



STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

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TO: Roger Ray and Patrick Hallinan, ERO
FROM: Norm Glenn and Tom Nell, EILS/WAS
SUBJECT: Kaiser Aluminum and Chemical Corporation-Trentwood, Class II Inspection

ABSTRACT

Ecology conducted a Class II Inspection at Kaiser Aluminum and Chemical Corporation, Trentwood, Washington, on May 21-23, 1990. Kaiser operates an aluminum rolling mill and metal finishing plant. Kaiser is permitted to discharge wastewater to the Spokane River as regulated by NPDES permit number WA-000089-2. Wastewater generated at Kaiser is discharged to the river through a four million gallon wastewater lagoon. The influent to the lagoon consists of effluent from industrial and domestic wastewater treatment (DWT) facilities, and contact and non-contact cooling water.

Kaiser was operating within the permit limits except for oil and grease samples collected from the lagoon discharge. A moderate removal efficiency of TSS, BOD₅, and COD was realized in the domestic wastewater treatment facility; lead concentrations were somewhat elevated.

Effluent from the industrial wastewater treatment facility was high in solids, chromium⁺⁶ and copper and moderately high in selenium. Industrial wastewater effluent to the lagoon caused 100% mortality in all four bioassays, both acute and chronic, indicating the presence of toxicity. Kaiser has added multi-media filtration since the inspection.

No significant quantities of organic compounds were found in any of the sampled waste streams.

INTRODUCTION

Ecology conducted a Class II Inspection at Kaiser Aluminum and Chemical Corporation (Kaiser), Trentwood, Washington, on May 21-23, 1990. Roger Ray of the Eastern Regional Office (ERO) requested the inspection. Pat Hallinan of the Environmental Investigations and Laboratory Services Program (EILS) conducted the inspection. Patrick Blau, Senior Environmental Engineer at Kaiser, provided on-site assistance. Tom Nell and Norm Glenn of EILS analyzed and interpreted laboratory data and wrote this report.

Objectives of the inspection were to:

1. Characterize Kaiser's intake water (Spokane River water) for selected general chemistry and priority pollutant parameters;
2. Characterize influents (treated industrial wastewater, treated domestic wastewater, and cooling water) to the wastewater lagoon;
3. Characterize effluent from the wastewater lagoon;
4. Verify compliance with NPDES permit limits;
5. Assess toxicity of intake water, treated industrial wastewater, and wastewater lagoon effluent using a bioassay;
6. Evaluate the permittee's sampling and flow measurement procedure using sample splits; and
7. Progress Ecology's research on the effectiveness of centrifugation.

Description and Location

The aluminum rolling mill and metal finishing plant was originally built in 1945. It operates continuously and employs about 1500 people. The primary products include aluminum coil, sheet, and plate. Aluminum is re-melted and formed into ingots as part of the manufacturing process. Three hot rolling mills are used to form coil, sheet, and plate followed by five cold rolling mills to acquire further reduction in thickness. Finishing operations involve degreasing, conversion coating, and painting. Figure 1 is a location map.

Kaiser is permitted to discharge wastewater to the Spokane River under National Pollutant Discharge Elimination System (NPDES) waste discharge permit number WA-000089-2, issued in 1988. Wastewater is discharged to the Spokane River through a four million gallon wastewater lagoon (outfall 001). Influent to the lagoon consists of effluent from industrial wastewater treatment (IWT) and domestic wastewater treatment (DWT) facilities, and contact

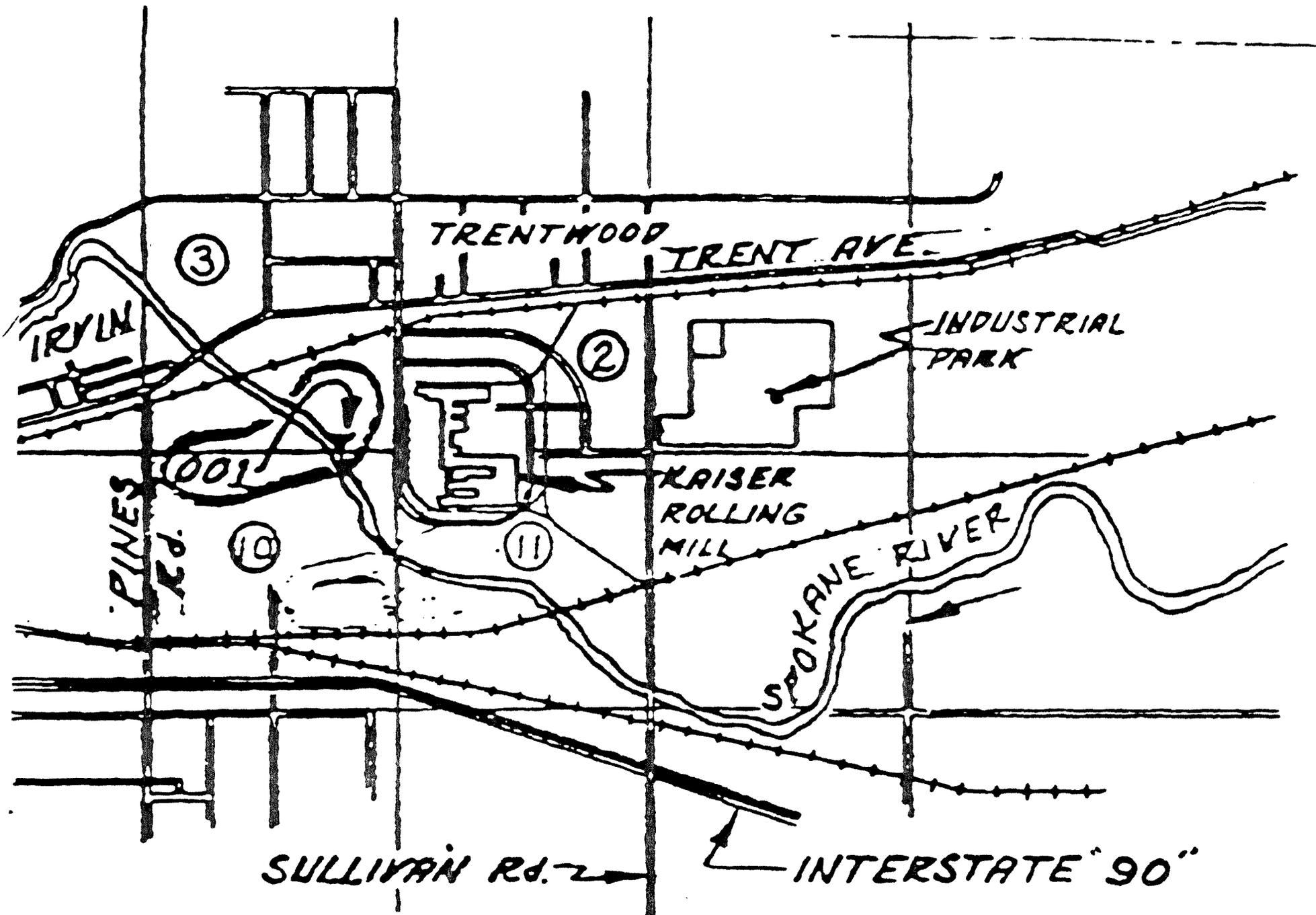


Figure 1. Location Map, Kaiser Aluminum and Chemical Corporation, Trentwood, Washington.

and non-contact cooling water. The IWT, DWT, and cooling water discharge locations are referred to as outfalls 002, 003, 004 and 005, respectively. The permit contains effluent limitations for outfalls 002 and 003, as well as 001. Figure 2 shows the treatment systems layout and wastewater flow regime.

Immediately after the permit was issued, Kaiser submitted documentation to establish that they could not, despite all reasonable best efforts, achieve several of the effluent limitations established for outfalls 001 and 002. Since these effluent limitations may not be waived or delayed, Ecology exercised its prosecutorial discretion by issuing Order No. DE 88-E248. The order provides for interim effluent limits during the schedule of compliance contained in the permit. These interim limits were in effect at the time of the inspection.

The IWT facility was designed to reduce the oil content, phosphorus, and chromium in the wastewater. This is achieved through a complex process. Acid-heat treatment demulsifies the oil-water emulsion. This demulsified mixture is separated by gravity. The reclaimed oil is sent to a local oil refining facility for further processing. The water portion flows into the neutralization tank.

Hexavalent chrome waste is reduced by acid-sulfur dioxide reduction. Reduced chromium (trivalent) waste combines with the water portion from the acid-heat treatment in the neutralization tank. Untreated phosphate waste is also allowed to flow into the neutralization tank. Lime and polymer are added. Calcium hydroxide (lime) complexes with the chromium and phosphate ions and forms floc which settles to the bottom of the neutralization tank.

The settled matter (sludge) is dewatered in a drum vacuum filter and hauled to a local landfill. The effluent undergoes further settling in a clarifier and passes through a Parshall Flume into the wastewater lagoon. (A multi-media filtration system was installed after the date of the inspection to provide additional treatment for IWT discharge to the lagoon.) The IWT process layout is given in Figure 3.

The DWT facility is designed to reduce biochemical oxygen demand (BOD), total suspended solids (TSS), and fecal coliform. It consists of a primary clarifier, rock trickling filter, secondary clarifier, and chlorine disinfection. Effluent passes through a Parshall Flume before discharge to the lagoon. Sludge is digested and dried on-site. Figure 4 shows the layout of the DWT.

Cooling water is the largest contributor of flow to the lagoon. It is made up of both noncontact and contact cooling water. Runoff from floor, storm, and roof drains also discharge to the lagoon.

All wastewater produced at Kaiser is discharged to the lagoon before it passes through a rectangular weir and outfall to the Spokane River. The combined wastewater in the lagoon is treated only for oil removal. The separation and removal of oil is accomplished mainly with oil booms and a mechanical skimmer.

