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CITY OF ORTING
CLASS II INSPECTION

August 19-20, 1991

by
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ABSTRACT

A Class II Inspection was conducted at the City of Orting Sewage Treatment Plant (STP) on August 19 and 20, 1991. Treatment and flow measurement were acceptable during the inspection. The plant effluent was within NPDES permit limits, although influent BOD_5 loading was approaching plant design capacity. The plant design capacity included in the permit appeared to be acceptable based on evaluation of plant capacity using inspection data.

INTRODUCTION

A Class II Inspection was conducted at the City of Orting Sewage Treatment Plant (STP) on August 19 and 20, 1991. Conducting the inspection were Rebecca Inman and Marc Heffner of the Washington State Department of Ecology (Ecology) Toxics, Compliance, and Ground Water Investigations Section. Clay Watkins, the treatment plant operator and Superintendent of Utilities, represented Orting and provided assistance on site. Kathy Cupps of the Ecology Southwest Regional Office, requested the inspection.

The City of Orting operates an aerated lagoon wastewater treatment facility discharging into the Carbon River. The wastewater treatment system was constructed in 1972. Upgrade and rehabilitation of existing facilities was recently completed: Ecology completed its final construction inspection in April 1991. The wastewater treatment plant includes a two cell aerated lagoon with chlorination prior to a final polishing pond (Figure 1). Ecology issued a new NPDES permit (#WA-002030-3) in January 1991. The permit expires in January 1994. Population projections included in a draft sewer plan/plant expansion report predict Orting will experience a fourfold population increase over the next decade (Parametrix, 1991). Questions about existing plant capacity and future needs have arisen.

Specific objectives of the inspection included:

1. verify NPDES permit self monitoring;

2. assess wastewater treatment plant loading and capacity; and

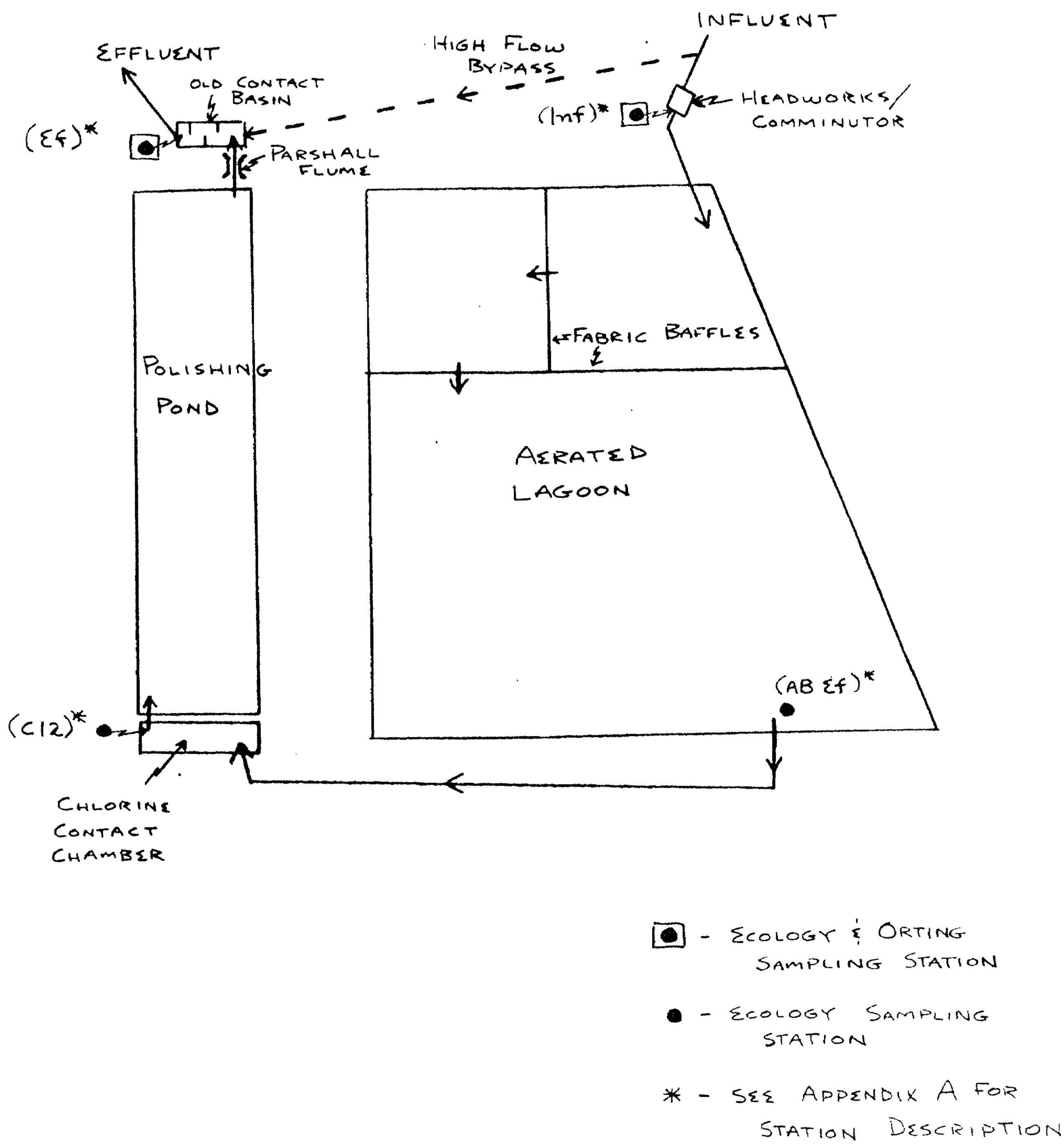
3. assess wastewater toxicity with priority pollutant scans and effluent bioassays.

PROCEDURES

Ecology collected grab and composite samples from several stations at the plant. Composite samples of the influent, aerated lagoon effluent, and final effluent (effluent) were collected. Ecology Isco® composite samplers were used to collect equal volumes of sample every 30 minutes for 24 hours. Sampler configurations and locations are summarized in Figure 1 and Appendix A. Also, a grab composite sample of effluent was collected for bioassay analysis. Sampling quality assurance/quality control (QA/QC) steps included priority pollutant cleaning the samplers prior to the inspection (Appendix A) and maintaining field chain of custody tracking on all samples.

Orting also collected influent and effluent composite samples. Orting samplers collected equal volumes of sample every 30 minutes (influent) or 15 minutes (effluent) for 24 hours. Ecology and Orting samples were split for analysis by both the Ecology and Orting labs. Orting contracts BOD_5, TSS, and fecal coliform laboratory work to the Sumner STP Laboratory. Samples collected, sampling times, and parameters analyzed are summarized in Appendix B.

Figure 1. Flow Schematic - Orting, August 1991.



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

RESULTS AND DISCUSSION

Flow Measurements

The Orting nine-inch Parshall flume was inspected and flume configuration was verified to be acceptable. Ecology made two instantaneous flow measurements for comparison with Orting flow meter measurements. Ecology and plant flow meter measurements agreed on both occasions; flow rates were 0.30 and 0.27 MGD. The Orting flow meter appeared to be accurate.

Quality Assurance/Quality Control (QA/QC)

Most Ecology laboratory data met Ecology QA/QC guidelines and are considered to be reliable. Those data that did not meet the guidelines are appropriately qualified on the data tables.

