3 B	4 B	6 B	7 B	5 B	6 B	34000 U
Pimaric acid	4	3	3	0.4 U	0.5 U	0.5 U	34000 U
Sandaracopimaric acid	3	1	2	2	0.5 U	0.5 U	34000 U
Neoabietic acid	0.5 U	0.5 U	0.5 U	0.4 U	0.5 U	0.5 U	34000 U
Retene	0.5 U	0.5 U	0.5 U	0.4 U	0.5 U	0.5 U	34000 U
Abietic acid	26	6	3	1	0.5 U	0.5 U	34000 U
9,10-Dichlorosteric acid	0.5 U	0.5 U	0.5 U	0.4 U	0.5 U	0.5 U	22000 J
Dichlorodehydroabietic acid	0.5 U	0.5 U	0.5 U	0.4 U	0.5 U	0.5 U	34000 U
14-Chlorodehydroabietic acid	2	2	2	0.4 U	0.5 U	0.5 U	34000 U
12-Chlorodehydroabietic acid	4	3	3	0.4 U	0.5 U	0.5 U	34000 U
Dehydroabietic acid	44	32	32	68 J	0.5 U	0.5 U	34000 BU
Palustric acid	1	0.7	0.3 J	0.4 U	0.5 U	0.5 U	34000 U
Isopimaric acid	8	5	5	6	0.5 U	0.5 U	34000 U
Surrog: Et-o-Methylpodocarpic acid	50 % Rec	55 % Rec	59 % Rec	18 % Rec	51 % Rec	5 % Rec	640 % Rec
Surrog: Heptadecanoic acid	15 % Rec	35 % Rec	28 % Rec	9 % Rec	14 % Rec	2 % Rec	1820 % Rec
Resin Acids/Fatty Acids Scan - Tentatively Identified Compounds - (ug/L)							
Decanoic acid, Menthyl...							310000 J
Decanoic acid, Hexa-	14 J			15 J			
Octadecanoic acid	11 J	7.7 J	6.0 J				320000 J
9-Hexadecenoic acid						12 J	830000 J
Pentadecanoic acid							540000 J
Docosanoic acid, Methyl...							85000 J
Tricosanoic acid							140000 J
Behenic acid	33 J	15 J	16 J	13 J			1100000 J
Lignoceric acid	29 J	13 J	11 J				880000 J
Cerotic acid							440000 J
p-Tolylvaleric acid				46 J			
2,6,10,14,18,22-Tetrac...							180000 J
1-Cyclohexene-1-Carboxylic acid				11 J			
1,3,6,10-Cyclotetradecatetraene						2.5 J	
Phenanthrene, 1,2,3,4,...	11 J	3.8 J	2.7 J				190000 J
Phenanthrene, 7-Etheny...							130000 J
1-Phenanthrenecarboxylic acid	4.7 J	2.1 J	1.9 J				
1,1'-Biphenyl, 2,2'-Diethyl-	51 J	35 J	33 J				
1,1'-Biphenyl, 2,2'-Diethyl- (isomer)	35 J	25 J	24 J				

* RAS (Return Activated Sludge) sample run as two fractions
RAS-L - liquid above the settled solids in the sample jar
RAS-SS - Settled solids in the sample jar - 5.6% solids

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

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

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

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

X Compound information was manually modified

Tabel 10 (cont'd) - Scott Everett, January 1989.

Sample:	Pri-Inf	001	003	Sec-Inf	008	RAS-L *	RAS-SS *
Lab Log #:	048240	048241	048243	048245	048246	048249	048249
Type:	ECO-Comp	ECO-Comp	ECO-Comp	Eco-Comp	Eco-Comp	Grab	Grab
Date:	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	2/1	2/1
Guaiacols/Catechols (ug/L)						(ug/Kg dry wt)	
Guaiacol	2	2	2	96	0.09 J	0.4 J	8500 U
4-Allylguaiacol (Eugenol)	1 U	0.5 J	0.5 J	12	1 U	1 U	8500 U
4-Propenylguaiacol	1 U	0.3 J	1 U	12 U	1 U	1 U	8500 U
Tetrachloroguaiacol	1 U	1 U	1 U	12 U	0.2 J	1 U	8500 U
4,5,6-Trichloroguaiacol	1 U	1 U	1 U	5 J	1 U	1 U	8500 U
4,5-Dichloroguaiacol	1 U	1 U	0.3 J	20	5	3	14000
Trichlorosyringol	1 U	1 U	1 U	12 U	0.5 J	1 J	8500 U
a-Terpineol	1 U	1 U	1 J	12 U	1 U	1 U	8500 U
4-Chloroguaiacol	1 U	1 U	1 U	12 U	1 U	1 U	8500 U
Surrog: 2-Ethoxyphenol	77 % Rec	91 % Rec	79 % Rec	78 % Rec	82 % Rec	112 % Rec	61 % Rec
IntStd: 2,6-Dibromophenol	114 % Rec	74 % Rec	108 % Rec	17 % Rec	79 % Rec	48 % Rec	7.0 % Rec
BNA Compounds (in Guaiacols/Catechols scan - ug/L)							
4-Chloro-3-Methylphenol	1 U	1 U	1 U	12 U	1 U	1 U	8500 U
Pentachlorophenol	1 U	1 U	1 U	12 U	1 U	1 BU	8500 U
2,4,6-Trichlorophenol	0.4 J	0.5 J	0.4 J	41	2	1 J	8400 J
2-Nitrophenol	1 U	1 U	1 U	12 U	1 U	1 U	8500 U
2-Methylphenol	1 U	1 U	1 U	12 U	1 U	1 U	8500 U
2-Chlorophenol	1 U	1 U	1 U	12 U	1 U	1 U	8500 U
2,4,5-Trichlorophenol	1 U	1 U	1 U	12 U	1 U	1 U	8500 U
4-Nitrophenol	1 U	1 U	1 U	12 U	1 U	1 U	8500 U
2,4-Dimethylphenol	1 U	0.2 J	1 U	12 U	1 U	1 U	8500 U
4-Methylphenol	0.9 J	3	3	2 J	1 U	0.9 BJ	12000
Phenol	1 BU	9 B	7 B	15 B	2 B	3 B	10000
2,4-Dichlorophenol	1 U	1 U	1 U	21	1 J	1 J	6500 J