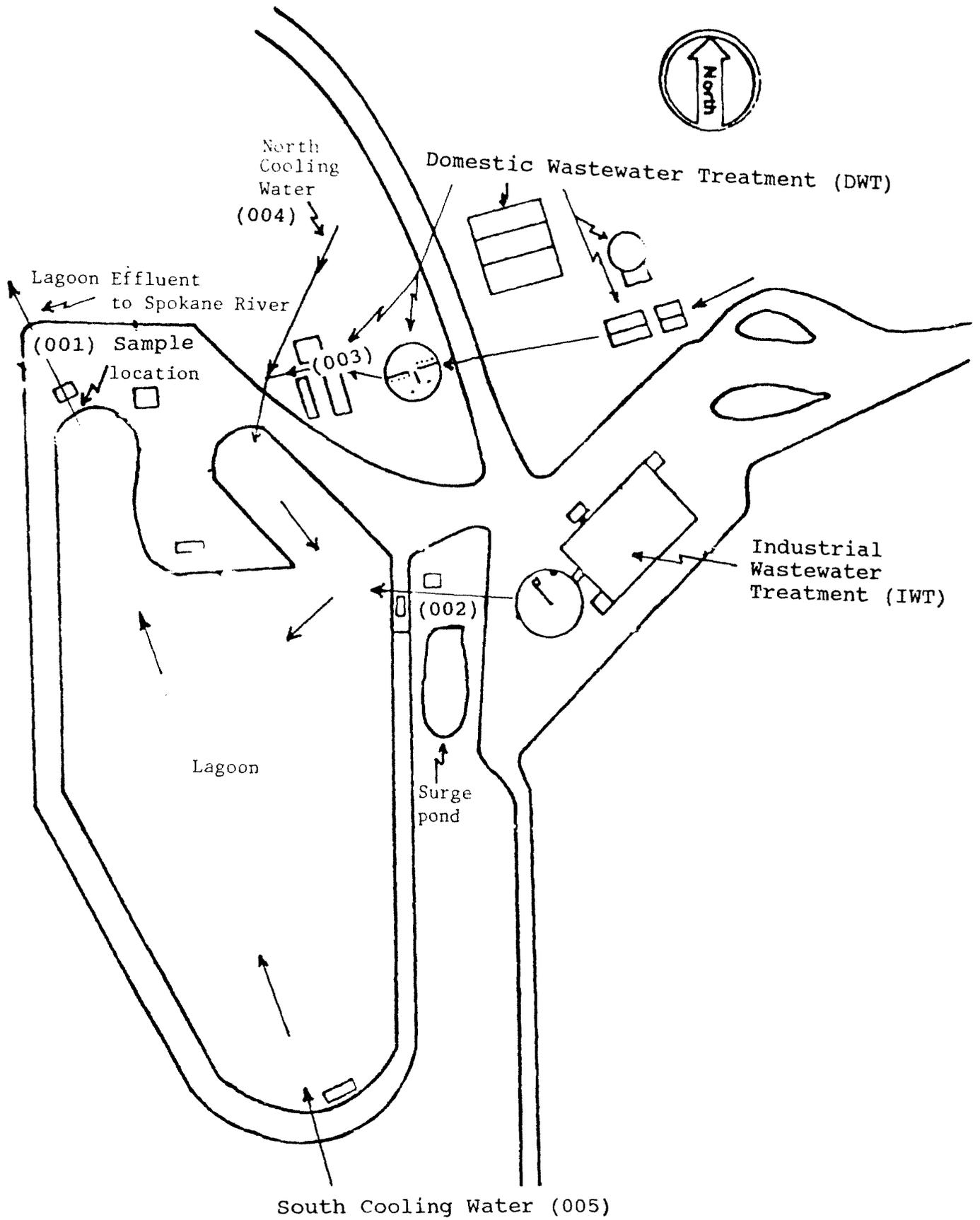


Figure 2. Wastewater Treatment Facilities Layout, Kaiser Aluminum and Chemical Corporation, Trentwood, Washington.

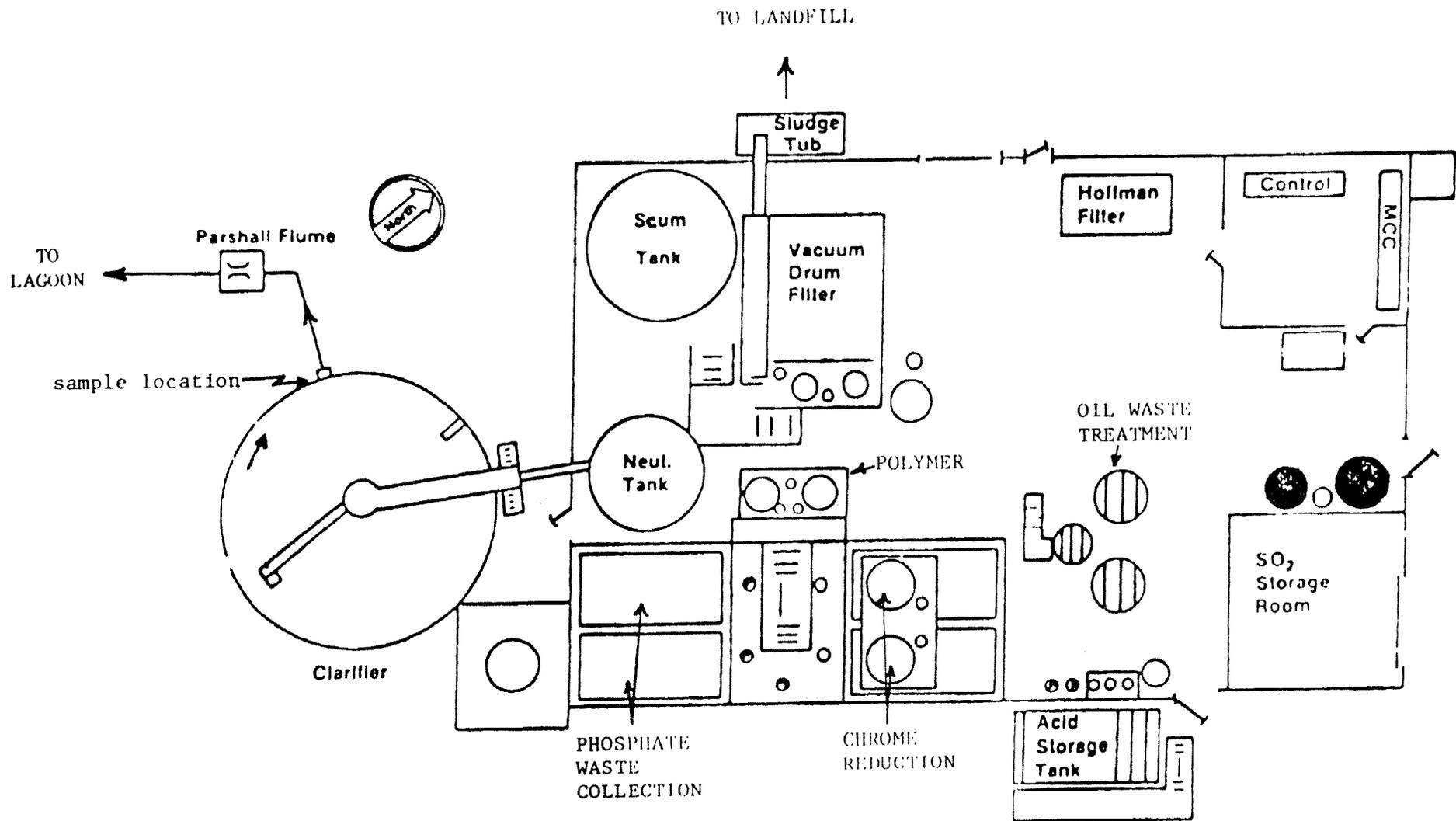


Figure 3. Industrial Wastewater Treatment Facility (IWT) Kaiser Aluminum and Chemical Corporation, Trentwood, Washington.

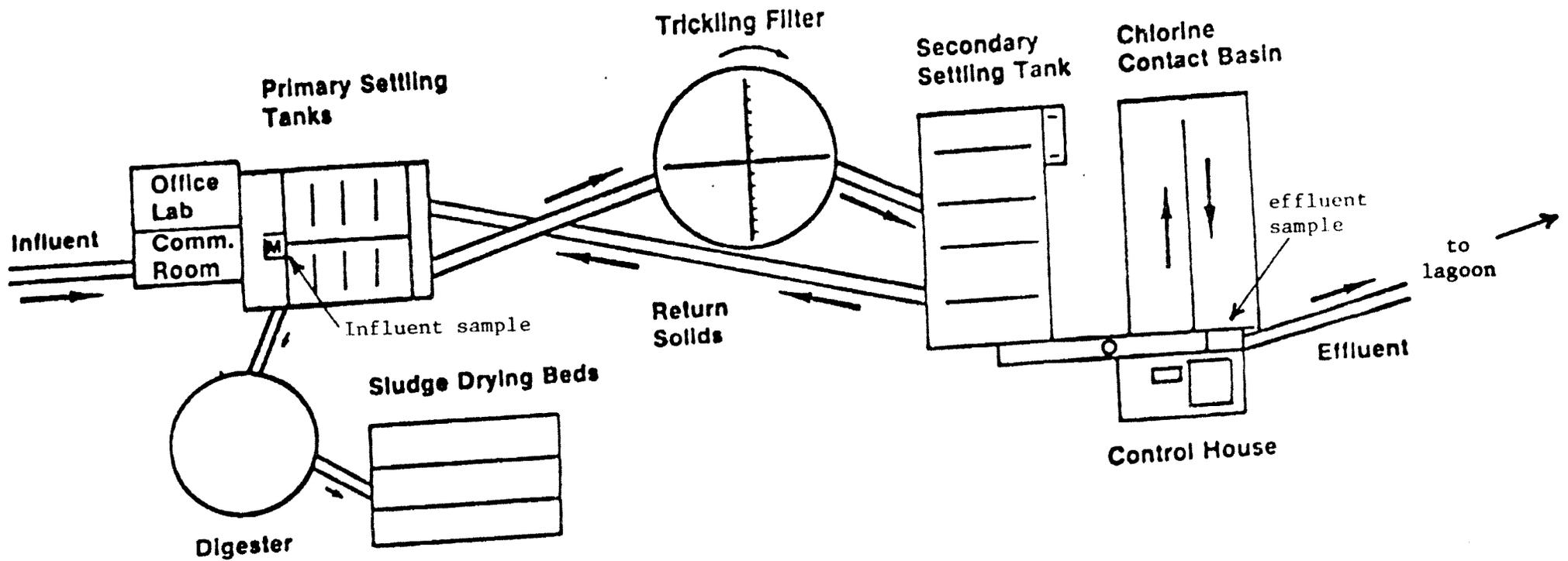


Figure 4. Domestic Wastewater Treatment Facility (DWT) Kaiser Aluminum and Chemical Corporation, Trentwood, Washington.

PROCEDURES

Ecology and Kaiser collected 24 hour composite samples of IWT, DWT, cooling water discharges, effluent from the lagoon, and plant intake (Spokane River water). In addition, Ecology collected a composite sample of the DWT influent. Ecology composite samplers were fitted with teflon tubing and glass sampling bottles. They were set to collect approximately 330 mL of sample every 30 minutes. Sample containers were iced to keep them at 4°C.

All sampling equipment was cleaned before use by washing with non-phosphate detergent and rinsing successively with tap water, ten percent nitric acid, then three times with de-ionized water, pesticide grade methylene chloride, and pesticide grade acetone. Collection equipment was air-dried and then wrapped in aluminum foil until used.

A two gallon jar sent from the Manchester Laboratory filled with organic-free water was transported to the site for use as a field blank. One-third gallon was pumped from the two gallon jar through an Ecology compositor, swirled around in the glass sampling bottle and discarded. The next one and two-thirds of a gallon was also pumped through the compositor and poured from the bottle into sample containers to be analyzed for cyanide, phenols, and metals. This was considered an equipment blank.

Multiple grab samples of wastewater were also collected at the same locations at different times of the day. Grab samples were collected of IWT and DWT sludge. A detailed description of samples collected and parameters tested at each station is given in Table 1. Appendix A gives a description of sampling locations and identifies station ID codes.

Ecology and Kaiser composite samples taken at several of the stations were split for comparative analysis as shown in Table 1. Appendix B lists the various laboratories and methods used for the analyses.

Grab-composites were taken of the intake water, IWT effluent, and lagoon effluent for bioassay. These consisted of three grab samples collected during the course of the day and composited. *Daphnia magna*, fathead minnow, *Daphnia pulex*, and salmonid tests were used to determine the toxicity of these sampled streams.

Wastewater lagoon effluent particulate matter was collected using two Alfa Laval Bowl type continuous centrifuges (model WSB/MAB 103) following procedures described by Andreasson (1991). Effluent was pumped by a positive displacement pump through teflon tubing to the centrifuge trailer. The low TSS concentration in the effluent dictated a minimum practical flow

Table 1 – Sampling Times and Parameters Analyzed – Kaiser, Trentwood, 5/90.