Results of samples submitted as blind duplicates for Ecology Laboratory analysis were acceptable. The results are included in parenthesis in Table 1 and Appendix E.

General Chemistry/NPDES Permit Compliance

BOD_5, TSS, and nutrient (NH_3-N, NO_2+NO_3-N, and Total-P) data indicate Orting STP influent is fairly typical domestic wastewater (Table 1). The plant provided BOD_5 and TSS treatment while NH_3-N and Total-P passed through the system largely untreated. The polishing pond provided adequate dechlorination; chlorine concentrations were below Ecology detection limits (<0.1 mg/L) in both effluent grab samples collected. Some bacterial regrowth appeared to occur in the polishing pond (inlet fecal coliform concentration <3/100 mL; outlet fecal coliform concentration 43-63/100 mL). TSS concentrations decreased through the chlorination/polishing pond system from 14-24 mg/L to 4-10 mg/L.

Inspection data were within weekly and monthly NPDES permit limits (Table 2). Ecology analysis of the Ecology composite sample found the influent BOD_5 load to be 97 percent of design capacity. Ecology analytical problems with the Ecology influent composite sample prevented comparison with the TSS design capacity. The influent grab sample data suggest the TSS concentration was likely similar to the BOD_5 concentration (Table 1). Thus, the TSS loading was likely approaching design capacity. Increasing plant capacity is discussed in an engineering report prepared for Orting by Parametrix (1991).

Table 1 - Ecology Laboratory General Chemistry Results - Orting, August 1991.

Location:	Inf-1	Inf-2	Inf-Eco	Inf-Ort	AB Ef-1	AB Ef-2	AB Ef-Eco	Cl2-1	Cl2-2	Ef-1	Ef-2	Ef-3	Ef-Eco	Ef-GC	Ef-Ort
Type:	grab	grab	E-comp	O-comp	grab	grab	E-comp	grab	grab	grab	grab	grab	E-comp	grab-comp	O-comp
Date:	8/19	8/19	8/19-20	8/19-20	8/19	8/19	8/19-20	8/19	8/19	8/19	8/19	8/20	8/19-20	8/19	8/19-20
Time:	0955	1345	0810-0810	0800-0800	1025	1405	0900-0900	1035	1430	1110	1450	0825	0810-0810	**	0800-0800
Lab Log#:	348080	348081	348082	348083	348084	348085	348086 (348095)	348087	348088	348089	348090 (348094)	348096	348091	348092	348093
LABORATORY RESULTS															
Conductivity (umhos/cm	632	620	569	455	557	563	578(580)			576	576		572	536	561
Alkalinity (mg/L CaCO3)			234				239(238)						229	229	
Hardness (mg/L CaCO3)			155				114(121)						122	124	
TS (mg/L)			578				373						345		
TNVS (mg/L)			239				252						245		
TSS (mg/L)	262	189	++	119	14	15	24(23)			6	6		4	7	10
TNVSS (mg/L)			35				8						4		
BOD5 (mg/L)			189	65			18(18)						18		18
CBOD5 (mg/L)							16						10		
COD (mg/L)	500	440	350	130	73	74	83(76)			58	57		57		54
TOC (mg/L)	82.6	84.5	52.6	39.0	27.8	28.5	29.8(25.1)			19.8	19.6		21.9		20.7
NH3-N (mg/L)			16.2	12.3			20.2(20.6)						18.9		18.1
NO2+NO3-N (mg/L)			<0.02	0.04			<0.02(0.04)						0.11		0.65
Total P (mg/L)			5.39	3.04			5.09(5.39)						4.82		4.88
F-Coliform (#/100 mL)								<3	<3	63	43(51)	51			
FIELD OBSERVATIONS															
Temperature (C)	18.1	19.0			23.5	25.0				24.4	26.1				
Temp - cooled (C)*			4.8	16.6			7.9						6.4		18.6
pH (S.U.)	7.4	7.2	7.3	7.5	7.6	8.3	8.0			7.5	7.7		7.7		7.9
Conductivity (umhos/cm	655	627	515	437	540	584	578			597	600		551		554
Chlorine (mg/L)															
Free								1.0	<0.1	<0.1	<0.1				
Total								1.0	0.5	<0.1	<0.1				

* temperature of composite sample at the end of the sampling period
** equal volumes collected at 1110 and 1450 on 8/19
++ lab error
( ) duplicate sample analytical result

E-comp composite sample collected by Ecology
O-comp composite sample collected by Orting
Inf influent sample
AB Ef aerated lagoon effluent
Cl2 chlorine contact chamber effluent
Ef plant effluent

Table 2 – NPDES Permit/Sample Split Comparison – Orting, August 1991.

Parameter	NPDES Permit Limits		Inspection Data					
			Ecology Composite		Orting Composite		Grab Samples	
	Monthly Average	Weekly Average	Ecology Analysis	Orting Analysis**	Ecology Analysis	Orting Analysis**	Ecology Analysis	Orting Analysis**
Influent BOD5								
(mg/L)			189	140	65	142		
(lbs/D)	600*		583	432	201	438		
Effluent BOD5								
(mg/L)	30	45	18	10	18	9		
(lbs/D)	90	135	56	31	56	28		
(% removal)	85		90	93	72	94		
Influent TSS								
(mg/L)			++	130	119	160		
(lbs/D)	600*			401	367	494		
Effluent TSS								
(mg/L)	75	110	4	7	10	5		
(lbs/D)	330	495	12	22	31	15		
(% removal)				95	92	97		
Fecal coliform (#/100 mL)	200	400					51 63; 43(51)	28
pH (S.U.)	not outside range 6.0 - 9.0						7.5; 7.7	
Chlorine (mg/L)	no detectable residual						<0.1; <0.1	
Toxics	no toxics in toxic amounts		+					
Flow (MGD)^	0.75		0.37	0.37	0.37	0.37		
NH3-N (mg/L)								
Influent			16.2	19.2	12.3	21.6		
Effluent			18.9	25.2	18.1	24.0		
N02+NO3-N (mg/L)								
Influent			<0.02	0.0	0.04	0.0		
Effluent			0.11	0.0	0.65	0.4		

* design criteria from NPDES Permit
** Orting BOD5, TSS, and fecal coliform analysis done by Sumner STP
^ measured by Orting flow meter
\+ no priority pollutants exceeded toxicity criteria (Table 3) and no toxicity was observed in the effluent bioassays (Table 4)
++ lab error
( ) duplicate sample analytical result

Field temperature measurement of the Ecology and Orting composite samples found the Ecology samples to be slightly warmer than the desired 4°C (Table 1). The hot weather during the inspection made cooling samples difficult. The Orting composite samples were 16.6°C and 18.6°C. Orting should improve their method of cooling composite samples during collection.

Ecology laboratory analysis of split samples found significant differences between the Ecology and Orting influent samples (Table 2). Ecology data show the Ecology influent composite sample to be stronger sewage than the Orting influent composite sample. Influent grab sample concentrations more closely approximated the Ecology composite sample concentrations than the Orting composite sample concentrations. A possible cause for the discrepancy is the positioning of the sampler intakes. The Orting influent composite sample intake was laid on the channel floor downstream of the comminutor. Laying the sampler intake on the channel floor may cause variability due to solids accumulation near the intake. The Ecology intake was suspended above the floor, in the deeper section of the channel near the headworks box outlet. Suspending the sampler intake should help avoid solids accumulation near the intake. Also, the Ecology intake was inspected several times during the inspection and cleared of rags. Extreme influent concentration variability is frequently reported by Orting. The August 1991 plant monitoring (DMR) influent data ranged from a low of BOD_5 (75 mg/L); TSS (54 mg/L); and flow (0.34 MGD) on 8/13; to a high of BOD_5 (757 mg/L); TSS (694 mg/L); and flow (0.36 MGD) on August 15. The operator reported he switched to the Ecology sample intake configuration after the inspection. Should highly variable influent strength persist after improving sampler intake configuration, further investigation to determine the cause is suggested. The Ecology and Orting effluent composite samples were similar.