* RAS (Return Activated Sludge) sample run as two fractions
RAS-L - liquid above the settled solids in the sample jar
RAS-SS - Settled solids in the sample jar - 5.6% solids

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

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

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

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

X Compound information was manually modified

Table 10 (cont'd) - Scott Everett, January 1989.

Sample:	Pri-Inf	001	003	Sec-Inf	008	RAS-L *	RAS-SS *
Lab Log #:	048240	048241	048243	048245	048246	048249	048249
Type:	ECO-Comp	ECO-Comp	ECO-Comp	Eco-Comp	Eco-Comp	Grab	Grab
Date:	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	2/1	2/1
Guaiacols/Catechols Scan - Tentatively Identified Compounds - (ug/L)							(ug/Kg dry wt)
Acetic acid, 4-Methylphenyl ester	2.4 J						
Benzene, Ethyl-	3.6 J	5.9 J					
Benzene, 1,3-Dimethyl-	17 J	26 J					
Benzene, 1-Methyl-3-(1-Methylethyl)-			59 JX				
Benzene, 2-Methoxy-1,4-Dimethyl-				1.1 J			
Benzoic acid, Methyl ester			24 JX				
Benzoic acid, 3-(1-Methlyethyl)-		2.0 J	66 JX				
Benzoic acid, 4-(1-Methlyethyl)-		4.6 J	14 JX				
Benzoic acid, 4-(1-Methlyethyl)-, Methyl ester			18 JX				
Benzaldehyde, 2,4-Dihydroxy-	11 J						
Benzaldehyde, 4-Hydroxy-3-Methoxy-	3.6 J	4.1 J		2.3 J			
Benzenebutanoic acid, 2,5-Dimethyl-	3.1 J	7.6 J	14 JX				
1-Cyclohexene-1-Carboxylic acid	4.7 J	6.2 J	22 JX				
1,3,6,10-Cyclotetradecatetraene	8.2 J	6.2 J	10 JX				
Decane, 6-Ethyl-2-Methyl-	4.2 J	4.4 J					
Decane, 2,6,7-Trimethyl-	12 J	13 J					
Tetradecane		2.1 J					
7-Tetradecene, (E)...							4200000 JX
Oxacyclotetradecane-2,...							20000000JX
Decanoic acid, Hexa-							17000000JX
9-Octadecenoic acid (Z...							4200000 JX
Ethanone, 1-(2,5-Dimethoxyphenyl)-			31 JX				
1,2-Ethanediol, Diacetate		1.9 J					
2(3H)-Furanone, Dihydro-3,4-bis [(4-Hydroxy...			61 JX				
1H-Indol-5-Ol	2.1 J						
Phenanthrene, 7-Ethenyl-		1.1 J					930000JX
Octane, 2,7-Dimethyl-						8.9 J	
1-Phenanthrenecarboxaldehyde		2.1 J	12 JX				
1-Phenanthrenecarboxylic acid	14 J	2.1 J					
Dehydroabiatic acid	14 J	15 J	89 JX				
1,1'-Biphenyl, 2,2'-Diethyl-	31 J	40 J	16 JX	2.3 J			
1,1'-Biphenyl, 2,2'-Diethyl- (isomer)	22 J						
Phenol, 2-Ethyl-5-Methyl-			42 JX				
Phenol, 4-Chloro-2-(1-Methylethyl)-				4.3 J	1.2 J		
Phenol, 2,5-Dichloro-4-Methoxy-				0.40J			
4-Pyridinol, 2,3,5-Trichloro-					0.35J		

* RAS (Return Activated Sludge) sample run as two fractions
RAS-L - liquid above the settled solids in the sample jar
RAS-SS - Settled solids in the sample jar - 5.6% solids

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

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

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

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

X Compound information was manually modified

Table 11 - Bioassay Results - Scott Everett, January 1989.