Parameter	Station:	Inf-003	Eff-003	Kaiser-003	Eff-003	Eff-003	Eff-002	Kaiser-002	Eff-002	Eff-002	Eff-001	Eff-001	Eff-002	Blank Transfer
	Type:	composite	composite	composite	grab	grab	composite	composite	grab	grab	grab	grab	grab	5/21/90
	Date:	5/22-23/90	5/22-23/90	5/22-23/90	5/22/90	5/23/90	5/22-23/90	5/22-23/90	5/22/90	5/22/90	5/22/90	5/22/90	5/23/90	
	Time:	24 hrs	24 hrs	24 hrs	11:15	12:25	24 hrs	24 hrs	9:00	14:15	15:15	15:15	8:40	
	Lab ID#:	218155	218156	218178	218166	218167	218157	218179	218168	218169	218182	218183	218170	218165
GENERAL CHEMISTRY														
Turbidity		E	E	E			E							
pH		E	E	E			E							
Conductivity		E	E	E			E							
Alkalinity		E	E	E			E							
Hardness			E				E							
Cyanide, total			E				EE+	E/K	EE+K	EE+K				E
SOLIDS														
TS		E	E	E			E	E						
TNVS		E	E	E			E	E						
TSS		E	E	E/K	E	E	E	E/K	E/K	E/K			E/K	
TNVSS		E	E	E			E	E						
BOD5		E	E	E/K										
COD		E	E	E	E	E	E	E	E	E			E	
TOC														
NUTRIENTS														
NH3-N		E	E	E	E	E	E	E	E	E			E	
NO3+NO2-N		E	E	E	E	E	E	E	E	E			E	
Phosphate - Total		E	E	E	E	E	E	E/K	E/K	E/K			E/K	
Phosphate - Ortho					E		E	E/K	E/K	E/K			E/K	
% Solids														
Fecal Collform				K		E								
ORGANICS AND METALS														
Phenols							E		E	E	E		E	
Oil and Grease								K	E/K	E	E	E	E/K	
Aluminum			EE**				EE*	E**						E**
PRIORITY POLLUTANTS														
BNAs							E							
Pesticides/PCBs							E							
VOAs							E							
Metals			EE**				EE*	E**/K						E**
Chrome (VI)							EE*	E**/K						
EP Tox														
BIOASSAYS														
Rainbow Trout							E							
Microtox							E							
Fathead Minnow							E							
Daphnia pulex							E							
Daphnia magna							E							
FIELD OBSERVATIONS														
Temp		E	E	E	E	E	E		E	E			E	
pH		E	E	E/K	E	E	E		E	E			E	
Conductivity		E	E	E	E	E	E		E	E			E	
Chlorine:														
Free Available					E	E								
Total Residual					E	E								

E - Ecology analysis.
K - Kaiser analysis.

* (1) total recoverable and (1) dissolved metals.
** Total metals.

+ (1) total and (1) weak and (1) dissociable cyanide.

Table 1 - Continued.

Parameter	Station: Eff-001	Kaiser-001	Eff-001	Eff-001	Eff-001	Intake	Kaiser-Intake	Intake	North CW	South CW	North CW	South CW	Sig-003	Sig-002
	Type: composite	composite	grab	grab	grab	composite	composite	grab	composite	composite	grab	grab	grab	grab
	Date: 5/22-23/90	5/22-23/90	5/22/90	5/22/90	5/23/90	5/22-23/90	5/22-23/90	5/22/90	5/22-23/90	5/22-23/90	5/22/90	5/22/90	5/22/90	5/22/90
	Time: 24 hrs	24 hrs	10:35	16:05	10:58	24 hrs	24 hrs	11:35	24 hrs	24 hrs	10:49	16:26	14:55	15:05
	Lab ID#: 218158	218180	218171	218172	218173	218159	218181	218174	218160	218161	218175	218176	218162	218163
GENERAL CHEMISTRY														
Turbidity	E					E			E	E				
pH	E					E			E	E				
Conductivity	E					E			E	E				
Alkalinity	E					E			E	E				
Hardness	E					E			E	E				
Cyanide, total	EE+	E	EE+	EE+		EE+	E/K		EE+	EE+			E	E
SOLIDS														
TS	E	E				E	E		E	E				
TNVS	E	E				E	E		E	E				
TSS	E	E	E	E	E	E	E/K		E	E			E	E
TNVSS	E	E				E	E		E	E				
BOD5														
COD	E	E	E	E	E	E	E		E	E				
TOC	E													
NUTRIENTS														
NH3-N	E	E	E	E	E	E	E							
NO3+NO2-N	E	E	E	E	E	E	E							
Phosphate - Total	E	E	E	E	E	E	E/K							
Phosphate - Ortho		E	E	E	E	E	E/K							
% Solids													E	E
Fecal Coliform														
ORGANICS AND METALS														
Phenols	E		E	E		E			E	E				
Oil and Grease			E	E	E		K	E	K	K	E	E		
Aluminum	EE*	E**				EE*	E**/K		E**/K	E**/K			E**	E**
PRIORITY POLLUTANTS														
BNAs	E					E								
Pesticides/PCBs	E					E								
VOAs	E					E								
Metals	EE*	E**				EE*	E**/K*		E**/K*	E**/K*			E**	E**
Chrome (VI)	EE*					EE*	K		K	K				
EP Tox														E
BIOASSAYS														
Rainbow Trout	E	K				E	K							
Microtox	E					E								
Fathead Minnow	E					E								
Daphnia pulex	E	K				E	K							
Daphnia magna	E					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:														
Free Available														
Total Residual														

E - Ecology analysis.
K - Kaiser analysis.

* (1) total recoverable and (1) dissolved metals.
** Total metals.

+(1) total and (1) weak and (1) dissociable cyanide.
^Zinc only.

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rate to the centrifuges, which were operated for approximately 48 hours. The centrifuges were cleaned prior to sampling following procedures described by Seiders (1989).

All samples collected for analysis by Ecology were placed on ice and shipped to the Manchester Laboratory.

Physical dimensions of the two Flumes and weir were compared to standards (ISCO, 1985). Instantaneous flows were taken by measuring depth of flow through each of the devices and referring to tables for conversion to volume. These flows were compared simultaneously to readings from Kaiser flow measuring instrumentation.

DATA QUALITY ASSURANCE

Metals

Holding times were met. All values obtained from the method blank were within the targeted limits of $\pm 20\%$ except for lead (22%). The outlier for lead is not of significance (Appendix C).

Matrix spike values were within the targeted $\pm 25\%$ of true values in most of the analyses. The exceptions were Al(+39%) and Ag(-27%) in the water matrix and As(+29%) and Ti(+26%) in the sludge matrix. Those analyses which did not meet the targeted matrix values are flagged with the letter "N". Duplicate results were within the targeted range of $\pm 20\%$ (Appendix C).

Volatiles, Semivolatiles, and Pesticides/PCBs

All samples were extracted and analyzed within the USEPA recommended holding times, which for volatiles, semivolatiles, and pesticides/PCBs is seven days. The extraction, cleanup, and analyses followed the procedure outlined in method SW846 (Appendix B). Method blank, matrix spike, and matrix spike duplicate results for all three analytical parameters are given in Appendix C.

Surrogate recoveries for the samples, the matrix spikes, and method blanks were within QC recovery limits.

Matrix spike and matrix spike duplicate (MS/MSD) recoveries and the relative percent difference (RPD) are within acceptable range for volatile and pesticide/PCB samples. The MS/MSD recoveries for the semivolatile samples were below the Contract Lab Program (CLP) recovery limits for five of 22 compounds, indicating the unacceptability of these recoveries. Sample results are not qualified based on MS/MSD results as recommended by Kirchmer (1988). The RPD for each of the spike analytes was within QC limits. All data is acceptable for use.

Nutrients

All analyses were done within holding times, except for $\text{NO}_2 + \text{NO}_3\text{-N}$, which was six days over the required two days. The sample was preserved, and the deterioration may have been minimal, but results are qualified. Spike recoveries were within the accepted range. All duplicate analyses were acceptable as well (the difference should be less than 0.01 or $\pm 5\%$), except for $\text{NO}_2 + \text{NO}_3\text{-N}$ which was 0.12. Check standards and blank analyses were also within accepted ranges.

Bioassays

Salmonid, Microtox[®], fathead minnow, *Daphnia pulex*, and *Daphnia magna* bioassays were done on lagoon effluent, IWT discharge, and the plant intake water. The salmonid laboratory control showed no mortality. The mean weight of the fish used was 0.61 g and mean length was 47.5 mm. The QA/QC documentation and water quality data were appropriate for the test (Stinson, 1990).

Synthetic water with hardness of 90 mg/L and alkalinity 60-70 mg/L was used for dilution during the fathead minnow bioassay. The dissolved oxygen saturation was kept at 40% or better at all times. For all three samples, the survival of control larvae was greater than 94% and the mean weight was greater than 0.55 mg. Therefore, the QA/QC procedure followed was adequate for the test and is acceptable (Stinson, 1990a).

Samples were used at 100% concentration for the *Daphnia pulex* bioassay. Reconstituted water with hardness of (80-90 mg/L as CaCO_3) was used as a control. Survival in the control was 90%, well above what is required to accept the data (Stinson, 1990b).

A series of five concentrations with 10 replicates per concentration with one *Daphnia* per replicate constituted the test mechanism for the *Daphnia magna* bioassay. A control was also set up. A separate vial for each concentration was set up to measure water quality. The quality control and test solution chemistry data were appropriate for the test and the control had a 100% survival rate. Therefore, the test is acceptable (Stinson, 1990c).

Phenol was used as the reference toxicant and saline-adjusted sterile deionized water was analyzed as the negative control for the Microtox[®] bioassay. QA/QC documentation and results were acceptable for the test (Stinson, 1990d).

Other Parameters

Manchester Laboratory analyzed samples for turbidity, pH, conductivity, hardness, total cyanide, cyanide (weak acid), solids, BOD_5 , COD, TOC, and fecal coliform. The standard QA/QC procedures of the laboratory were followed, and no unusual problems were encountered. The data are acceptable for use.

RESULTS AND DISCUSSION

Flow

Kaiser maintains instrumentation to monitor flow from the IWT and DWT facilities and the lagoon. Flows obtained from Kaiser, during the inspection, are listed in Table 2.

Table 2: Flows Recorded by Kaiser Instrumentation - Kaiser, Trentwood 5/90.

Date 7 am to 7 am	Lagoon discharge (MGD)	IWT discharge (MGD)	DWT discharge (MGD)
5/20-21/90	22.0	0.106	0.198
5/21-22/90	22.5	0.154	0.172
5/22-23/90	22.1	0.117	0.172

Three instantaneous flow measurements were taken on two different days at the lagoon effluent weir. The measured flows, 15.06 to 15.54MGD, were well below Kaiser's recorded flows of 22.0 to 22.5 MGD. The shape of the rectangular weir was altered by slime growths which undoubtedly contributed to the discrepancy in flow readings.

Similar discrepancies were found when measuring the IWT and DWT flows to the lagoon. All appeared to be due to inconsistent maintenance of the devices resulting in biological growths.

NPDES Permit Compliance

Kaiser's wastewater treatment systems were operating well within the permit and interim effluent limits except for oil and grease from the lagoon effluent (001) (Table 3). The effluent concentration of oil and grease ranged from 1.7 mg/L to 17.6 mg/L. The highest of the five concentrations measured exceeded both the daily average and the daily maximum interim effluent limits. Results of general chemistry analyses are presented in Table 4.

Domestic Wastewater Discharge (003) to Wastewater Lagoon

The DWT facility was working properly during the inspection, with a moderate percent removal of TSS, COD, and BOD₅ (Table 5). The temperature of Kaiser's composite sample was 8.7°C; this should be 4°C.

Table 3 - Comparison of Inspection Results to NPDES Permit Limits - Kaiser, Trentwood, 5/90.