Comparison of Ecology and Orting analytical results of split samples was acceptable for effluent BOD_5, effluent TSS, fecal coliform, and NO_2+NO_3-N tests (Note: Orting contracts BOD_5, TSS, and fecal coliform analysis to the Sumner STP Laboratory). The Orting NH_3-N results were consistently greater than the Ecology results, but comparisons appear acceptable with the exception of the Orting sample influent result. Orting analysis of the two influent samples found similar BOD_5 and TSS concentrations. Ecology analysis found the Ecology sample to be much stronger than the Orting sample. BOD_5, COD, TOC, NH_3-N, and Total-P all indicated a weaker Orting sample. The cause of the differences in Ecology and Orting analytical results from the two influent composite samples is unclear.

Priority Pollutants

Few organic priority pollutants were detected in the samples collected (Table 3). None were detected in the effluent sample. Acetone and methylene chloride were detected in the aerated lagoon effluent at concentrations greater than 100 μg/L in the morning sample and between 20 and 85 μg/L in the afternoon sample. The concentrations are likely a carryover from the composite sampler cleaning procedures (collection of grab samples from the desired aerated lagoon location required pumping the grab samples with the compositor). Several tentatively identified compounds were also detected (Appendix D). Tentatively identified compounds in the effluent were at low concentrations, ranging from an estimated 10-18 μg/L.

Table 3 - VOA, BNA, Pesticide/PCB and Metals Detected - Orting, August 1991.

	Location:	Inf-1	Inf-2	AB Ef-1	AB Ef-2	Ef-1	Ef-2	EPA Water Quality Criteria Summary**	
	Type:	grab	grab	grab	grab	grab	grab		
	Date:	8/19	8/19	8/19	8/19	8/19	8/19	Acute	Chronic
	Time:	0955	1345	1025	1405	1110	1450	Fresh	Fresh
	Lab Log#:	348080	348081	348084	348085	348089	348090		
	VOA Compounds	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
(Group)[1]									
a	Methylene Chloride	2 U	2 U	110	26	2 U	2 U	11,000 *(a)	
a	Chloroform	1 J	3 J	2 U	2 U	2 U	2 U	28,900 *	1,240 *
	Acetone	15 UJ	30 UJ	200 E	81 J	8 U	10 UJ		
	Toluene	4 J	3 J	2 U	2 U	2 U	2 U	17,500 *	

	Location:	Inf-Eco	AB Ef-Eco	(AB Ef-Eco)	Ef-Eco	Acute Fresh	Chronic Fresh
	Type:	E-comp	E-comp	(E-comp)	E-comp		
	Date:	8/19-20	8/19-20	(8/19-20)	8/19-20		
	Time:	0810-0810	0900-0900	(0900-0900)	0810-0810		
	Lab Log#:	348082	348086	(348095)	348091		
	BNA Compounds	ug/L	ug/L	ug/L	ug/L		
i	Bis(2-Ethylhexyl)Phthalate	6 J	4 U		4 U	940 *(i)	3 *(i)
	4-Methylphenol	21	6 U		6 U		
	Benzyl Alcohol	5 J	3 U		3 U		
	Benzoic Acid	46 J	7 U		7 U		
	Pesticide/PCB Compounds						
q	gamma-BHC (Lindane)	0.035 J	0.050 UJ		0.050 UJ	2.0	0.08
	Metals - total recoverable						
	Antimony	30 U	30 U	(30 U)	35 P	9,000 *	1,600 *
	Arsenic	2.6 P	2.2 P	(2.2 P)	2.1 P		
	Pentavalent					850 *	48 *
	Trivalent					360	190
	Cadmium	0.25	0.10 U	(0.10 U)	0.10 U	4.9 +	1.3 +
	Copper	36.9	3.9 P	(4.9 P)	3.2 P	21 +	14 +
	Lead	6.93	1.0 U	(1.3 P)	1.2 P	105 +	4.1 +
	Nickel	2.6 P	1.9 P	(2.0 P)	2.3 P	1,678 +	187 +
	Zinc	73.6	9.3 P	(9.2 P)	8.0 P	138 +	125 +

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

- U The analyte was not detected at or above the reported result.
- UJ The analyte was not detected at or above the reported estimated result.
- J The analyte was positively identified. The associated numerical result is an estimate.
- B Analyte was found in the analytical method blank, indicating the sample may have been contaminated.
- P The analyte was detected above the instrumentation detection limit but below the established minimum quantitation limit.
- E The concentration of this analyte exceeded the calibration range, and a dilution should be performed.
- * Insufficient data to develop criteria. Value presented is the LOEL - Lowest Observed Effect Level.
- ( ) Duplicate sample analytical result.
- + Hardness dependent criteria (122 mg/L used).

- a Total Halomethanes
- i Total Phthalate Esters
- q Total BHCs
- ** EPA, 1986.
- Inf influent sample
- AB Ef aerated lagoon effluent
- Ef plant effluent

Several priority pollutant metals were also detected in the samples collected (Table 3). Effluent concentrations were all less than freshwater acute and chronic toxicity criteria (EPA, 1986).

A complete listing of priority pollutant analytes and detection limits is presented in Appendix E.

Bioassays

Results of the rainbow trout and *Daphnia magna* bioassays indicated no effluent toxicity (Table 4). The chronic portion of the *Daphnia magna* test found increased reproduction as the percentage of effluent in the test increased, suggesting the effluent provided nutritional enhancement for the test organisms.

Plant Capacity

Plant capacity was estimated using the Ecology (1985) and Metcalf and Eddy (1991) aerated lagoon equations. The two equations are quite similar, with slightly different reaction coefficient (K-rate) temperature corrections. The system of estimation used in this report considered the aerated lagoon to be a single cell with a uniform K-rate. Sample collection to calculate an inspection K-rate was made at the inlet and outlet of the aerated lagoon. The aerated lagoon outlet BOD_5 and the final effluent BOD_5 as measured by Ecology were equal (Table 1), so final effluent BOD_5 concentrations were used for calculations. The original design (Parametrix, 1990) considered the lagoon to be a two cell system with a higher K-rate in the more heavily aerated first two sections and a lower K-rate in the larger facultative section (Figure 1). A sample was not collected between the heavily aerated and facultative portions of the aerated lagoon, so the two K-rates for the original design method could not be calculated from inspection data.