Rainbow Trout (Oncorhynchus mykiss)

Lab Log #	Sample	% Effluent	# Tested	# Survived	Percent Mortality	Percent Survival
	Control	0	30	30	0	100
048241	001	65	30	30	0	100
048243	003	65	30	30	0	100
048246	008	65	30	29	3	97

Microtox

Lab log #	Sample	15 minute EC_{50} (% Effluent)	Ranking *
048241	001	NSR	low
048243	003	NSR	low
048246	008	34.8	moderate
048249	RAS (whole sample)	NSRC	low
048249	RAS (water fraction)	51.0	moderate

NSRC - not suitable for reduction due to particulate interference with light transmissions
NSR - data not suitable for reduction due to low toxicity of sample
* - priority ranking for further toxicity evaluation based on the EC_{50}s (EPA, 1980)

Daphnia magna - 7 day survival and reproduction test

Lab Log #	Sample	# Tested	# Survived	Percent Survival	Total Reproduction	Test Statistics	
	Control	10	10	100	208		
048241	Outfall 001						
	1.0 % Effluent	10	10	100	213	Acute (survival)	Chronic (reproduction)
	3.0 % Effluent	10	10	100	223		
	10.0 % Effluent	10	10	100	212	LC_{50} > 100% effluent	NOEC = 30% effluent
	30.0 % Effluent	10	9	90	241	NOEC = 100% effluent	LOEC = 100% effluent
	100 % Effluent	10	10	100	144		
048243	Outfall 003						
	1.0 % Effluent	10	10	100	246	Acute (survival)	Chronic (reproduction)
	3.0 % Effluent	10	10	100	229		
	10.0 % Effluent	10	10	100	240	LC_{50} > 100% effluent	NOEC = 100% effluent
	30.0 % Effluent	10	10	100	263	NOEC = 100% effluent	
	100 % Effluent	10	8	80	192		
048246	Outfall 008						
	1.0 % Effluent	10	10	100	200	Acute (survival)	Chronic (reproduction)
	3.0 % Effluent	10	10	100	190		
	10.0 % Effluent	10	10	100	198	LC_{50} = 54% effluent	NOEC = 30% effluent
	30.0 % Effluent	10	10	100	203	NOEC = 30% effluent	LOEC = 100% effluent
	100 % Effluent	10	0	0	68	LOEC = 100% effluent	

NOEC - no observable effects concentration
LOEC - lowest observable effects concentration
LC_{50} - lethal concentration for 50% of the organisms

Table 11 (cont'd) - Scott Everett, January 1989.

Bivalve Larvae Results - Pacific Oyster (Crassostrea gigas) +

Sample: Lab Log #:	Outfall 001 048241		Outfall 003 048243		Outfall 008 048246		Salinity Checks		Control	
	Weighted Mean % Abnormality*	Mean % Mortality**	Weighted Mean % Abnormality*	Mean % Mortality**	Weighted Mean % Abnormality*	Mean% Mortality**	Weighted Mean % Abnormality*	Mean % Mortality**	Weighted Mean % Abnormality*	Mean % Mortality**
									1.8	0
0.1 % Effluent	0.8	0.4	1.0	14.0	4.6	5.2	1.2	46.6		
0.5 % Effluent	1.0	14.0	1.1	24.0	84.7	23.5	5.2	9.7		
1.0 % Effluent	5.8	18.1	39.6	22.1	99.6	43.5	1.8	31.9		
3.2 % Effluent	14.0	22.7	90.0	14.4	100.0	38.5	0.4	30.6		
5.6 % Effluent	22.1	23.8	91.6	18.3	100.0	34.4	2.2	13.8		
10.0 % Effluent	62.7	24.6	99.2	17.5	100.0	43.5	2.2	27.8		

Acute (mortality)	Acute (mortality)	Acute (mortality)
LC_{50} > 10% effluent	LC_{50} > 10% effluent	LC_{50} > 10% effluent
NOEC = 0.1% effluent	NOEC < 0.1% effluent	NOEC = 0.1% effluent
LOEC = 0.5% effluent	LOEC = 0.1% effluent	LOEC = 0.5% effluent
Chronic (abnormality)	**Chronic (abnormality)**	**Chronic (abnormality)**
EC_{50} = 8.5% effluent	EC_{50} = 1.2% effluent	EC_{50} = 0.3% effluent
NOEC = 1.0% effluent	NOEC = 0.5% effluent	NOEC < 0.1% effluent
LOEC = 3.2% effluent	LOEC = 1.0% effluent	LOEC = 0.1% effluent

+ - means are the average of 6 replicates for the control and 3 replicates for all other samples

$$* - \text{Weighted Mean Abnormality (\%)} = \frac{\text{Number Larvae Surviving in Replicate 1}}{\text{Total Number Larvae Surviving in All Replicates}} \times \text{Larval Abnormality in Replicate 1 (\%)} + \frac{\text{Number Larvae Surviving in Replicate 2}}{\text{Total Number Larvae Surviving in All Replicates}} \times \text{Larval Abnormality in Replicate 2 (\%)} + \ldots$$

Where:

$$\text{Larval Abnormality (\%)} = \frac{\text{Number Abnormal Larvae}}{\text{Number Abnormal + Normal Larvae}} \times 100$$

$$** - \text{Mean Mortality (\%)} = \frac{\text{Mean Number of Larvae Introduced - Mean Number of Larvae Surviving}}{\text{Mean Number of Larvae Introduced}} \times 100$$

Appendix A

Appendix A - Results of VOA, BNA, Pest/PCB and metal priority pollutant scans - Scott Everett, January 1989.