WASTEWATER LAGOON DISCHARGE (001)					
**** Flow = 22.2 MGD					
Parameter	Interim Effluent Limits		Inspection Data		
	Daily	Daily	Ecology	Grab	
	Maximum	Average	Composite	Samples	
	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
Oil and Grease	15	10			1.7;4.7;9.6
TSS	15	10	3		3;2;3
Zinc (total)		0.5	0.09		
Chromium (total)		0.05	0.01		
pH, s.u.	6 - 9	6 - 9	7.8		7.2;7.6;8.0
Temperature	*	*			18.6, 20.1
Cyanide (lbs./day)**	1.42	0.59	0.37 U		0.37 U
Al - Total (mg/l)	-----	0.5	0.35 N		
* Should not violate water quality criteria (WAC 173-201) ** Permit limits; not interim limits					
IWT DISCHARGE (002)					
**** Flow = 0.126 MGD					
Parameter	NPDES Permit Limits		Inspection Data		
	Daily	Monthly	Ecology	Grab	Effluent
	Maximum	Average	Composite	Samples	Loading
	(lbs/day)	(lbs/day)	(mg/l)	(mg/l)	(lbs/day)
Oil and Grease	84	50	na	24.5;44.8	25.8; 47.1
TSS	171	82	32	34; 53	(34); 36; 56
Ortho-phosphate - (as P) (filtered)	12.0	9.6	0.005 U	0.005 U	ns
Aluminum (total)	***	***	80.5 N		84.65
Zinc (total)	3.08	1.30	0.05		0.05
Chrome (VI)	0.20	0.16	0.05		0.05
Chromium (total)	0.94	0.39	0.01 U		ns
Cyanide	0.63	0.26	0.002 U	0.002	0.002
*** = Effluent limit for Al is suspended during the schedule of compliance (refer to order no. DE 88-E248).					
DWT DISCHARGE (003)					
**** Flow = 0.181 MGD					
Parameter	NPDES Permit Limits		Inspection Data		
	Weekly	Monthly	Ecology	Grab	Effluent
	Average	Average	Composite	Samples	Loading
BOD5 (mg/L)	45	30	8	na	na
(lbs/day)	94	63		-	12
TSS (mg/L)	45	30	8	7	na
(lbs/day)	94	63			12
Fecal Coliform (#/100 ml)	400	200	na	3	
**** = Average daily flow from 5/20/90 to 5/23/90			na = Not applicable		
N - Spiked sample recovery not within control limits			ns = Non-significant		
U - Indicates compound was not detected at the given detection limit.					

Table 4 – General Chemistry Results – Kaiser, Trentwood, 5/90.

Parameter	Station:	Inf-003	Eff-003	Kaiser-003	Eff-003	Eff-003	Eff-002	Kaiser-002	Eff-002	Eff-002	Eff-001	Eff-001	Eff-002
	Type:	composite	composite	composite	grab	grab	composite	composite	grab	grab	grab	grab	grab
	Date:	5/22-23/90	5/22-23/90	5/22-23/90	5/22/90	5/23/90	5/22-23/90	5/22-23/90	5/22/90	5/22/90	5/22/90	5/22/90	5/23/90
	Time:	24 hrs	24 hrs	24 hrs	11:15	12:25	24 hrs	24 hrs	9:00	14:15	15:15	15:15	8:40
	Lab ID#:	218155	218156	218178	218166	218167	218157	218179	218168	218169	218182	218183	218170
LABORATORY													
	UNITS												
Turbidity	NTU	7.9	4.8	3.7					8.7				
pH	S.U.	7.5	7.3	7.5					8.8				
Conductivity	umho/cm	475	467	465					2450				
Alkalinity	mg/l as CaCO3	136(132)+	142	110					144				
Hardness	mg/l as CaCO3		157						1470				
Cyanide, Total	mg/l		0.002					0.002 U	0.002	0.002 U	0.002		
Cyanide, WAD	mg/l							0.002 U		0.002	0.002		
SOLIDS													
TS	mg/l	326	302	307				2630	2630				
TNVS	mg/l	194	195	178				2130	2110				
TSS	mg/l	39	8	8	7	7		32	61	53	34		17
TNVSS	mg/l	7	1	2				20	32				
BOD5	mg/l	47	8	6									
COD	mg/l	108	41.7	41.6	34.2	40.5		617	572	667	550		522
TOC	mg/l												
NUTRIENTS													
NH3-N	mg/l as N	3.43	3.48	3.36	2.41	3.31	2.02	2.32	2.00	1.86			1.83
NO3+NO2-N	mg/l as N	3.48 JH	4.48 JH	4.47 JH	4.74 JH	4.53 JH	0.443 JH	0.262 JH	0.498 JH	0.498 JH			0.065 JH (0.053 JH)+
Phosphate – Total	mg/l as P	1.28	1.74	1.38	1.34	2.16	1.04	1.0	1.20	1.36(1.34)+			0.460
Phosphate – Ortho	mg/l as P				0.855		0.005 U	0.005 U	0.005 U	0.005 U			0.005 U
Fecal Coliform	#/100 ml					3							
Phenols	mg/l						10.6		0.919	0.941	0.005 U		
Oil and Grease	mg/l								44.8	24.5	4.7	1.7	17.3
FIELD OBSERVATIONS													
Temp	deg. C				14.6	15.6				33.6	35.3		31.1
pH	S.U.	7.9	7.7	8.0	7.6	7.8	8.7		8.6	8.5			8.6
Conductivity	umho/cm	470	430	467	434	462	2100		2120	2350			2200
Chlorine:													
Free Available	mg/l				0.5	<0.1							
Total Residual	mg/l				1.5	1.3							

+Duplicate analysis

* (membrane filter technique)

U – Not detected at the given quantification limit.

WAD – Weak and Dissociable.

JH – Value is an approximation. Samples were held longer than the EPA holding time limits.

Table 4 – Continued.

Parameter	Station:	Eff-001	Kaiser-001	Eff-001	Eff-001	Eff-001	Intake	Kaiser-Intake	Intake	North CW	South CW	North CW	South CW
	Type:	composite	composite	grab	grab	grab	composite	composite	grab	composite	composite	grab	grab
	Date:	5/22-23/90	5/22-23/90	5/22/90	5/22/90	5/23/90	5/22-23/90	5/22-23/90	5/22/90	5/22-23/90	5/22-23/90	5/22/90	5/22/90
	Time:	24 hrs	24 hrs	10:35	16:05	10:58	24 hrs	24 hrs	11:35	24 hrs	24 hrs	10:49	16:26
Parameter	Lab ID#:	218158	218180	218171	218172	218173	218159	218181	218174	218160	218161	218175	218176
LABORATORY													
UNITS													
Turbidity	NTU	1.8					1.7			1.5	3.4		
pH	S.U.	7.2					7.1			7.1	7.2		
Conductivity	umho/cm	83					59			64	59		
Alkalinity	mg/l as CaCO3	36					26			25	29		
Hardness	mg/l as CaCO3	36.8					26.2			26.6	24.5		
Cyanide, Total	mg/l	0.002 U	0.002 U	0.002 U	0.002 U		0.002 U	0.002 U		0.002 U	0.002 U		
Cyanide, WAD	mg/l	0.002 U		0.002 U	0.002 U		0.002 U			0.002 U	0.002 U		
SOLIDS													
TS	mg/l	87	110				59	117		58	129		
TNVS	mg/l	51	48				30	57		26	27		
TSS	mg/l	3 (1 U)*	3	3	2	3	1	13		2	9		
TNVS	mg/l	2	1				1 U	9		1	7		
BOD5	mg/l												
COD	mg/l	10.5	9.9	9.7	11.4	13.8	9.5	5.2		6.0	6.7		
TOC	mg/l	6.02											
NUTRIENTS													
NH3-N	mg/l as N	0.060	0.043	.022(0.021)	0.040	0.028	0.005 U	0.005 U					
NO3+NO2-N	mg/l as N	0.076 JH	0.091 JH	0.077 JH	0.090 JH	0.081 JH	0.048 JH	0.035 JH (0.038 JH)+					
Phosphate - Total	mg/l as P	1.12	0.034	0.028	0.039	0.045	0.015	0.017(0.018)+					
Phosphate - Ortho	mg/l as P		0.005 U	0.005 U	0.005 U	0.005 U	0.036	0.005 U					
Fecal Coliform	#/100 ml												
Phenols	mg/l	0.005 U		0.005 U	0.005 U		0.005 U			0.005 U	0.005 U		
Oil and Grease	mg/l			1.8	17.6	9.6			6.4			1.0 U	1.1
FIELD OBSERVATIONS													
Temp	deg. C			18.6	20.1				12.9		10.9	18.8	14.6
pH	S.U.	7.8	7.6	8.0	7.2		7.6	7.4	7.8	7.6	7.4	7.6	7.3
Conductivity	umho/cm	86	86	92	90		55	55	57	69	68	625	61
Chlorine:													
Free Available	mg/l												
Total Residual	mg/l												

+Duplicate analysis

* (membrane filter technique)

U – Not detected at the given quantification limit.

WAD – Weak and Dissociable.

JH – Value is an approximation. Samples were held longer than the EPA holding time limits.

Table 5: Removal Efficiencies of DWT Facility - Kaiser, Trentwood 5/90.

Flow = 0.181 MGD

Parameter	Influent Loading (lbs./day)	Effluent Loading (lbs./day)	Removal Efficiency (percent)
TSS	59	12	80
BOD ₅	71	12	83
COD	163	63	61

Chromium, lead, selenium and zinc were the only metals positively identified in the DWT effluent (Table 6). Lead concentration slightly exceeded the chronic water quality criterion. Neither a characterization for organics nor an assessment for toxicity using bioassays was done on the DWT effluent.

Industrial Wastewater Discharge (002) to Wastewater Lagoon

The IWT effluent contained high levels of solids which were predominantly non-volatile (Table 4). Chromium (6+) and copper exceeded both acute and chronic fresh water criteria while selenium exceeded the chronic fresh water criterion (Table 6). Although other metals were identified (Sb, Be, Lb, Ni, and Zn), they were at relatively low concentrations.

Results of the organic priority pollutant scan shows that 4-methylphenol, benzoic acid, naphthalene and several Pesticide/PCB compounds were positively identified. Table 7 is a list of organic compounds identified with corresponding acute and chronic water quality criteria. This information is included because the permit does specify effluent limits for Outfall 002. Appendix D provides a complete organic priority pollutant scan with detection limits.

Results of various *Daphnia magna*, fathead minnow, salmonid, and *Daphnia pulex* bioassays are given in Figures 5-8, respectively. These figures show that IWT effluent caused 100% mortality in all four bioassays indicating high levels of toxicity. The reporting laboratory noted that ammonia, hardness, and conductivity were all elevated in the salmonid test solution (Stinson, 1990). However, the ammonia result (13.9 mg/L) is not consistent with the result shown in Table 4 (2.02 mg/L) and, therefore, is suspect. [Note: Kaiser has installed a polishing filtration system for the effluent from IWT since the inspection was completed. It is designed to significantly reduce contaminant concentrations (Blau, 1990).]

Results of the Microtox® analyses shown in Table 8 support the other bioassay results.

Table 6 – Priority Pollutant Metals Results – Kaiser, Trentwood, 5/90.