After calculating the K-rates using inspection data, the inspection K-rates were used to calculate K-rates for wet weather conditions (Table 5). Winter wet weather conditions present difficult treatment conditions due to shorter detention times and lower K-rates. Direct calculation of coefficients from DMR data was not attempted due to the variability of reported influent data. Because of the low influent BOD_5 concentration of the Orting Sample-Ecology Laboratory data, results from calculations with these data are considered least reliable. At design flow (0.75 MGD), design BOD_5 loading (600 lbs/D), and design temperature (13°C) the temperature corrected inspection K-rates predict an effluent BOD_5 concentration in the 20-30 mg/L range. The calculations suggest the design capacity is appropriate for the system of operation during the inspection. Plant operation was not thoroughly evaluated to determine if it was optimal during the inspection. August 1991 DMR data indicate aerated lagoon dissolved oxygen concentrations ranged from 2 to 5 mg/L, suggesting oxygen was not limiting in the system.

Average influent temperature on the April 1991 DMR was 11°C, less than the design temperature of 13°C. As expected, slightly higher effluent concentrations were predicted at 11°C than at 13°C (Table 5). Routine monitoring of the aerated lagoon effluent temperature is suggested to document the actual temperature.

Table 4 – Effluent Bioassay Results – Orting, August 1991.

NOTE: All bioassays were run with the effluent grab composite sample (Ef-GC; Lab Log # 348092)

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

Sample	# Tested	Percent Survival	Mean # Young per Original Female
Control	10	100	12.1
6.25 % Effluent	10	70	23.6
12.5 % Effluent	10	100	24.3
25 % Effluent	10	90	26.7
50 % Effluent	10	100	29.6
100 % Effluent	10	100	37.2

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

Rainbow Trout - 96 hour survival test
(Oncorhynchus mykiss)

Sample	# Tested	Percent Survival
Control	25	100
100% Effluent	25	100

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 5 - Plant Capacity Estimates - Orting, August 1991.

Capacity Estimates based on Ecology Criteria for Sewage Works Design (Ecology, 1985)

S/S0 = 1/(1+2.3(K1)t)
K1 = K20(1.047^(T-20))

S	effluent BOD5 (mg/L)
S0	influent BOD5 (mg/L)
K1	reaction coefficient for given temperature (day^-1)
K20	reaction coefficient at 20 degrees C (day^-1: typical value = 0.20)
t	aerated lagoon detention time (days)
Q	flow (MGD)
V	volume (MG)
T	lagoon water temperature (C)

Sampler/ Lab	S (mg/L)	S0 (mg/L)	K1 (day -1)	K20 (day -1)	T (C)	t (days)	Q (MGD)	V (MG)
Inspection conditions	K1 and K20 calculated based on inspection conditions							
Eco/Eco	18	189	0.29	0.24	24	14.1	0.37	5.2
Eco/Ort	10	140	0.40	0.33	24	14.1	0.37	5.2
Ort/Eco	18	65	0.08	0.07	24	14.1	0.37	5.2
Ort/Ort	9	142	0.46	0.38	24	14.1	0.37	5.2
Wet weather conditions	effluent concentration calculated using a K1 calculated with the inspection K20 and the design winter temperature. Design flow assumed with BOD5 influent load equivalent to inspection conditions (I/I BOD5 load assumed = 0).							
Eco/Eco	25	95	0.18	0.24	13	6.9	0.75	5.2
Eco/Ort	14	70	0.24	0.33	13	6.9	0.75	5.2
Ort/Eco	18	33	0.05	0.07	13	6.9	0.75	5.2
Ort/Ort	13	71	0.28	0.38	13	6.9	0.75	5.2
Wet weather conditions	effluent concentration calculated using a K1 calculated with the inspection K20 and the design winter temperature. Design flow and design influent BOD5 load assumed.							
Eco/Eco	25	96	0.18	0.24	13	6.9	0.75	5.2
Eco/Ort	20	96	0.24	0.33	13	6.9	0.75	5.2
Ort/Eco	54	96	0.05	0.07	13	6.9	0.75	5.2
Ort/Ort	18	96	0.28	0.38	13	6.9	0.75	5.2
Wet weather conditions	effluent concentration calculated using a K1 calculated with the inspection K20 and 4/91 average influent temperature. Design flow and design influent BOD5 load assumed.							
Eco/Eco	27	96	0.16	0.24	11	6.9	0.75	5.2
Eco/Ort	21	96	0.22	0.33	11	6.9	0.75	5.2
Ort/Eco	56	96	0.04	0.07	11	6.9	0.75	5.2
Ort/Ort	19	96	0.25	0.38	11	6.9	0.75	5.2

Table 5 - (cont'd) - Orting, August 1991.

Capacity Estimates based on Metcalf and Eddy (1991)

S/S0 = 1/(1+(K)t)
K = K20(1.06^(T-20))

S	effluent BOD5 (mg/L)
S0	influent BOD5 (mg/L)
K	reaction coefficient for given temperature (day^-1)
K20	reaction coefficient at 20 degrees C (day^-1: typical value = 0.25-1.0)
t	aerated lagoon detention time (days)
Q	flow (MGD)
V	volume (MG)
T	temperature (C)

Sampler/ Lab	S (mg/L)	S0 (mg/L)	K (day -1)	K20 (day -1)	T (C)	t (days)	Q (MGD)	V (MG)
Inspection conditions	K and K20 calculated based on inspection conditions							
Eco/Eco	18	189	0.68	0.51	25	14.1	0.37	5.2
Eco/Ort	10	140	0.93	0.69	25	14.1	0.37	5.2
Ort/Eco	18	65	0.19	0.14	25	14.1	0.37	5.2
Ort/Ort	9	142	1.05	0.79	25	14.1	0.37	5.2
Wet weather conditions	effluent concentration calculated using a K calculated with the inspection K20 and the design winter temperature. Design flow assumed with BOD5 influent load equivalent to inspection conditions (I/I BOD5 load assumed =0).							
Eco/Eco	28	95	0.34	0.51	13	6.9	0.75	5.2
Eco/Ort	17	70	0.46	0.69	13	6.9	0.75	5.2
Ort/Eco	20	33	0.09	0.14	13	6.9	0.75	5.2
Ort/Ort	15	71	0.52	0.79	13	6.9	0.75	5.2
Wet weather conditions	effluent concentration calculated using a K calculated with the inspection K20 and the design winter temperature. Design flow and design influent BOD5 load assumed.							
Eco/Eco	29	96	0.34	0.51	13	6.9	0.75	5.2
Eco/Ort	23	96	0.46	0.69	13	6.9	0.75	5.2
Ort/Eco	58	96	0.09	0.14	13	6.9	0.75	5.2
Ort/Ort	21	96	0.52	0.79	13	6.9	0.75	5.2
Wet weather conditions	effluent concentration calculated using a K calculated with the inspection K20 and 4/91 average influent temperature. Design flow and design influent BOD5 load assumed.							
Eco/Eco	31	96	0.30	0.51	11	6.9	0.75	5.2
Eco/Ort	25	96	0.41	0.69	11	6.9	0.75	5.2
Ort/Eco	61	96	0.08	0.14	11	6.9	0.75	5.2
Ort/Ort	23	96	0.47	0.79	11	6.9	0.75	5.2

Using the Metcalf and Eddy (1991) temperature correction formula, the K-rates used in the initial design calculations (Parametrix, 1990) were corrected to inspection temperatures (Table 6). Calculations with the temperature corrected design K-rates were made to predict inspection effluent concentrations. Measured effluent BOD_5 concentrations ranged from 10-18 mg/L while predicted concentrations range from 3-4 mg/L. Again, operation was not evaluated to determine if it was optimal. However, the calculations suggest the original design equations may predict somewhat better effluent quality than the plant produces.