Sample:	Trns Blank	Pri-Inf	Pri-Inf	001	001	003	003	Sec-Inf	Sec-Inf	008	008	RAS	RAS
Lab Log #:	048250	048230	048235	048231	048236	048232	048237	048233	048238RE	048234RE	048239	048249	048249
Type:	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Date:	1/30	1/31	1/31	1/31	1/31	1/31	1/31	1/31	1/31	1/31	1/31	2/1	2/1
Time:	1630	1115	1555	1215	1700	1230	1620	0940	1425	1030	1455	1215	1215
VOA Compounds (ug/L)													(ug/Kg dry wt)
Chloromethane	10 U	10 U	10 U	10 U	50 U	50 U	50 U	10 U	100 U	10 U	10 U	17 U	830 U
Bromomethane	10 U	10 U	10 U	10 U	50 U	50 U	50 U	10 U	100 U	10 U	10 U	17 U	830 U
Vinyl Chloride	10 U	10 U	10 U	10 U	50 U	50 U	50 U	10 U	100 U	10 U	10 U	17 U	830 U
Chloroethane	10 U	10 U	10 U	10 U	50 U	50 U	50 U	10 U	100 U	10 U	10 U	17 U	830 U
Methylene Chloride	1 UJ	0.6UJ	2 UJ	1 UJ	10 UJ	33 B	5 BJ	5 U	14 J	1 J	1 J	2 J	110 J
Acetone	10 U	11	10 U	28	50 U	50 U	50 U	33	100 U	10 U	10 U	25	1300
Carbon Disulfide	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	50 U	5 U	5 U	8 U	420 U
1,1-Dichloroethene	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	50 U	5 U	5 U	8 U	420 U
1,1-Dichloroethane	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	50 U	5 U	5 U	8 U	420 U
1,2-Dichloroethene (total)	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	50 U	5 U	5 U	8 U	420 U
Chloroform	5 U	110	230 D	180	220	160	190	1600 D	610	73	51	77	3800
2-Butanone	10 U	1 J	10 U	10 U	50 U	23 J	14 J	5 UJ	16 J	10 U	10 U	17 U	830 U
1,2-Dichloroethane	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	50 U	5 U	5 U	8 U	420 U
1,1,1-Trichloroethane	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	50 U	5 U	5 U	8 U	420 U
Carbon Tetrachloride	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	50 U	5 U	5 U	8 U	420 U
Vinyl Acetate	10 U	10 U	10 U	10 U	50 U	50 U	50 U	10 U	100 U	10 U	10 U	17 U	830 U
Bromodichloromethane	5 U	1 J	2 J	1 J	3 J	25 U	25 U	12	50 U	0.8J	0.6J	8 U	420 U
1,2-Dichloropropane	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	50 U	5 U	5 U	8 U	420 U
Trichloroethene	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	50 U	5 U	5 U	8 U	420 U
Benzene	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	50 U	5 U	5 U	8 U	420 U
Dibromochloromethane	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	50 U	5 U	5 U	8 U	420 U
1,1,2-Trichloroethane	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	50 U	5 U	5 U	8 U	420 U
Bromoform	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	50 U	5 U	5 U	8 U	420 U
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	50 U	50 U	50 U	10 U	100 U	10 U	10 U	17 U	830 U
2-Hexanone	10 U	10 U	10 U	10 U	50 U	50 U	50 U	10 U	100 U	10 U	10 U	17 U	830 U
1,1,2,2-Tetrachloroethane	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	50 U	5 U	5 U	8 U	420 U
Tetrachloroethene	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	50 U	5 U	5 U	8 U	420 U
Toluene	5 U	6	5 U	13	3 J	13 J	3 J	5 U	50 U	5 U	5 U	8 U	420 U
Chlorobenzene	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	50 U	5 U	5 U	8 U	420 U
trans-1,3-Dichloropropene	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	50 U	5 U	5 U	8 U	420 U
Ethylbenzene	5 U	67	1 J	150	23 J	170	25	5 U	50 U	5 U	5 U	8 U	420 U
cis-1,3-Dichloropropene	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	50 U	5 U	5 U	8 U	420 U
Styrene	5 U	5 U	5 U	5 U	25 U	25 U	25 U	5 U	50 U	5 U	5 U	8 U	420 U
Total Xylenes	5 U	700	19 X	1700 D	260 X	1900	310 X	5 U	50 U	5 U	5 U	8 U	420 U
2-Chloroethylvinylether													

Appendix A (cont'd) - Scott Everett, January 1989.