	Station:	Eff-003	Eff-002	Eff-002	Kaiser-002	Eff-001	Eff-001	Kaiser-001
	Type:	composite						
	Date:	5/22-23/90	5/22-23/90	5/22-23/90	5/22-23/90	5/22-23/90	5/22-23/90	5/22-23/90
	Time:	24 hrs						
	Lab ID#:	218156	218157	218157	218179	218158	218158	218180
	Matrix:	Water						
	Anal for:	Tot. Met	Tot. Met	Tot. Rec.	Tot. Met	Tot. Met	Tot. Rec.	Tot. Met
<u>PARAMETER</u>	<u>UNITS</u>							
Aluminum	ppm	0.46 N	80.5 N	80.3 N	8.11 N	0.35 N	0.47 N	0.41 N
Antimony	ppm	0.06 U	0.31	0.3	0.57	0.13	0.06 U	0.42
Arsenic	ppm	0.052 N	0.136 N	0.063 N	0.005 UN	0.065 N	0.005 UN	0.005 UN
Beryllium	ppm	0.005 U						
Cadmium	ppm	0.005 U	0.007	0.008	0.01	0.005 U	0.005 U	0.005 U
Chromium	ppm	0.02	0.01 U	0.02	0.02	0.01	0.01	0.01
Copper	ppm	0.025 U	0.033	0.032	0.037	0.025 U	0.025 U	0.025 U
Lead	ppm	0.018	0.005	0.005 U	0.005 U	0.012	0.042	0.006
Nickel	ppm	0.04 U	0.065	0.05	0.06	0.04 U	0.04 U	0.04 U
Selenium	ppm	0.054	0.206	0.154	0.225	0.033	0.009	0.012
Silver	ppm	0.01 UN	0.01 UN	0.01 UN	0.01 N	0.01 UN	0.01 UN	0.01 UN
Thallium	ppm	0.01 UN	0.1 UN	0.1 UN	0.1 UN	0.1 UN	0.1 UN	0.1 UN
Zinc	ppm	0.11	0.05	0.05	0.06	0.09	0.09	0.13
Mercury	ppm	0.002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.002 U	0.0002 U
Chromium(6+)	ppm	-	0.047	-	0.032	0.023	-	-

U = Not detected at the given quantification limit.

N = Spiked sample recovery not within control limits.

Table 6. Priority Pollutant Metals Results (Continued).

	Station:	Intake	Intake	Kaiser-Intake	North CW	South CW	SLG-003	SLG-002	Blank
	Type:	composite	composite	composite	composite	composite	Grab	Grab	Grab
	Date:	5/22-23/90	5/22-23/90	5/22-23/90	5/22-23/90	5/22-23/90	5/22/90	5/22/90	5/21/90
	Time:	24 hrs	24 hrs	24 hrs	24 hrs	24 hrs			
	Lab ID#:	218159	218159	218181	218160	218161	218162	218163	218165
	Matrix:	Water	Water	Water	Water	Water	Sludge	Sludge	Water
	Anal for:	Tot. Met	Tot. Rec.	Tot. Met	Tot. Met	Tot. Met	Tot. Met	Tot. Met	Tot. Met
PARAMETER	UNITS								
Aluminum	ppm	0.24 N	0.22 N	0.31 N	0.29 N	0.6 N	15949	74591	0.86 N
Antimony	ppm	0.11 U	0.21	0.45	0.18	0.34	144	118	0.34
Arsenic	ppm	0.013 N	0.007 N	0.005 U	0.005 U	0.023 N	41.4	11	0.005 UN
Beryllium	ppm	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	1.9	1.05	0.005 U
Cadmium	ppm	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	21.6	6.2	0.005 U
Chromium	ppm	0.01 U	0.01 U	0.01 U	0.01 U	0.01	316	99	0.01 U
Copper	ppm	0.025 U	0.025 U	0.025 U	0.025 U	0.025	1101	279	0.025 U
Lead	ppm	0.005 U	0.005 U	0.021	0.006	0.026	38.7	118	0.008
Nickel	ppm	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	41.4	71.5	0.04 U
Selenium	ppm	0.006	0.007	0.005 U	0.009	0.009	29.2	34.8	0.005 U
Silver	ppm	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	34.1	1	0.01 UN
Thallium	ppm	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	38.1	8.7	0.1 UN
Zinc	ppm	0.08	0.08	0.11	0.09	0.12	4633	1279	0.08
Mercury	ppm	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	11.4	0.1	0.0002 U
Chromium(6+)	ppm	0.023	-	-	-	-	-	-	-

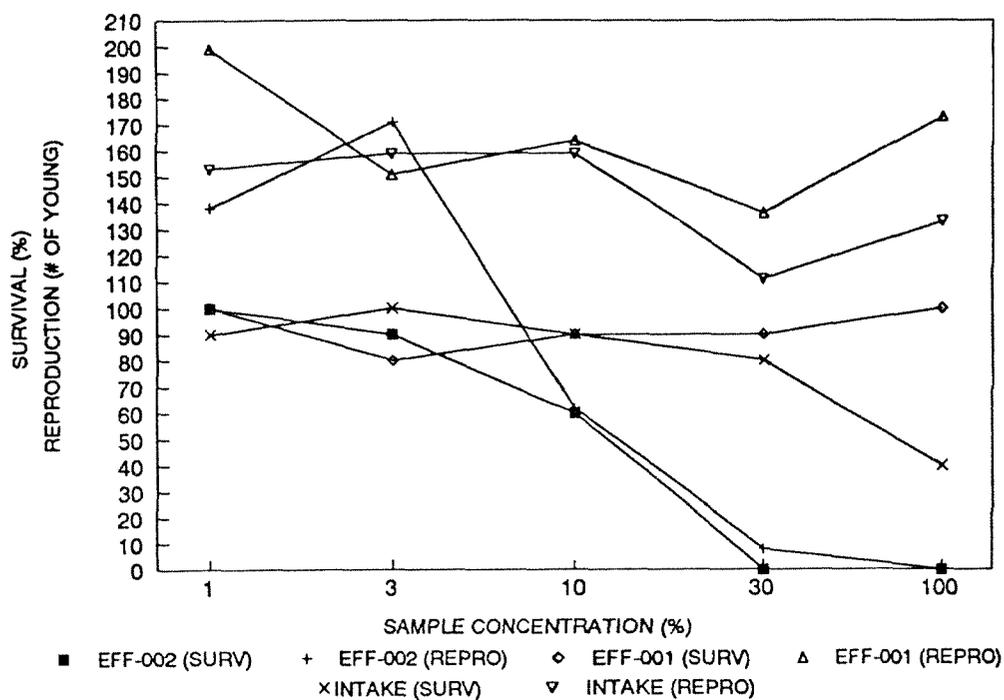
U = Not detected at the given quantification limit.

N = Spiked sample recovery not within control limits.

Table 7 – Organic Priority Pollutant Scan Results – Kaiser, Trentwood, 5/90.

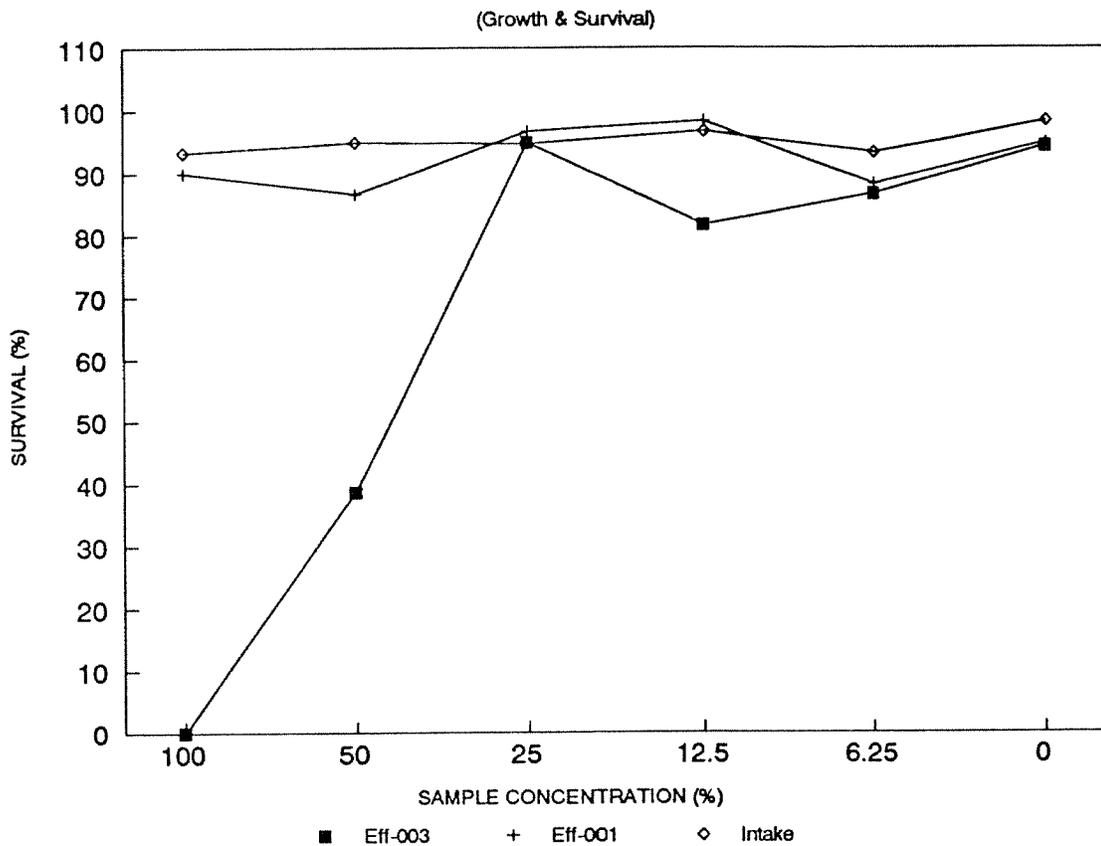
Parameter	Station: Type: Date: Time: Lab Sample #:	Eff-002 composite 5/22-23/90 24 hrs 218157	Eff-001 composite 5/22-23/90 24 hrs 218158	Intake composite 5/22-23/90 24 hrs 215159	Water Quality Criteria Freshwater	
					<u>acute</u>	<u>chronic</u>
VOA Compounds (ug/l)						
Acetone		220 E	2 J	10 U		
Xylene (total)		3 J	5 U	5 U		
BNA Compounds (ug/l)						
Phenol		1000 E	10 U	10 U	10200+	2560+
4-Methylphenol		15	10 U	10 U		
Benzoic Acid		240	50 U	50 U		
Naphthalene		13	10 U	10 U	2300+	620+
Pesticide/PCB Compounds (ug/l)						
beta-BHC		1.6	0.050 U	0.050 U		
gamma-BHC (Lindane)		0.11	0.050 U	0.050 U	2.0	0.08
Heptachlor		0.11	0.050 U	0.0072 J	0.52	0.0038
Aldrin		0.050 U	0.050 U	0.020 J	3	
Dieldrin		0.13	0.10 U	0.10 U	2.5	0.0019
Endosulfan Sulfate		0.15	0.10 U	0.10 U	0.22	0.056
<p>U - Indicates the compound was not detected at the given quantification limit. J - Indicates an estimated value, concentration is below method quantification limit. E - Indicates the concentration of the associated value exceeds the known calibration range. + - Insufficient data to develop criteria. Presented value is Lowest Observed Effect Concentration (LOEC).</p>						