RECOMMENDATIONS AND CONCLUSIONS

Treatment and flow measurement were acceptable during the inspection. The plant effluent was within NPDES permit limits. Ecology data indicate the influent BOD_5 load was 97 percent of plant design capacity. Increasing plant capacity is discussed in an engineering report prepared for Orting by Parametrix (1991).

Ecology analysis found the Ecology and Orting influent composite samples were significantly different. Orting DMR data has shown extreme variability of influent strength. Suspending the influent intake in the deeper part of the channel, and checking the intake several times a day for rags and removing as necessary are recommended. The operator reported he began suspending the intake after the inspection. Should highly variable influent strength persist after improving sampling, further investigation to determine the cause is recommended. Also, Orting composite samples should be properly cooled during collection. Ecology and Orting analysis of the influent composite samples did not compare well. The reason is unclear.

Priority pollutants detected in the effluent included only metals at concentrations less than toxicity criteria. No toxicity was observed in the rainbow trout or *Daphnia magna* bioassays.

Evaluation of plant capacity using inspection data found the design capacity of 600 lbs/D BOD_5 at a flow rate of 0.75 MGD to be reasonable. Routine monitoring of the aerated lagoon effluent temperature is recommended to establish actual lagoon operating temperatures.

Table 6 – Plant Performance Estimates – Orting, August 1991.

Performance Estimates based on design K-rates (Parametrix, 1990)

S/S0 = 1/(1+(K)t)
K = K20(1.06^(T-20)) - from Metcalf and Eddy (1991)

S effluent BOD5 (mg/L)
S0 influent BOD5 (mg/L)
K reaction coefficient for given temperature (day^-1)
design values (Parametrix, 1990): @ 13 C - Stage 1 = 0.98; Stage 2 = 0.24
K20 reaction coefficient at 20 degrees C (day^-1)
t aerated lagoon detention time (days)
Q flow (MGD)
V volume (MG)
T temperature (C)

Sampler/ Lab	S (mg/L)	S0 (mg/L)	K (day -1)	K20 (day -1)	T (C)	t (days)	Q (MGD)	V (MG)
Inspection conditions								
Eco/Eco	18	189			24	14.1	0.37	5.2
Eco/Ort	10	140			24	14.1	0.37	5.2
K20 calculation	K20 calculated based on initial design K-rates taken from Orting plans (Parametrix, 1990)							
			0.98	1.47	13			
			0.24	0.36	13			
Effluent concentrations	effluent concentration calculated based on inspection influent BOD5 concentration and flow. Temperature adjusted K-rates calculated based on design K-rates.							
Eco/Eco								
Stage 1	22	189	1.86	1.47	24	4.1	0.37	1.5
Stage 2	4	22	0.46	0.36	24	10.0	0.37	3.7
Eco/Ort								
Stage 1	16	140	1.86	1.47	24	4.1	0.37	1.5
Stage 2	3	16	0.46	0.36	24	10.0	0.37	3.7

REFERENCES

Ecology. 1985. Criteria for Sewage Works Design. DOE 78-5, Revised October 1985.

EPA. 1986. Quality Criteria for Water. EPA 440/5-86-001.

Metcalf and Eddy. 1991. Wastewater Engineering Treatment Disposal Reuse. Third Edition.

Parametrix, Inc. 1990. City of Orting, Washington - Wastewater Treatment Plant Improvements. Received by Ecology January 16, 1990.

-----. 1991. General Sewer Plan/Engineering Report for Sewage Treatment Plant Expansion City of Orting, Washington. September 1991 Draft.

APPENDICES

Appendix A - Sampling Locations and Cleaning Procedures - Orting, August 1991.

SAMPLING LOCATIONS

Influent (Inf)

composite sample was collected with the sampler intake suspended in the shallow pit at the outlet end of the headworks basin. Grab samples were taken at the same location.

Aerated lagoon effluent (AB Ef)

composite sampler intake was suspended approximately six feet from the side of the lagoon and approximately three feet deep. Intake was suspended above the lagoon bottom in the area identified by the operator as the outlet pipe area. Location was near the eastern vent on the south side of the lagoon. Grab samples were taken by pumping the samples with the compositor pump.

Chlorine contact basin effluent (Cl2)

samples taken at the effluent end of the chlorine contact basin.

Effluent (Ef)

composite sampler intake was suspended in front of the outlet pipe in the old chlorine contact basin. Grab samples were taken at the same location.

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

Appendix B - Sampling Schedule - Orting, August 1991.

Location:	Inf-1	Inf-2	Inf-Eco	Inf-Ort	AB Ef-1	AB Ef-2	AB Ef-Eco	Cl2-1	Cl2-2	Ef-1	Ef-2	Ef-3	Ef-Eco	Ef-GC	Ef-Ort
Type:	grab	grab	E-comp	O-comp	grab	grab	E-comp	grab	grab	grab	grab	grab	E-comp	grab-comp	O-comp
Date:	8/19	8/19	8/19-20	8/19-20	8/19	8/19	8/19-20	8/19	8/19	8/19	8/19	8/20	8/19-20	8/19	8/19-20
Time:	0955	1345	0810-0810	0800-0800	1025	1405	0900-0900	1035	1430	1110	1450	0825	0810-0810	**	0800-0800
Lab Log#:	348080	348081	348082	348083	348084	348085	348086 (348095)	348087	348088	348089	348090 (348094)	348096	348091	348092	348093
GENERAL CHEMISTRY															
Conductivity	E	E	E	E	E	E	E (E)			E	E		E	E	E
Alkalinity			E				E (E)						E	E	
Hardness			E				E (E)						E	E	
TS			E				E						E		
TNVS			E				E						E		
TSS	E	E	E O	E O	E	E	E (E)			E	E		E O	E	E O
TNVSS			E				E						E		
BOD5			E O	E O			E (E)						E O		E O
CBOD5							E						E		
COD	E	E	E	E	E	E	E (E)			E	E		E		E
TOC	E	E	E	E	E	E	E (E)			E	E		E		E
NH3-N			E O	E O			E (E)						E O		E O
NO2+NO3-N			E O	E O			E (E)						E O		E O
Phosphorous - Total			E	E			E (E)						E		E
F-Coliform MF								E	E	E	E (E)	E O			
ORGANICS															
VOA	E	E			E	E				E	E				
BNAs			E				E						E		
Pest/PCB			E				E						E		
METALS															
PP Metals			E				E						E		
BIOASSAYS															
Salmonid (acute 100%)														E	
Daphnia magna (chronic)														E	
FIELD OBSERVATIONS															
Temp	E	E	E	E	E	E	E			E	E		E		E
pH	E	E	E	E	E	E	E			E	E		E		E
Conductivity	E	E	E	E	E	E	E			E	E		E		E
Chlorine								E	E	E	E				

** equal volumes collected at 1110 and 1450 on 8/19
( ) duplicate sample analytical result
E-comp composite sample collected by Ecology
O-comp composite sample collected by Orting
E Ecology laboratory analysis
O Orting laboratory analysis

Inf influent sample
AB Ef aerated lagoon effluent
Cl2 chlorine contact chamber effluent
Ef plant effluent

Appendix C – Ecology Analytical Methods and Laboratories Used – Orting, August 1991.