Sample:	Trns Blank	Pri-Inf	001	003	Sec-Inf	008	RAS	RAS
Lab Log #:	048248	048240	048241	048243	048245	048246	048249	048249
Type:	Grab	ECO-Comp	ECO-Comp	ECO-Comp	Eco-Comp	Eco-Comp	Grab	Grab
Date:	1/30	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	2/1	2/1
Cyanide (ug/L)		4	2	4	22	10		
BNA Compounds (ug/L)							(ug/Kg dry wt)	
Phenol	10 U	3 J	10 U	10 U	7 J	10 U	380	19000
Aniline								
Bis(2-Chloroethyl)Ether	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
2-Chlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Benzyl Alcohol	10 U	6 J	4 J	6 J	8 J	10 U	330 U	16000 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Bis(2-chloroisopropyl) ether	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
4-Methylphenol	10 U	10 U	10 U	10 U	3 J	10 U	1400	68000
N-Nitroso-Di-n-Propylamine	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Hexachloroethane	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Nitrobenzene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Isophorone	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
2-Nitrophenol	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Benzoic Acid	50 U	27 J	50 U	20 J	61	50 U	230 J	11000 J
Bis(2-Chloroethoxy) Methane	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U	17	10 U	330 U	16000 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Naphthalene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
4-Chloroaniline	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
4-Chloro-3-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Hexachlorocyclo-pentadiene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U	39	3 J	330 U	16000 U
2,4,5-Trichlorophenol	50 U	50 U	50 U	50 U	50 U	50 U	1600 U	79000 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
2-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U	1600 U	79000 U
Dimethyl Phthalate	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Acenaphthylene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
3-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U	1600 U	79000 U
Acenaphthene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
2,4-Dinitrophenol	50 U	50 U	50 U	50 U	50 U	50 U	1600 U	79000 U
4-Nitrophenol	50 U	50 U	50 U	50 U	50 U	50 U	1600 U	79000 U
Dibenzofuran	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Diethyl Phthalate	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
4-Chlorophenyl-Phenylether	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U

Sample:	Trns Blank	Pri-Inf	001	003	Sec-Inf	008	RAS	RAS
Lab Log #:	048248	048240	048241	048243	048245	048246	048249	048249
Type:	Grab	ECO-Comp	ECO-Comp	ECO-Comp	Eco-Comp	Eco-Comp	Grab	Grab
Date:	1/30	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	2/1	2/1
BNA Compounds (ug/L)								(ug/Kg dry wt)
Fluorene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
4-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U	1600 U	79000 U
4,6-Dinitro-2-Methylphenol	50 U	50 U	50 U	50 U	50 U	50 U	1600 U	79000 U
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
1,2-Diphenylhydrazine								
4-Bromophenyl-Phenylether	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Hexachlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Pentachlorophenol	50 U	50 U	50 U	50 U	50 U	50 U	1600 U	79000 U
Phenanthrene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Di-n-Butyl Phthalate	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Pyrene	10 U	3 J	10 U	10 U	10 U	10 U	330 U	16000 U
Benzidine								
Butylbenxylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
3,3'-Dichlorobenzidine	20 U	20 U	20 U	20 U	20 U	20 U	660 U	33000 U
Benzo(a)Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Chrysene	10 U	3 J	10 U	10 U	10 U	10 U	330 U	16000 U
Bis(2-Ethylhexyl)phthalate	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Di-n-Octyl Phthalate	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Benzo(b)Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Benzo(k)Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Benzo(a)Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Indeno(1,2,3-cd)Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Dibenzo(a,h)Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Benzo(g,h,i)Perylene	10 U	10 U	10 U	10 U	10 U	10 U	330 U	16000 U
Pest/PCB Compounds (ug/L)								
alpha-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	8.0U	440 U
beta-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	8.0U	440 U
delta-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	8.0U	440 U
gamma-BHC (Lindane)	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	8.0U	440 U
Heptachlor	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	8.0U	440 U
Aldrin	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	8.0U	440 U
Heptachlor Epoxide	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	8.0U	440 U
Endosulfan I	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	8.0U	440 U
Dieldrin	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	16.0U	890 U
4,4'-DDE	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	16.0U	890 U
Endrin	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	16.0U	890 U
Endosulfan II	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	16.0U	890 U
4,4'-DDD	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	16.0U	890 U
Endosulfan Sulfate	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	16.0U	890 U
4,4'-DDT	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	16.0U	890 U
Methoxychlor	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	80.0U	4400 U
Endrin Ketone	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	16.0U	890 U
alpha-Chlordane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	80.0U	4400 U
gamma-Chlordane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	80.0U	4400 U
Toxaphene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	160.0U	8900 U
Aroclor-1016	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	80.0U	4400 U
Aroclor-1221	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	80.0U	4400 U
Aroclor-1232	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	80.0U	4400 U
Aroclor-1242	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	80.0U	4400 U
Aroclor-1248	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	80.0U	4400 U
Aroclor-1254	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	80.0U	4400 U
Aroclor-1260	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	80.0U	4400 U
Endrin Aldehyde								