FIGURE 5. RESULTS OF DAPHNIA MAGNA BIOASSAY



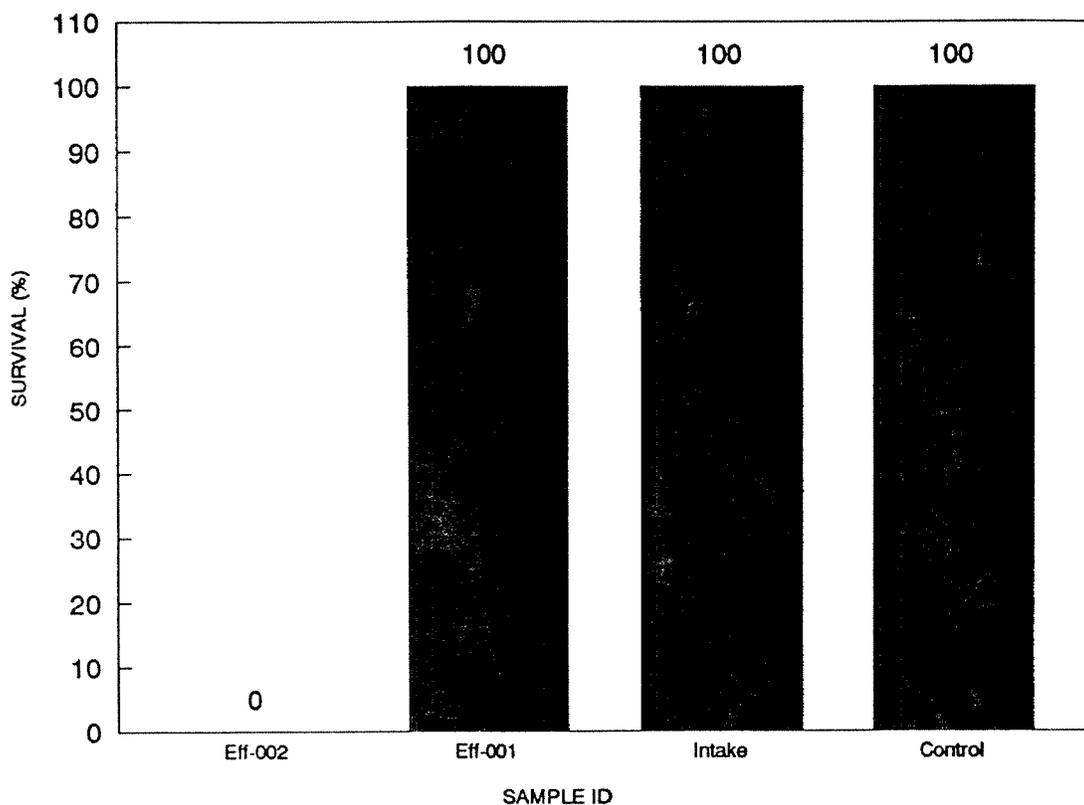
LAB ID	Sample Conc. (%)	Survival (%)	Reproduction (# of young)
218157 (Eff-002)	1	100	138
	3	90	171
	10	60	62
	30	0	8
	100	0	0
218158 (Eff-001)	1	100	199
	3	80	151
	10	90	164
	30	90	136
	100	100	173
218159 (Intake)	1	90	153
	3	100	159
	10	90	159
	30	80	111
	100	40	133

FIGURE 6. RESULTS OF FATHEAD MINNOW BIOASSAY



LAB ID	Effl. Conc.(%)	Mean % Survival	Mean weight (mg)
218157 (Eff-002)	100	0	-
	50	38.7	-
	25	95	0.402
	12.5	81.7	0.513
	6.25	86.7	0.475
	0	94.3	0.551
218158 (Eff-001)	100	90	0.548
	50	86.7	0.592
	25	96.7	0.555
	12.5	98.3	0.52
	6.25	88.3	0.566
	0	94.9	0.597
218159 (Intake)	100	93.3	0.563
	50	95	0.55
	25	94.8	0.57
	12.5	96.7	0.563
	6.25	93.3	0.553
	0	98.3	0.597

FIGURE 7. RESULTS OF SALMONID BIOASSAY

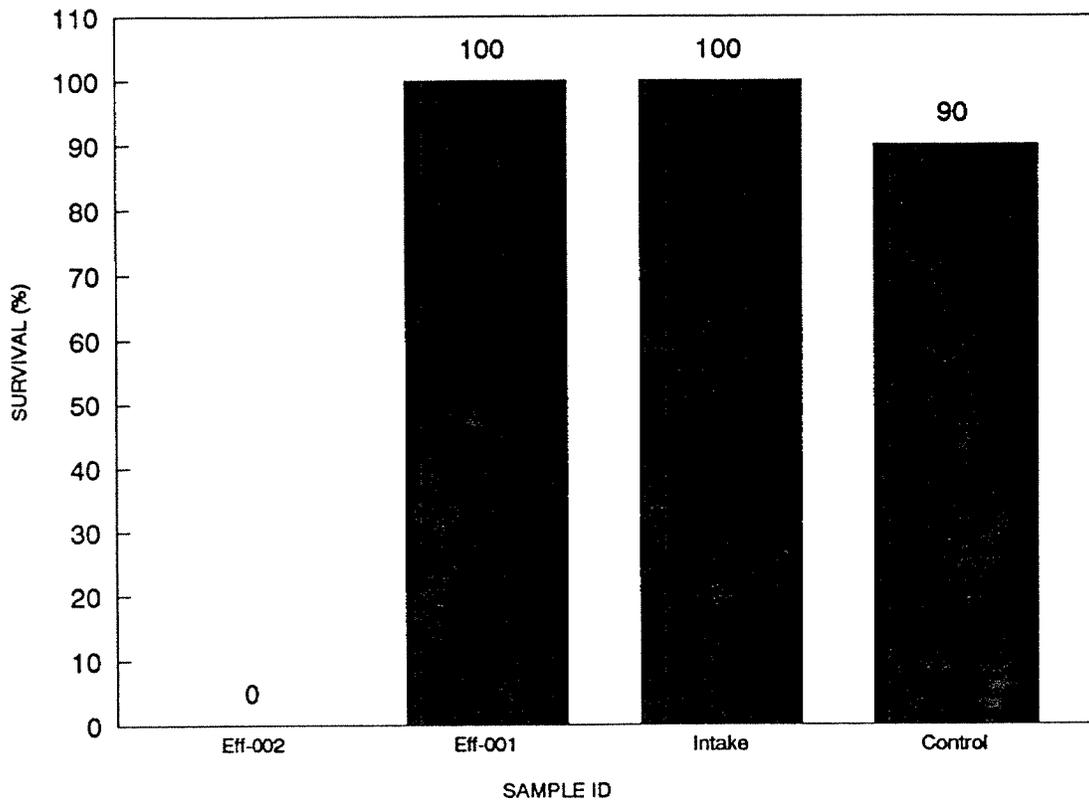


LAB ID:	218157 (Eff-002)	218158 (Eff-001)	218159 (Intake)	Control
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TEST CONDITIONS AND RESULT

Initial pH (average)	8.8	7.7	7.7	7.9
Final pH (average)	-	7.8	7.8	7.77
Initial Alkalinity (mg/l as CaCo3)	110	21	94	53
Final Alkalinity (mg/l as CaCo3)	-	29	16	51
Ammonia (mg/l)	13.9	0.6	0.48	0
Chlorine (mg/l)	0	0	0	0
Initial Hardness (mg/l as CaCo3)	1300	78	31	65
Final Hardness (mg/l as CaCo3)	-	38	27	70
Mean length of fish (mm)	47.5	47.5	47.5	47.5
Mean weight of fish (g)	0.61	0.61	0.61	0.61
Length of study (hrs.)	96	96	96	96
INITIAL NUMBER OF FISH	10	10	10	10
FINAL NUMBER OF FISH	0	10	10	10
% MORTALITY	100	0	0	0

FIGURE 8. RESULTS OF DAPHNIA PULEX BIOASSAY



LAB ID:	218157 (Eff-002)	218158 (Eff-001)	218159 (Intake)	Control
TEST CONDITIONS AND RESULT				
Initial pH (average)	8.74	7.41	7.53	8.2
Final pH (average)	8.47	7.36	7.84	7.98
Final Alkalinity (mg/l as CaCo3)	162	25	21	57
Final Hardness (mg/l as CaCo3)	1409	42	26	84
Initial Dissolved Oxygen (mg/l)	8.6	9.7	10.2	8.5
Final Dissolved Oxygen (mg/l)	8.3	8.1	8.5	8.4
Conductivity (umhos/cm)	2550	108	69	306
Length of study (hrs.)	48	48	48	48
NUMBER OF ADULT FISH	5	5	5	5
SURVIVAL (%)	0	100	100	90

Table 8: Results of Microtox® Analyses

SAMPLE	EC ₅₀	
	5 MINUTES	15 MINUTES
Control	a	a
Eff-002	7.3%	7.2%
Eff-001	a	a
Intake	a	a

a = Unsuitable for reduction - Indicates low toxicity.

The lower the EC₅₀ value the higher the toxicity. EC₅₀ values less than 20% indicate high toxicity.

Cooling Water Discharges to Wastewater Lagoon

The cooling water discharges, north and south, had very low concentrations of metals (Table 6) and general chemistry parameters. TSS and COD were detected in minimal concentrations.

Wastewater Lagoon Discharge (001) to Spokane River

No significant concentrations of the general chemistry parameters were found in samples collected from the effluent (Table 3). Oil and grease concentration varied considerably among five grab samples collected (1.7 mg/L to 17.6 mg/L). The permit specifies, "For Al, Zn, and Cr, the total discharge shall be determined by summing the quantities discharged to the WL through Outfall 002, Outfall 003, Outfall 004, and Outfall 005". Aluminum results are all qualified due to QC concerns, and no conclusions can be drawn. Summing the zinc quantities gives a concentration of 0.37 mg/L, which is slightly less than the interim limit of 0.50 mg/L. Zinc concentrations are relatively high (0.08) in the intake water which provides a partial explanation. Chromium results are 0.03 mg/L; less than the interim limit of 0.05.

The lead concentration is 0.012 mg/L which exceeds the chronic water quality criterion (Table 6). Lead concentration is relatively high (0.018) in the DWT effluent (003) as mentioned earlier. The strong acid extraction procedure "total metals" produced a lower result (0.012) than the result received (0.042) from the weak acid procedure "total recoverable". There is no explanation.

Results from the organic priority pollutant scan detected no compounds (Table 7). Bioassay and Microtox® analyses showed no indication of toxicity.

Results of Centrifuge Sampling

Centrifugation captures and concentrates the particulate matter from thousands of gallons of effluent. This sampling efficiency allows detection of priority pollutants not otherwise detectable in whole effluent samples. Data associated with centrifuge sampling are contained in Tables 9 (organics) and 10 (metals), organized as whole effluent, centrate, and particulate results. Centrate is the portion of whole effluent that passed through the centrifuge. Particulate is the portion retained by the centrifuge.

Table 9 shows that the organics adsorb to fine particulate matter which passes through the treatment process but is captured by the centrifuge. These data confirm the presence of several pesticides/PCBs noted in an earlier discussion under the IWT discharge. Metals are also captured, with only small amounts of soluble chromium and zinc escaping with the extremely fine particulates in the centrate. Most of the metals in Table 10 were detected by the "total recoverable" procedure, which indicates they are in the biologically available form. Only the strong acid extraction used in the "total metals" procedure is able to detect metals tied up in silicate structure.

Chemical Characterization of Spokane River Water

The Spokane River water plant intake did not seem to have significant levels of contamination. Most parameter values were less than the water quality standards. Zinc was detected at about 100 $\mu\text{g/L}$. A study of Table 7 indicates that at least one pesticide/PCB compound was present in the intake water. No toxicity was detected by bioassays or Microtox[®] analyses.