Parameter	Method	Laboratory
Conductivity	EPA, 1979: 120.1	Manchester
Alkalinity	EPA, 1979: 310.1	Manchester
Hardness	EPA, 1979: 130.2	Manchester
TS	EPA, 1979: 160.3	Manchester
TNVS	EPA, 1979: 160.3	Manchester
TSS	EPA, 1979: 160.2	Manchester
TNVSS	EPA, 1979: 160.2	Manchester
BOD5	EPA, 1979: 405.1	Water Management Laboratories, Inc.
COD	EPA, 1979: 410.1	Sound Analytical Services, Inc.
TOC (water)	EPA, 1979: 415.1	Manchester
NH3-N	EPA, 1979: 350.1	Sound Analytical Services, Inc.
NO2+NO3-N	EPA, 1979: 353.2	Sound Analytical Services, Inc.
Phosphorous - Total	EPA, 1979: 365.3	Sound Analytical Services, Inc.
F-Coliform MF	APHA, 1989: 9222D	Manchester
VOA (water)	EPA, 1984: 624	Weyerhaeuser
BNAs (water)	EPA, 1984: 625	Weyerhaeuser
Pest/PCB (water)	EPA, 1984: 608	Weyerhaeuser
PP Metals	EPA, 1979: 4.1.1	Manchester*
Salmonid (acute 100%)	Ecology, 1981	Manchester
Daphnia magna (chronic)	EPA, 1987	Manchester

* Hg analysis done by Water Management Laboratories, Inc.

APHA, 1989. Standard Methods for the Examination of Water and Wastewater, APHA-AWWA-WPCF, 17th ed.
Ecology, 1981. Static Acute Fish Toxicity Test, DOE 80-12, revised July 1981.
EPA, 1979. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020 (Rev. March, 1983).
EPA, 1984. 40 CFR Part 136, October 26, 1984.
EPA, 1987. A Short-Term Chronic Toxicity Test Using Daphnia magna, EPA/600/D-87/080.

Appendix D – Tentatively Identified Compounds – Orting, August 1991.

Ecology Influent Sample

Location: Inf-Eco
Type: E-comp
Date: 8/19-20
Time: 0810-0810
Lab Log#: 348082

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

348082

Lab Name: WEYERHAEUSER Method: 8270

Lab Code: WEYER Case No.: 06532 SAS No.: SDG No.: 76526

Matrix: (soil/water) WATER Lab Sample ID: 76532

Sample wt/vol: 1000 (g/mL) ML Lab File ID: BN0903G

Level: (low/med) LOW Date Received: 08/22/91

% Moisture: not dec. dec. Date Extracted: 08/26/91

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 09/04/91

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

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

Number TICs found: 20

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN	6.05	43	JX NJ
2. 10482-56-1	3-CYCLOHEXENE-1-METHANOL, .A	11.87	120	JX
3. 5635-50-7	PHENOL, 4,4'-(1,2-DIETHYL-1,	15.59	79	JX
4. 112-53-8	1-DODECANOL	16.80	19	JX
5. 90-43-7	[1,1'-BIPHENYL]-2-OL	17.59	66	JX
6. 120-40-1	DODECANAMIDE, N,N-BIS(2-HYDR	18.40	76	JX
7.	UNKNOWN	19.94	26	JX
8. 544-63-8	TETRADECANOIC ACID	21.30	160	JX
9. 629-76-5	1-PENTADECANOL	21.40	33	JX
10.	UNKNOWN	22.57	66	JX
11.	UNKNOWN	22.75	32	JX
12. 2091-29-4	9-HEXADECENOIC ACID	23.74	89	JX
13. 57-10-3	HEXADECANOIC ACID	24.19	1900	JX
14.	UNKNOWN	25.14	27	JX
15.	UNKNOWN	26.37	4500	JX
16.	UNKNOWN	26.62	1900	JX
17.	UNKNOWN	27.12	61	JX
18.	UNKNOWN	33.36	94	JX
19.	UNKNOWN	35.94	71	JX
20.	UNKNOWN	36.32	83	JX

Appendix D – (cont'd) – Orting, August 1991.

Ecology Aerated Lagoon Effluent Sample

Location: AB Ef–1
Type: grab
Date: 8/19
Time: 1025
Lab Log#: 348084

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

348084

Lab Name: WEYERHAEUSER   Contract: 046-5751

Lab Code: WEYER   Case No.: 06532   SAS No.: ____   SDG No.: 348080

Matrix: (soil/water) WATER   Lab Sample ID: 76528

Sample wt/vol: 5.0 (g/mL) ML   Lab File ID: B5704

Level: (low/med) LOW   Date Received: 08/22/91

% Moisture: not dec. ____   Date Analyzed: 08/26/91

Column (pack/cap) CAP   Dilution Factor: 1.0

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

Number TICs found: 9

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 541059	Cyclotrisiloxane, hexamethyl	17.75	110	BJ
2. 111842	Nonane	22.19	21	J
3. 13475815	Hexane, 2,2,3,3-tetramethyl-	23.27	5.0	J
4. 15869893	Octane, 2,5-dimethyl-	23.70	12	J
5. 5911046	Nonane, 3-methyl-	24.24	49	J
6. 7045672	Cyclohexane, 2-ethyl-1,3-dim	24.72	60	J
7. 871830	Nonane, 2-methyl-	26.01	270	J
8. 5911046	Nonane, 3-methyl-	26.39	110	J
9. 489203	Cyclopentane, 1,2-dimethyl-3	26.76	47	J

Appendix D - (cont'd) - Orting, August 1991.

Ecology Aerated Lagoon Effluent Sample

Location: AB Ef-Eco
Type: E-comp
Date: 8/19-20
Time: 0900-0900
Lab Log#: 348086

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

348086

Lab Name: WEYERHAEUSER Method: 8270

Lab Code: WEYER Case No.: 06532 SAS No.: SDG No.: 76526

Matrix: (soil/water) WATER Lab Sample ID: 76533

Sample wt/vol: 1000 (g/mL) ML Lab File ID: BN0903H

Level: (low/med) LOW Date Received: 08/22/91

% Moisture: not dec. dec. Date Extracted: 08/26/91

Extraction: (SepF/Cont/Sonc) CONT Date Analyzed: 09/04/91

GPC Cleanup: (Y/N) N pH: Dilution Factor: 1.0

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

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 20324-32-7	2-PROPANOL, 1-(2-METHOXY-1-M	8.08	11	JX
2.	UNKNOWN	8.00	15	JX
3. 13429-07-7	2-PROPANOL, 1-(2-METHOXYPROP	8.28	16	JX
4. 5635-50-7	PHENOL, 4,4'-(1,2-DIETHYL-1,	15.55	38	JX
5. 2091-29-4	9-HEXADECENOIC ACID	23.60	28	JX
6. 57-10-3	HEXADECANOIC ACID	23.85	63	JX
7.	UNKNOWN	26.07	170	JX

Appendix D – (cont'd) – Orting, August 1991.