Sample:	Trns Blank	Pri-Inf	001	003	Sec-Inf	008	RAS	RAS
Lab Log #:	048248	048240	048241	048243	048245	048246	048249	048249
Type:	Grab	ECO-Comp	ECO-Comp	ECO-Comp	Eco-Comp	Eco-Comp	Grab	Grab
Date:	1/30	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	1/31-2/1	2/1	2/1
Priority pollutant metals (ug/L)								(mg/Kg dry wt *)
Antimony (TR)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U		4.23U
Arsenic (TR)	1.0 U	2.0 U	1.0 U	1.3	5.0 U	5.0 U		4.15U
Beryllium (T)	1 U	1 U	1 U	1 U	1 U	1 U		4.15U
Cadmium (T)	2 U	2	2	2	2 U	2 U		8.30U
Chromium (T)	5 U	5 U	5 U	5 U	7	5 U		409
Copper (T)	2 U	25	15	14	22	11		25.5
Lead (T)	2.2	15.1	7.7	10.0	13.0	5.0 U		104 U
Mercury (T)	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U		2.93U
Nickel (T)	10 U	10 U	10 U	10 U	10 U	10 U		70.2
Selenium (TR)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U		4.15U
Silver (T)	3 U	3 U	3 U	3 U	3 U	3 U		12.4 U
Thallium (T)	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U		4.15U
Zinc (T)	7	118 B	77 B	97 B	63 B	46 B		93.7

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

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

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

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

X Compound information was manually modified

T Total metals digestion

TR Total recoverable metals digestion

* all RAS sample metals are total

Appendix B

Daily - 4 Sish in 001

Laboratory Procedure Review Sheet

Discharger: Scott Everett

Date: 1/31

Discharger representative: Doris Claybrook

Ecology reviewer: Marc Heffner

Instructions

Questionnaire for use reviewing laboratory procedures. Circled numbers indicate work is needed in that area to bring procedures into compliance with approved techniques. References are sited to help give guidance for making improvements. References sited include:

Ecology = Department of Ecology Laboratory User's Manual, December 8, 1986.

SM = APHA-AWWA-WPCF, Standard Methods for the Examination of Water and Wastewater, 16th ed., 1985.

SSM = WPCF, Simplified Laboratory Procedures for Wastewater Examination, 3rd ed., 1985.

Sample Collection Review

1. Are grab, hand composite, or automatic composite samples collected for influent and effluent BOD and TSS analysis? automatic - Isco

2. If automatic compositor, what type of compositor is used? Isco
   The compositor should have pre and post purge cycles unless it is a flow through type. Check if you are unfamiliar with the type being used.

3. Are composite samples collected based on (time) or flow? 15 min

4. What is the usual day(s) of sample collection? 7/wk

5. What time does sample collection usually begin? 0830 - 0830

6. How long does sample collection last? 24 hrs

7. How often are subsamples that make up the composite collected? 15 /min

8. What volume is each subsample?

9. What is the final volume of sample collected? ≈ $2\frac{1}{2}$ - $3\frac{1}{2}$ gal

10. Is the composite cooled during collection? yes - daily check

11. To what temperature? - 34-42°F
The sample should be maintained at approximately 4 degrees C (SM p41, #5b: SSM p2).

12. How is the sample cooled?
Mechanical refrigeration or ice are acceptable. Blue ice or similar products are often inadequate.

13. How often is the temperature measured? daily
The temperature should be checked at least monthly to assure adequate cooling.

14. Are the sampling locations representative? yes

15. Are any return lines located upstream of the influent sampling location? N/A - See OK
This should be avoided whenever possible.

16. How is the sample mixed prior to withdrawal of a subsample for analysis? - Mixed
The sample should be thoroughly mixed.

17. How is the subsample stored prior to analysis? use w/in 2-2½ hrs
The sample should be refrigerated (4 degrees C) until about 1 hour before analysis, at which time it is allowed to warm to room temperature.

18. What is the cleaning frequency of the collection jugs? weekly
The jugs should be thoroughly rinsed after each sample is complete and occasionally be washed with a non-phospate detergent.

19. How often are the sampler lines cleaned? weekly - soap & poly pig - rinse
Rinsing lines with a chlorine solution every three months or more often where necessary is suggested.

ivory soap → chip bars

pH Test Review

1. How is the pH measured? meter
A meter should be used. Use of paper or a colorimetric test is inadequate and those procedures are not listed in Standard Methods (SM p429).

2. How often is the meter calibrated? daily
The meter should be calibrated every day it is used.

3. What buffers are used for calibration? 4-7 (2 & 10 when necessary)
Two buffers bracketing the pH of the sample being tested should be used.

If the meter can only be calibrated with one buffer, the buffer closest in pH to the sample should be used. A second buffer, which brackets the pH of the sample should be used as a check. If the meter cannot accurately determine the pH of the second buffer, the meter should be repaired.

inst people - calibrate daily - inline meters

BOD Test Review

1. What reference is used for the BOD test?
   Standard Methods or the Ecology handout should be used.

2. How often are BODs run? daily
   The minimum frequency is specified in the permit.

3. How long after sample collection is the test begun? 2-3 hours
   The test should begin within 24 hours of composite sample completion (Ecology Lab Users Manual p42). Starting the test as soon after samples are complete is desirable.

4. Is distilled or deionized water used for preparing dilution water?

5. Is the distilled water made with a copper free still? - but deionize
   Copper stills can leave a copper residual in the water which can be toxic to the test (SSM p36).