Comparison of Kaiser and Ecology Results

Kaiser and Ecology each collected samples and ran the analyses at labs of their choice. Each also split samples with the other and ran those analyses. Results of samples collected and analyzed by Kaiser are given in Table 11. Results of samples collected by both Kaiser and Ecology and analyzed by Ecology are given in Tables 4 and 6.

The samples of lagoon effluent collected and analyzed by Kaiser for oil and grease differed significantly from those collected and analyzed by Ecology. The Ecology samples varied from 1.7 mg/L to 17.6 mg/L, while Kaiser results were non-detected at 0.5 mg/L. The explanation for these differences may lie in the sampling procedures employed. Results indicate that their analyses were run on composited samples (rather than grab), which can introduce a low bias due to 1) adherence of the oil and grease to the sampling container, and 2) collection of the sample below the lagoon surface.

General chemistry results compared well, except for TSS of the IWT effluent and total phosphorus from the lagoon effluent (Table 4). In both cases, the rather large discrepancies were between Kaiser and Ecology results from the same lab. This suggests differences in

Table 9. Results of Priority Pollutant Organics Analyses of Centrifuge Samples – Kaiser, Trentwood, 5/90.

	Wastewater Lagoon Effluent Concentrations (grams/1,000,000 gallons)		
	Whole*	Centrate**	Particulates***
<u>VOLATILES</u>			
Acetone^	8 J		
2-Butanone	38 U	Not Tested	Not Tested
Toluene	19 U		
Xylene (total)	19 U		
<u>BNAs</u>			
Phenol	38 U	26 J	0.02 J
4-Methylphenol	38 U	38 U	0.14 J
Benzoic Acid	189 U	189 U	0.07 J
Dimethylphthalate	38 U	38 U	0.01 J
Phenanthrene	38 U	38 U	0.01 J
Fluoranthene	38 U	38 U	0.02 J
Pyrene	38 U	38 U	0.02 J
Benzo(a)anthracene	38 U	38 U	0.01 J
Bis(2-ethylhexyl)phthalate	38 U	38 U	0.11 J
Chrysene	38 U	38 U	0.01 J
<u>PESTICIDES/PCBs</u>			
Endosulfan sulfate	0.38 U	0.38 U	0.015 J
a-BHC	0.189 U	0.189 U	0.002 J
PCB 1248	1.89 U	1.89 U	0.4 J

Outlined results indicate detected analyte

* Whole - Effluent collected by compositor as part of Class II inspection.

** Centrate - Portion of whole effluent passed through the centrifuge and collected by compositor.

*** Particulates - Portion of whole effluent retained by the centrifuge.

^ Indicates centrifuge and/or effluent field blank contamination.

U Indicates analyte not detected at quantitation limit given.

J Indicates Estimated value, concentration is below method quantification limit.

Table 10. Results of Priority Pollutant Metals Analyses of Centrifuge Samples -
Kaiser, Trentwood, 5/90.

	Wastewater Lagoon Effluent Concentration (grams/1,000,000 gallons)		
	Whole*	Centrate**	Particulates***
Antimony, Total^	490	230 U	0.6
Antimony, Total recoverable	230 U	230 U	
Antimony, Dissolved		230 U	
Arsenic, Total^	250	159	0.9
Arsenic, Total recoverable	19 U	238	
Arsenic, Dissolved		38 U	
Beryllium, Total	19 U	19 U	0.1
Beryllium, Total recoverable	19 U	19 U	
Beryllium, Dissolved		19 U	
Cadmium, Total	19 U	19 U	0.4
Cadmium, Total recoverable	19 U	19 U	
Cadmium, Dissolved		19 U	
Chromium, Total^	38	38 U	20
Chromium, Total recoverable	38	38 U	
Chromium, Dissolved		38	
Copper, Total^	95 U	95 U	5
Copper, Total recoverable	95 U	102	
Copper, Dissolved		95 U	
Lead, Total^	45	19 U	6
Lead, Total recoverable	159	19 U	
Lead, Dissolved		19 U	
Nickel, Total^	150 U	150 U	0.4
Nickel, Total recoverable	150 U	150 U	
Nickel, Dissolved		150 U	
Selenium, Total^	125	212	0.2
Selenium, Total recoverable	34	193	
Selenium, Dissolved		19 U	
Silver, Total^	38 U	38 U	0.03
Silver, Total recoverable	38 U	38 U	
Silver, Dissolved		38 U	
Zinc, Total^	340	300	70
Zinc, Total recoverable	340	300	
Zinc, Dissolved		76	
Aluminum, Total^	1,320	1,100	400
Aluminum, Total recoverable	1,780	1,500	
Aluminum, Dissolved		800 U	

Outlined results indicate detected analyte.

* Whole - Effluent collected by compositor as part of Class II inspection.

** Centrate - Portion of whole effluent passed through the centrifuge and collected by compositor..

*** Particulates - Portion of whole effluent retained by the centrifuge.

^ The centrifuge field blank had detectable levels of arsenic, chromium, copper, nickel, selenium, silver, zinc, and aluminum.

The effluent transfer blank had detectable levels of antimony, lead, zinc and aluminum.

U Indicates analyte not detected at quantification limit given.

Table 11 - Results of Metal and General Chemistry Analyses* - Kaiser, Trentwood, 5/90.

Station:	Wastewater Lagoon Discharge				IWT Discharge				DWT Discharge	North CW	South CW	River Intake
	Outfall #001				Outfall #002				Outfall #003	Outfall #004	Outfall #005	
Type:	grab	grab	grab	comp	grab	grab	grab	comp	comp	comp	comp	comp
Date:	5/22	5/22	5/23	5/22-5/23	5/22	5/22	5/23	5/22-5/23	5/22-5/23	5/22-5/23	5/22-5/23	5/22-5/23
Time:	10:10 am	3:50 pm	11:00 am	7:00 am - 7:00 am	9:22 am	2:21 pm	8:30 am	7:00 am - 7:00 am				
Parameter (mg/L)												
Chromium (total)				0.005				0.003		0.005	0.001	0.001
Zinc (total)				0.096				0.031		0.100	0.089	0.085
Aluminum (total)				0.170				6.1		0.170	0.100	0.064
TSS	<2.	2	<2.		44	24	32	30	9.2			<2.
Oil & Grease	<.5			<.5	<.5		0.6	1.9		<.5	<.5	<.5
Cyanide		<.005		<.005	0.083	0.088		0.073				<.005
O-PO4 as P	<.01	<.01	<.01		<.01	<.01	<.01	<.01				0.010
Total P	0.035	0.042	0.037	0.042	0.11	0.077	0.075	0.16				0.013
Cr (6+)								0.02				
BOD									7			
Fecal									0			
pH									7.62			

* - Sample collection and analyses by Kaiser.

sampling procedures: Kaiser's inadequate refrigeration of composited samples is a possible explanation.

Metals results compared well, except for the Kaiser and Ecology IWT samples analyzed by Ecology for aluminum. However, all Ecology aluminum results were qualified. All other sampling and analytical procedures compared well.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. Discrepancies were found between flows recorded by Kaiser's instrumentation and instantaneous measurements taken by Ecology inspectors. Differences at all three devices were significant enough to warrant attention by Kaiser personnel.
2. All three wastewater treatment systems were operating within the permit and interim effluent limits except for oil and grease from the lagoon effluent. Of five samples taken, there was one excursion.
3. The DWT facility was working properly with a moderate percent removal of TSS, COD, and BOD₅. Lead concentration was elevated - slightly exceeding the chronic water quality criterion.
4. The IWT effluent was high in non-volatile solids and toxicity. Chromium⁺⁶, copper, and selenium exceeded water quality criteria. There was 100% mortality in the four test species, and Microtox[®] bioassay showed a high level of toxicity. However, Kaiser has installed a polishing filtration system for the effluent from IWT since the inspection was completed. It is designed to significantly reduce contaminant concentrations.
5. No significant concentrations of general chemistry parameters were found in lagoon effluent. Lead exceeded the chronic water quality criterion. Bioassay results showed no indication of toxicity.
6. Although particulate matter samples were gathered and the resulting data analyzed, it is too early in Ecology's piloting of centrifugation to draw any definitive conclusions from the data.
7. The procedure used by Kaiser when collecting oil and grease samples may be biasing the results. A large discrepancy in total phosphorus results from the lagoon effluent suggests sampling procedure differences between Kaiser and Ecology. One explanation may be inadequate cooling of Kaiser composite samples prior to analysis. All metals results compared well except for aluminum. However, all Ecology aluminum results were qualified.

Recommendations

Several recommendations were made to Dan Pupo concerning wastewater sampling procedures during the inspection. They were:

1. Periodic cleaning of sampling lines and jugs for both the lagoon effluent and river intake;
2. Frequent cleaning and calibration of continuous recording pH meter at lagoon discharge; and
3. Re-calibration of Parshall Flume on DWT discharge.

A letter sent to Roger Ray of Ecology's Eastern Regional Office by Patrick Blau of Kaiser confirms that these recommendations were implemented (Blau, 1990a).

4. Collect oil and grease samples by grab, rather than composite;
5. Store and transport all samples at 4°C; and
6. Provide regular cleaning and maintenance of flow measuring devices;

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- . Kaiser Trentwood Class II Inspection Results of Microtox Bioassay, Washington State Department of Ecology Memorandum, EILS Program, July 16, 1990.

APPENDICES

Appendix A. Description of Sampling Locations - Kaiser, Trentwood, May 1990.

Station ID	Type	Date	Time	Description of Sampling Locations
Inf-003	comp	5/22-23	24 hr.	Influent to DWT.
Eff-003	comp	5/22-23	24 hr.	Effluent from DWT.
Kaiser-003	comp	5/22-23	24 hr.	Effluent from DWT.
Eff-003	grab	5/22	a.m.	Effluent from DWT.
Eff-003	grab	5/23	p.m.	Effluent from DWT.
Eff-002	comp	5/22-23	24 hr.	Effluent from IWT.
Kaiser-002	comp	5/22-23	24 hr.	Effluent from IWT.
Eff-002	grab	5/22	a.m.	Effluent from IWT.
Eff-002	grab	5/22	a.m.	Effluent from IWT.
Eff-001	grab	5/22	p.m.	Effluent from wastewater lagoon.
Eff-001	grab	5/22	p.m.	Effluent from wastewater lagoon.
Eff-002	grab	5/23	a.m.	Effluent from IWT.
Eff-001	comp	5/22-23	24 hr.	Effluent from wastewater lagoon.
Kaiser-001	comp	5/22-23	24 hr.	Effluent from wastewater lagoon.
Eff-001	grab	5/22	a.m.	Effluent from wastewater lagoon.
Eff-001	grab	5/22	p.m.	Effluent from wastewater lagoon.
Eff-001	grab	5/23	a.m.	Effluent from wastewater lagoon.
Intake	comp	5/22-23	24 hr.	Intake water from Spokane River.
Kaiser-Intake	comp	5/22-23	24 hr.	Intake water from Spokane River.
Intake	grab	5/22	a.m.	Intake water from Spokane River.
North CW	comp	5/22-23	24 hr.	Cooling water to wastewater lagoon.
South CW	comp	5/22-23	24 hr.	Cooling water to wastewater lagoon.
North CW	grab	5/22	a.m.	Cooling water to wastewater lagoon.
South CW	grab	5/22	p.m.	Cooling water to wastewater lagoon.
Slg-003	grab	5/22	p.m.	Sludge from DWT.
Slg-002	grab	5/22	p.m.	Sludge from IWT.
Blank	Transfer	5/21	p.m.	Deionized water run-through.

Appendix B – Ecology Analytical Methods Used – Kaiser, Trentwood, 5/90.