Ecology Plant Effluent Sample

Location: Ef-Eco
Type: E-comp
Date: 8/19-20
Time: 0810-0810
Lab Log#: 348091

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

348091

Lab Name: WEYERHAEUSER   Method: 8270

Lab Code: WEYER   Case No.: 06532   SAS No.:   SDG No.: 76526

Matrix: (soil/water) WATER   Lab Sample ID: 76534

Sample wt/vol: 1000 (g/mL) ML   Lab File ID: BN0903I

Level: (low/med) LOW   Date Received: 08/22/91

% Moisture: not dec. dec.   Date Extracted: 08/26/91

Extraction: (SepF/Cont/Sonc) CONT   Date Analyzed: 09/04/91

GPC Cleanup: (Y/N) N   pH: Dilution Factor: 1.0

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

Number TICs found: 6

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 20324-32-7	2-PROPANOL, 1-(2-METHOXY-1-M	8.08	10	JX
2.	UNKNOWN	8.00	14	JX
3. 13429-07-7	2-PROPANOL, 1-(2-METHOXYPROP	8.28	13	JX
4.	UNKNOWN	23.57	10	JX
5. 57-10-3	HEXADECANOIC ACID	23.80	12	JX
6.	UNKNOWN	26.02	18	JX

Appendix E - VOA, BNA, Pesticide/PCB and Metals Scan Results - Orting, August 1991.

		Location:	Inf-1		Inf-2		AB Ef-1		AB Ef-2		Ef-1		Ef-2	
		Type:	grab		grab		grab		grab		grab		grab	
		Date:	8/19		8/19		8/19		8/19		8/19		8/19	
		Time:	0955		1345		1025		1405		1110		1450	
		Lab Log#:	348080		348081		348084		348085		348089		348090	
	VOA Compounds		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
(Group)[1]														
a	Chloromethane		4	U	4	U	4	U	4	U	4	U	4	U
a	Bromomethane		2	U	2	U	2	U	2	U	2	U	2	U
a	Methylene Chloride	***	2	U	2	U	110		26		2	U	2	U
a	Chloroform	***	1	J	3	J	2	U	2	U	2	U	2	U
a	Carbon Tetrachloride		2	U	2	U	2	U	2	U	2	U	2	U
a	Bromodichloromethane		1	U	1	U	1	U	1	U	1	U	1	U
a	Dibromochloromethane		2	U	2	U	2	U	2	U	2	U	2	U
a	Bromoform		1	U	1	U	1	U	1	U	1	U	1	U
	Chloroethane		4	U	4	U	4	U	4	U	4	U	4	U
	Vinyl Chloride		3	U	3	U	3	U	3	U	3	U	3	U
	1,1-Dichloroethane		2	U	2	U	2	U	2	U	2	U	2	U
	1,2-Dichloroethane		2	U	2	U	2	U	2	U	2	U	2	U
b	1,1-Dichloroethene		3	U	3	U	3	U	3	U	3	U	3	U
b	1,2-Dichloroethene (total)		2	U	2	U	2	U	2	U	2	U	2	U
c	1,1,1-Trichloroethane		2	U	2	U	2	U	2	U	2	U	2	U
c	1,1,2-Trichloroethane		2	U	2	U	2	U	2	U	2	U	2	U
	Trichloroethene		2	U	2	U	2	U	2	U	2	U	2	U
f	1,1,2,2-Tetrachloroethane		2	U	2	U	2	U	2	U	2	U	2	U
	Tetrachloroethene		2	U	2	U	2	U	2	U	2	U	2	U
d	1,2-Dichloropropane		2	U	2	U	2	U	2	U	2	U	2	U
e	cis-1,3-Dichloropropene		2	U	2	U	2	U	2	U	2	U	2	U
e	trans-1,3-Dichloropropene		1	U	1	U	1	U	1	U	1	U	1	U
	Acetone	***	15	UJ	30	UJ	200	E	81	J	8	U	10	UJ
	2-Butanone (MEK)		3	U	3	U	3	U	3	U	3	U	3	U
	4-Methyl-2-Pentanone (MIBK)		2	U	2	U	2	U	2	U	2	U	2	U
	2-Hexanone		4	U	4	U	4	U	4	U	4	U	4	U
	Vinyl Acetate		2	U	2	U	2	U	2	U	2	U	2	U
	Carbon Disulfide		3	U	3	U	3	U	3	U	3	U	3	U
	Benzene		2	U	2	U	2	U	2	U	2	U	2	U
	Toluene	***	4	J	3	J	2	U	2	U	2	U	2	U
	Ethylbenzene		3	U	3	U	3	U	3	U	3	U	3	U
	Styrene		2	U	2	U	2	U	2	U	2	U	2	U
	Total Xylenes		3	U	3	U	3	U	3	U	3	U	3	U
g	Chlorobenzene		3	U	3	U	3	U	3	U	3	U	3	U

Appendix E (cont'd) - Orting, August 1991.

(Group)[1]	BNA Compounds		Inf-Eco		AB Ef-Eco		Ef-Eco	
	Location:		Inf-Eco		AB Ef-Eco		Ef-Eco	
	Type:		E-comp		E-comp		E-comp	
	Date:		8/19-20		8/19-20		8/19-20	
	Time:		0810-0810		0900-0900		0810-0810	
	Lab Log#:		348082		348086		348091	
			ug/L		ug/L		ug/L	
	Hexachloroethane		3	U	3	U	3	U
	Hexachlorobutadiene		2	U	2	U	2	U
	Hexachlorocyclopentadiene		2	U	2	U	2	U
j	Bis(2-Chloroethyl)Ether		5	U	5	U	5	U
j	Bis(2-Chloroisopropyl)Ether		5	U	5	U	5	U
j	Bis(2-Chloroethoxy)Methane		3	U	3	U	3	U
k	N-Nitroso-di-n-Propylamine		4	U	4	U	4	U
k	N-Nitrosodiphenylamine		4	U	4	U	4	U
	Isophorone		3	U	3	U	3	U
n	Naphthalene		7	U	7	U	7	U
	2-Methylnaphthalene		9	U	9	U	9	U
n	Acenaphthylene		9	U	9	U	9	U
n	Acenaphthene		9	U	9	U	9	U
n	Fluorene		7	U	7	U	7	U
n	Phenanthrene		4	U	4	U	4	U
n	Anthracene		4	U	4	U	4	U
n	Fluoranthene		4	U	4	U	4	U
n	Pyrene		4	U	4	U	4	U
n	Benzo(a)Anthracene		4	U	4	U	4	U
n	Chrysene		4	U	4	U	4	U
n	Benzo(b)Fluoranthene		4	U	4	U	4	U
n	Benzo(k)Fluoranthene		5	U	5	U	5	U
n	Benzo(a)Pyrene		4	U	4	U	4	U
n	Indeno(1,2,3-cd)Pyrene		8	U	8	U	8	U
n	Dibenzo(a,h)Anthracene		7	U	7	U	7	U
n	Benzo(g,h,i)Perylene		8	U	8	U	8	U
h	1,2-Dichlorobenzene		6	U	6	U	6	U
h	1,3-Dichlorobenzene		8	U	8	U	8	U
h	1,4-Dichlorobenzene		5	U	5	U	5	U
g	1,2,4-Trichlorobenzene		7	U	7	U	7	U
g	Hexachlorobenzene		5	U	5	U	5	U
m	2-Chloronaphthalene		11	U	11	U	11	U
i	Dimethyl Phthalate		17	U	17	U	17	U
i	Diethyl Phthalate		7	U	7	U	7	U
i	Di-n-Butyl Phthalate		4	U	4	U	4	U
i	Butylbenzyl Phthalate		6	U	6	U	6	U
i	Bis(2-Ethylhexyl)Phthalate	***	6	J	4	U	4	U
i	Di-n-Octyl Phthalate		4	U	4	U	4	U
	Nitrobenzene		3	U	3	U	3	U
o	2,4-Dinitrotoluene		3	U	3	U	3	U
o	2,6-Dinitrotoluene		2	U	2	U	2	U
	3,3'-Dichlorobenzidine		10	UJ	10	UJ	10	UJ
	Phenol		5	U	5	U	5	U
	2-Methylphenol		4	U	4	U	4	U
	4-Methylphenol	***	21		6	U	6	U
	2,4-Dimethylphenol		4	U	4	U	4	U
l	2-Nitrophenol		5	U	5	U	5	U
l	4-Nitrophenol		13	U	13	U	13	U

Appendix E (cont'd) - Orting, August 1991.