6. Are any nitrification inhibitors used in the test? What? no
   2-chloro-6(trichloro methyl) pyridine or Hach Nitrification Inhibitor 2533 may be used only if carbonaceous BODs are being determined (SM p 527, #4g: SSM p 37).

7. Are the 4 nutrient buffers of powder pillows used to make dilution water?
   If the nutrients are used, how much buffer per liter of dilution water are added? OK
   1 mL per liter should be added (SM p527, #5a: SSM p37).

8. How often is the dilution water prepared? daily
   Dilution water should be made for each set of BODs run.

9. Is the dilution water aged prior to use? ~~no~~ no - dist H_2O 2days old
   Dilution water with nitrification inhibitor can be aged for a week before use (SM p528, #5b).
   Dilution water without inhibitor should not be aged.

10. Have any of the samples been frozen? no
    If yes, are they seeded?
    Samples that have been frozen should be seeded (SSM p38).

CHECK 2° INF

11. Is the pH of all samples between 6.5 and 7.5? 1 ml - checked so OK
    If no, is the sample pH adjusted?
    The sample pH should be adjusted to between 6.5 and 7.5 with 1N NaOH or 1N H2SO4 if 6.5 > pH >7.5 if caustic alkalinity or acidity is present (SM p529, #5e1: SSM p37).
    High pH from lagoons is usually not caustic. Place the sample in the dark to warm up, then check the pH to see if adjustment is necessary.

    If the sample pH is adjusted, is the sample seeded?
    The sample should be seeded to assure adequate microbial activity if the pH is adjusted (SM p528, #5d).

SULFIDE KILLS

12. Have any of the samples been chlorinated or ozonated? NOT CHECKED
If chlorinated are they checked for chlorine residual and dechlorinated as necessary?
How are they dechlorinated?
Samples should be dechlorinated with sodium sulfite (SM p529, #5e2: SSM p38), but dechlorination with sodium thiosulfate is common practice. Sodium thiosufate dechlorination is probably acceptable if the chlorine residual is < 1-2 mg/L.
If chlorinated or ozonated, is the sample seeded?
The sample should be seeded if it was disinfected (SM p528, #5d&5e2: SSM p38).

13. Do any samples have a toxic effect on the BOD test? NOT REALLY
Specific modifications are probably necessary (SM p528, #5d: SSM p37).

14. How are DO concentrations measured? YSI METER
If with a meter, how is the meter calibrated? - SATURATED AIR @ 20°C - SEA LEVEL
Air calibration is adequate. Use of a barometer to determine saturation is desirable, although not manditory. Checks using the Winkler method of samples found to have a low DO are desirable to assure that the meter is accurate over the range of measurements being made.

How frequently is the meter calibrated? DAILY - 2x's
The meter should be calibrated before use.

15. Is a dilution water blank run? YES
A dilution water blank should always be run for quality assurance (SM p527, #5b: SSM p40, #3).

What is the usual initial DO of the blank? ≈ 8.6
The DO should be near saturation; 7.8 mg/L @ 4000 ft, 9.0 mg/L @ sea level (SM p528, #5b). The distilled or deionized water used to make the dilution water may be aged in the dark at ~20 degrees C for a week with a cotton plug in the opening prior to use if low DO or excess blank depletion is a problem .

What is the usual 5 day blank depletion? ≈.1 CHECK IF >.2
The depletion should be 0.2 mg/L or less. If the depletion is greater, the cause should be found (SM p527-8, #5b: SSM p41, #6).

16. How many dilutions are made for each sample? 2
At least two dilutions are recommended. The dilutions should be far enough apart to provide a good extended range (SM p530, #5f: SSM p41).

17. Are dilutions made by the liter method or in the bottle?
Either method is acceptable (SM p530, #5f).

REC. DO

18. How many bottles are made at each dilution? 1/DILUTIONS
How many bottles are incubated at each dilution? 1
When determining the DO using a meter only one bottle is necessary. The DO is measured, then the bottle is sealed and incubated (SM p530, #5f2).
When determining the DO using the Winkler method two bottles are necessary. The initial DO is found of one bottle and the other bottle is sealed and incubated (Ibid.).

19. Is the initial DO of each dilution measured? no
What is the typical initial DO?
The initial DO of each dilution should be measured. It should approximate saturation (see #14).

20. What is considered the minimum acceptable DO depletion after 5 days? ok
What is the minimum DO that should be remaining after 5 days?
The depletion should be at least 2.0 mg/L and at least 1.0 mg/L should be left after 5 days (SM p531, #6: SSM p41).

21. Are any samples seeded? Tried - made no difference
Which?
What is the seed source?
Primary effluent or settled raw wastewater is the preferred seed. Secondary treated sources can be used for inhibited tests (SM p528, #5d: SSM p41).

How much seed is added to each sample?
Adequate seed should be used to cause a BOD uptake of 0.6 to 1.0 mg/L due to seed in the sample (SM p529, #5d).

How is the BOD of the seed determined?
Dilutions should be set up to allow the BOD of the seed to be determined just as the BOD of a sample is determined. This is called the seed control (SM p529, #5d: SSM p41).

Will put in H_2O (22.) What is the incubator temperature? -
The incubator should be kept at 20 +/- 1 degree C (SM p531, #5i: SSM p40, #3).

How is incubator temperature monitored?
A thermometer in a water bath should be kept in the incubator on the same shelf as the BODs are incubated.

How frequently is the temperature checked? Daily
The temperature should be checked daily during the test. A temperature log on the incubator door is recommended.

How often must the incubator temperature be adjusted? seldom - air out 1x/week
Adjustment should be infrequent. If frequent adjustments (every 2 weeks or more often) are required the incubator should be repaired.

Is the incubator dark during the test period? ok
Assure the switch that turns off the interior light is functioning.

23. Are water seals maintained on the bottles during incubation? Yes
Water seals should be maintained to prevent leakage of air during the incubation period (SM p531, #5i: SSM p40, #4).

24. Is the method of calculation correct? OK
Check to assure that no correction is made for any DO depletion in the blank and that the seed correction is made using seed control data.

Standard Method calculations are (SM p531, #6):

for unseeded samples;

$$BOD\ (mg/L) = \frac{D1 - D2}{P}$$

for seeded samples;

$$BOD\ (mg/L) = \frac{(D1 - D2) - (B1 - B2)f}{P}$$

Where: D1 = DO of the diluted sample before incubation (mg/L)
D2 = DO of diluted sample after incubation period (mg/L)
P = decimal volumetric fraction of sample used
B1 = DO of seed control before incubation (mg/L)
B2 = DO of seed control after incubation (mg/L)

$$f = \frac{\text{amount of seed in bottle D1 (mL)}}{\text{amount of seed in bottle B1 (mL)}}$$

Total Suspended Solids Test Review

Preparation

1. What reference is used for the TSS test? TSS

2. What type of filter paper is used?
   Std. Mthds. approved papers are: Whatman 934AH (Reeve Angel), Gelman A/E, and Millipore AP-40 (SM p95,footnote: ~~SSM p23~~)

3. What is the drying oven temperature? OK
   The temperature should be 103-105 degrees C (SM p96, #3a: SSM p23).

4. Are any volatile suspended solids tests run? No
   If yes--What is the muffle furnance temperature?
   The temperature should be 550+/- 50 degrees C (SM p98, #3: SSM p23).

5. What type of filtering apparatus is used? BUCHNER FUNNEL W/ SCREEN
   Gooch crucibles or a membrane filter apparatus should be used (SM p95, #2b: SSM p23).

6. How are the filters pre-washed prior to use? Yes
   The filters should be rinsed 3 times with distilled water (SM p23, #2: SSM p23, #2).

   Are the rough or smooth sides of the filters up? OK
   The rough side should be up (SM p96, #3a: SSM p23, #1)

   How long are the filters dried? OVERNIGHT
   The filters should be dried for at least one hour in the oven. An additional 20 minutes of drying in the furnance is required if volatile solids are to be tested (Ibid).

   How are the filters stored prior to use? ≈3 days
   The filters should be stored in a dessicator (Ibid).

7. How is the effectiveness of the dessicant checked? Indicator dessicant
   All or a portion of the dessicant should have an indicator to assure effectiveness.

Test Procedure

8. In what is the test volume of sample measured? volumetric cylinder
   The sample should be measured with a wide tipped pipette or a graduated cylinder.

9. Is the filter seated with distilled water? yes
   The filter should be seated with distilled water prior to the test to avoid leakage along the filter sides (SM p97, #3c).

Use Forceps

10. Is the entire measured volume always filtered? yes
The entire volume should always be filtered to allow the measuring vessel to be properly rinsed (SM p97, #3c: SSM p24, #4).

11. What are the average and minimum volumes filtered?

	Volume	
	Minimum	Average
Influent	200 ml	
Effluent		

12. How long does it take to filter the samples?

	Time
Influent	
Effluent	

13. How long is filtering attempted before deciding that a filter is clogged? 15 minutes
Prolonged filtering can cause high results due to dissolved solids being caught in the filter (SM p96, #1b). We usually advise a five minute filtering maximum.

14. What do you do when a filter becomes clogged? pitch
The filter should be discarded and a smaller volume of sample should be used with a new filter.

15. How are the filter funnel and measuring device rinsed onto the filter following sample addition? Yes
Rinse 3x's with approximately 10 mLs of distilled water each time (? ?).

16. How long is the sample dried? ≥ 1 hours
The sample should be dried at least one hour for the TSS test and 20 minutes for the volatile test (SM p97, #3c; p98, #3: SSM p24, #4). Excessive drying times (such as overnight) should be avoided.

17. Is the filter thoroughly cooled in a dessicator prior to weighing? 30 min
The filter must be cooled to avoid drafts due to thermal differences when weighing (SM p97, #3c: SSM p97 #3c).

18. How frequently is the drying cycle repeated to assure constant filter weight has ben reached (weight loss <0.5 mg or 4%, whichever is less: SM p97, #3c)?
We recommend that this be done at least once every 2 months. - should try

19. Do calculations appear reasonable?
Standard Methods calculation (SM p97, #3c).

$$\text{mg/L TSS} = \frac{(A - B) \times 1000}{\text{sample volume (mL)}}$$

where: A= weight of filter + dried residue (mg)
B= weight of filter (mg)