(Group)[1]			Inf-Eco		AB Ef-Eco		Ef-Eco	
	Location:		Inf-Eco		AB Ef-Eco		Ef-Eco	
	Type:		E-comp		E-comp		E-comp	
	Date:		8/19-20		8/19-20		8/19-20	
	Time:		0810-0810		0900-0900		0810-0810	
	Lab Log#:		348082		348086		348091	
			ug/L		ug/L		ug/L	
l	2,4-Dinitrophenol		9	U	9	U	9	U
l	4,6-Dinitro-2-Methylphenol		25	UJ	25	UJ	25	UJ
	2-Chlorophenol		5	U	5	U	5	U
	2,4-Dichlorophenol		2	U	2	U	2	U
	4-Chloro-3-Methylphenol		5	U	5	U	5	U
	2,4,5-Trichlorophenol		4	U	4	U	4	U
	2,4,6-Trichlorophenol		4	U	4	U	4	U
	Pentachlorophenol		4	U	4	U	4	U
p	4-Chlorophenyl Phenylether		9	U	9	U	9	U
p	4-Bromophenyl Phenylether		6	U	6	U	6	U
	2-Nitroaniline		3	U	3	U	3	U
	3-Nitroaniline		5	U	5	U	5	U
	4-Nitroaniline		9	U	9	U	9	U
	4-Chloroaniline		4	U	4	U	4	U
	Benzyl Alcohol	***	5	J	3	U	3	U
	Benzoic Acid	***	46	J	7	U	7	U
	Dibenzofuran		8	U	8	U	8	U
	Pesticide/PCB Compounds		ug/L		ug/L		ug/L	
	Aldrin		0.050	UJ	0.050	UJ	0.050	UJ
	Dieldrin		0.10	UJ	0.10	UJ	0.10	UJ
v	alpha-Chlordane		0.50	UJ	0.50	UJ	0.50	UJ
v	gamma-Chlordane		0.50	UJ	0.50	UJ	0.50	UJ
s	Endosulfan I		0.050	UJ	0.050	UJ	0.050	UJ
s	Endosulfan II		0.10	UJ	0.10	UJ	0.10	UJ
s	Endosulfan Sulfate		0.10	UJ	0.10	UJ	0.10	UJ
t	Endrin		0.10	UJ	0.10	UJ	0.10	UJ
t	Endrin Ketone		0.10	UJ	0.10	UJ	0.10	UJ
r	Heptachlor		0.050	UJ	0.050	UJ	0.050	UJ
r	Heptachlor Epoxide		0.050	UJ	0.050	UJ	0.050	UJ
q	alpha-BHC		0.050	UJ	0.050	UJ	0.050	UJ
q	beta-BHC		0.050	UJ	0.050	UJ	0.050	UJ
q	delta-BHC		0.050	UJ	0.050	UJ	0.050	UJ
q	gamma-BHC (Lindane)	***	0.035	J	0.050	UJ	0.050	UJ
u	4,4'-DDT		0.10	UJ	0.10	UJ	0.10	UJ
u	4,4'-DDE		0.10	UJ	0.10	UJ	0.10	UJ
u	4,4'-DDD		0.10	UJ	0.10	UJ	0.10	UJ
	Toxaphene		1.0	UJ	1.0	UJ	1.0	UJ
	Methoxychlor		0.50	UJ	0.50	UJ	0.50	UJ
w	Aroclor-1016		0.50	UJ	0.50	UJ	0.50	UJ
w	Aroclor-1221		0.50	UJ	0.50	UJ	0.50	UJ
w	Aroclor-1232		0.50	UJ	0.50	UJ	0.50	UJ
w	Aroclor-1242		0.50	UJ	0.50	UJ	0.50	UJ
w	Aroclor-1248		0.50	UJ	0.50	UJ	0.50	UJ
w	Aroclor-1254		1.0	UJ	1.0	UJ	1.0	UJ
w	Aroclor-1260		1.0	UJ	1.0	UJ	1.0	UJ

Appendix E (cont'd) – Orting, August 1991.

Location:		Inf–Eco		AB Ef–Eco		(AB Ef–Eco)		Ef–Eco	
Type:		E–comp		E–comp		(E–comp)		E–comp	
Date:		8/19–20		8/19–20		(8/19–20)		8/19–20	
Time:		0810–0810		0900–0900		(0900–0900)		0810–0810	
Lab Log#:		348082		348086		(348095)		348091	
Metals – total recoverable									
Antimony	***	30	U	30	U	(30	U)	35	P
Arsenic	***	2.6	P	2.2	P	(2.2	P)	2.1	P
Pentavalent									
Trivalent									
Beryllium		1.0	U	1.0	U	(1.0	U)	1.0	U
Cadmium	***	0.25		0.10	U	(0.10	U)	0.10	U
Chromium		5.0	UB	5.0	UB	(5.0	UB)	5.0	UB
Hexavalent									
Trivalent									
Copper	***	36.9		3.9	P	(4.9	P)	3.2	P
Lead	***	6.93		1.0	U	(1.3	P)	1.2	P
Mercury (total)		1	U	1	U	(1	U)	1	U
Nickel	***	2.6	P	1.9	P	(2.0	P)	2.3	P
Selenium		2.0	U	2.0	U	(2.0	U)	2.0	U
Silver		0.50	UN	0.50	UN	(0.50	UN)	0.50	UN
Thallium		2.5	U	2.5	U	(2.5	U)	2.5	U
Zinc	***	73.6		9.3	P	(9.2	P)	8.0	P

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

Inf influent sample
AB Ef aerated lagoon effluent
Ef Plant effluent
U The analyte was not detected at or above the reported result.
UJ The analyte was not detected at or above the reported estimated result.
J The analyte was positively identified. The associated numerical result is an estimate.
B Analyte was found in the analytical method blank, indicating the sample may have been contaminated.
N For metals – the spike sample recovery was not within control limits
P The analyte was detected above the instrumentation detection limit but below the established minimum quantitation limit.
E The concentration of the analyte exceeded the calibration range, and a dilution should be performed.
*** Analyte detected in one or more samples.
( ) Duplicate sample analytical result.

a Total Halomethanes
b Total Dichloroethenes
c Total Trichloroethanes
d Total Dichloropropanes
e Total Dichloropropenes
f Total Tetrachloroethanes
g Total Chlorinated Benzenes (excluding Dichlorobenzenes)
h Total Dichlorobenzenes
i Total Phthalate Esters
j Total Chloroalkyl Ethers
k Total Nitrosamines
l Total Nitrophenols
m Total Chlorinated Naphthalenes
n Total Polynuclear Aromatic Hydrocarbons
o Total Dinitrotoluenes
p Total Haloethers
q Total BHCs
r Heptachlor
s Endosulfan
t Endrin
u DDT plus metabolites
v Total Chlordane
w Total Aroclors (PCBs)