Analysis	Method Used	Laboratory
GENERAL CHEMISTRY		
Turbidity	EPA, 1979: 180.1	Ecology; Manchester, WA
pH	EPA, 1979: 150.1	Ecology; Manchester, WA
Conductivity	EPA, 1979: 120.1	Ecology; Manchester, WA
Alkalinity	EPA, 1979: 310.1	AmTest Inc.; Redmond, WA
Hardness	EPA, 1979: 130.2	Ecology; Manchester, WA
Cyanide, total	EPA, 1979: 335.2 (mod)	Ecology; Manchester, WA
Cyanide, weak and dissociable	APHA, 1989: 4500-CN I.	Ecology; Manchester, WA
SOLIDS		
TS	EPA, 1979: 160.3	Ecology; Manchester, WA
TNVS	EPA, 1979: 106.4	Ecology; Manchester, WA
TSS	EPA, 1979: 160.2	Ecology; Manchester, WA
TNVSS	EPA, 1979: 106.4	Ecology; Manchester, WA
BOD5	EPA, 1979: 405.1	Ecology; Manchester, WA
COD	EPA, 1979: 410.1	Ecology; Manchester, WA
TOC (water)	EPA, 1979: 415.2	Ecology; Manchester, WA
NUTRIENTS		
NH3-N	EPA, 1979: 350.1	AmTest Inc.; Redmond, WA
NO2+NO3-N	EPA, 1979: 353.2	AmTest Inc.; Redmond, WA
Phosphate - Total	EPA, 1979: 365.1	AmTest Inc.; Redmond, WA
Phosphate - Ortho	EPA, 1979: 365.3	AmTest Inc.; Redmond, WA
% Solids	APHA, 1989: 2540G	Ecology; Manchester, WA
Fecal Coliform	APHA, 1989: 9222D	Ecology; Manchester, WA
ORGANICS AND METALS		
Phenols	EPA, 1979: 420.2	AmTest Inc.; Redmond, WA
Oil and Grease	EPA, 1979: 413.1	AmTest Inc.; Redmond, WA
Aluminum	EPA, 1984: 200	Sound Analytical; Fife, WA
PRIORITY POLLUTANTS		
Semivolatiles	EPA, 1986: 8270	Pacific Northwest Environmental Laboratory; Redmond, WA
Volatiles	EPA, 1986: 8240	Pacific Northwest Environmental Laboratory; Redmond, WA
Pest/PCBs	EPA, 1986: 8080	Pacific Northwest Environmental Laboratory; Redmond, WA
Metals	EPA, 1984: 200	Sound Analytical; Fife, WA
Chrome(VI)	EPA, 1984: 200	Sound Analytical; Fife, WA
EP Tox	EPA, 1986: 1310	Sound Analytical; Fife, WA
BIOASSAYS		
Rainbow Trout	Ecology, 1981	Parametrix, Inc.; Bellevue, WA
Microtox	Beckman, 1982	ECOVA; Redmond, WA
Fathead Minnow	EPA, 1989	Northwestern Aquatic Sciences; Newport, OR
Daphnia pulex	EPA, 1985	Ecology; Manchester, WA
Daphnia magna	EPA, 1987	E.V.S. Consultants; Seattle, WA

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Appendix C – Results of Metals Matrix Spikes and Matrix Spikes Duplicates – Kaiser, Trentwood 5/90.

SAMPLE ID: 218156	Sb	As	Be	Cd	Cr	Cu	Pb	Ni	Se	Ag	Th	Zn	Hg	Al
spiked sample (ss)	0.8	1.04	1.05	0.98	1.04	1.04	0.23	1.07	0.99	0.73	1.05	1.30	0.00	1.85
sample result (sr)	*0.06	0.05	*0.005	*0.005	0.02	*0.025	0.02	*0.04	0.05	*0.01	*0.1	0.11	*0.0002	0.46
spike added (sa)	1.00	1.00	1.00	1.00	1.00	1.00	0.20	1.00	1.00	1.00	1.00	1.00	0.00	1.00
spiked sample (ss)	0.8	1.04	1.05	0.984	1.04	1.04	0.229	1.07	0.988	0.729	1.05	1.3	0.0022	1.85
ss duplicate (ssd)	0.829	0.984	1.04	0.964	1.05	1.03	0.242	1.07	0.988	0.755	1.08	1.27	0.002	1.92
% recovery (%R)	80	98.8	105	98.4	102	104	105.5	107	93.4	72.9	105	119	110	139
relative % difference (RPD)	-3.6	5.5	1.0	2.1	-1.0	1.0	-5.5	0.0	0.0	-3.5	-2.8	2.3	9.5	-3.7

SAMPLE ID: 218162

spiked sample (ss)	343	493.00	359.00	354.00	647.00	1224.00	87.60	399.00	382.00	349.00	442.00	---	4.09	NA
sample result (sr)	144	41.40	*1.90	21.60	316.00	881.00	38.40	41.40	29.20	34.10	*0.1	4633.00	*0.3	1595.00
spike added (sa)	175	350.00	350.00	350.00	350.00	350.00	43.80	350.00	350.00	350.00	350.00	---	3.80	NA
spiked sample (ss)	343	493.00	359.00	354.00	647.00	1224.00	87.60	399.00	608.00	349.00	442.00	---	3.80	NA
ss duplicate (ssd)	309	529.00	371.00	365.00	680.00	1283.00	84.70	419.00	627.00	360.00	406.00	---	4.40	NA
% recovery (%R)	113.7	129.0	102.6	95.0	94.6	98.0	112.3	102.2	100.8	90.0	126.3		107.6	
relative % difference (RPD)	10.4	-7.0	-3.3	-3.1	-5.0	-4.7	3.4	-4.9	-3.1	-3.1	8.5		-14.6	

* means less than

$$\%R = [(ss-sr)/sa] * 100$$

$$RPD = [(ss-ssd)/((ss+ssd)/2)] * 100$$

Appendix C - Results of Metals Duplicate Analysis – Kaiser, Trentwood 5/90.

SAMPLE ID: 218156

sample result (sr)	*0.06	0.05	*0.005	*0.005	0.02	*0.025	0.02	*0.04	0.05	*0.01	*0.1	0.11	*0.0002	0.46
sample duplicate result (sdr)	*0.06	0.06	*0.005	*0.005	0.02	*0.025	0.02	*0.04	0.06	*0.01	*0.01	0.11	*0.0002	0.42
relative % difference (RPD)	0.0	-5.6	0.0	0.0	-4.9	0.0	0.0	0.0	-8.8	0.0	0.0	0.0	0.0	9.1

SAMPLE ID: 218162

sample result (sr)	144	41.4	*1.90	21.6	316	1101	38.7	41.4	29.2	34.1	*38.0	4633	*0.3	15949
sample duplicate result (sdr)	123	36.7	*1.72	18.5	287	1236	34.7	33.2	26.4	30.2	*38.0	4325	*0.3	13249
relative % difference (RPD)	15.7	12.0	9.9	15.5	9.6	-11.6	10.9	22.0	10.1	12.1	0.0	6.9	0.0	18.5

* means less than

$$RPD = [(sr-sdr)/((sr+sdr)/2)] * 100$$

Appendix C – Continued.

Volatile Matrix Spike Results – Kaiser, Trentwood 5/90.

Compound	Spike	Duplicate	RPD
Chloromethane	10 U	10 U	0.0
Bromomethane	10 U	10 U	0.0
Vinyl Chloride	10 U	10 U	0.0
Chloroethane	10 U	10 U	0.0
Methylene Chloride	5 U	5 U	0.0
Acetone	3 J	4 J	28.6
Carbon Disulfide	5 U	5 U	0.0
1,1-Dichloroethene	5 U	5 U	0.0
1,1-Dichloroethane	5 U	5 U	0.0
1,2-Dichloroethene(Tot)	5 U	5 U	0.0
Chloroform	5 U	5 U	0.0
1,2-Dichloroethane	5 U	5 U	0.0
2-Butanone (MEK)	10 U	10 U	0.0
1,1,1-Trichloroethane	5 U	5 U	0.0
Carbon Tetrachloride	5 U	5 U	0.0
Vinyl Acetate	10 U	10 U	0.0
Bromodichloromethane	5 U	5 U	0.0
1,2-Dichloropropane	5 U	5 U	0.0
cis-1,3-Dichloropropene	5 U	5 U	0.0
Trichloroethene	5 U	5 U	0.0
Dibromochloromethane	5 U	5 U	0.0
1,1,2-Trichloroethane	5 U	5 U	0.0
Benzene	5 U	5 U	0.0
trans-1,3-Dichloropropene	5 U	5 U	0.0
Bromoform	5 U	5 U	0.0
4-Methyl-2-Pentanone	10 U	10 U	0.0
2-Hexanone	10 U	10 U	0.0
Tetrachloroethene	5 U	5 U	0.0
1,1,2,2-Tetrachloroethane	5 U	5 U	0.0
Toluene	5 U	5 U	0.0
Chlorobenzene	5 U	5 U	0.0
Ethylbenzene	5 U	5 U	0.0
Ethenylbenzene (Styrene)	5 U	5 U	0.0
Total Xylenes	5 U	5 U	0.0

U = less than the minimum detection limit.

Appendix C – Continued.

Semivolatile Matrix Spike Results – Kaiser, Trentwood, 5/90.

Compound	Spike	Duplicate	RPD
Phenol	10 U	10 U	0.0
Bis(2-Chloroethyl)Ether	10 U	10 U	0.0
2-Chlorophenol	10 U	10 U	0.0
1,3-Dichlorobenzene	10 U	10 U	0.0
1,4-Dichlorobenzene	10 U	10 U	0.0
Benzyl Alcohol	10 U	10 U	0.0
1,2-Dichlorobenzene	10 U	10 U	0.0
2-Methylphenol	10 U	10 U	0.0
Bis(2-chloroisopropyl)ether	10 U	10 U	0.0
4-Methylphenol	10 U	10 U	0.0
N-Nitroso-Di-n-Propylamine	10 U	10 U	0.0
Hexachloroethane	10 U	10 U	0.0
Nitrobenzene	10 U	10 U	0.0
Isophorone	10 U	10 U	0.0
2-Nitrophenol	10 U	10 U	0.0
2,4-Dimethylphenol	10 U	10 U	0.0
Benzoic Acid	50 U	50 U	0.0
Bis(2-Chloroethoxy)Methane	10 U	10 U	0.0
2,4-Dichlorophenol	10 U	10 U	0.0
1,2,4-Trichlorobenzene	10 U	10 U	0.0
Naphthalene	10 U	10 U	0.0
4-Chloroaniline	10 U	10 U	0.0
Hexachlorobutadiene	10 U	10 U	0.0
4-Chloro-3-Methylphenol	10 U	10 U	0.0
2-Methylnaphthalene	10 U	10 U	0.0
Hexachlorocyclopentadiene	10 U	10 U	0.0
2,4,6-Trichlorophenol	10 U	10 U	0.0
2,4,5-Trichlorophenol	50 U	50 U	0.0
2-Chloronaphthalene	10 U	10 U	0.0
2-Nitroaniline	50 U	50 U	0.0
Dimethyl Phthalate	10 U	10 U	0.0
Acenaphthylene	10 U	10 U	0.0
2,6-Dinitrotoluene	10 U	10 U	0.0
3-Nitroaniline	50 U	50 U	0.0
Acenaphthene	10 U	10 U	0.0
2,4-Dinitrophenol	50 U	50 U	0.0
4-Nitrophenol	50 U	50 U	0.0
Dibenzofuran	10 U	10 U	0.0
2,4-Dinitrotoluene	10 U	10 U	0.0
Diethyl Phthalate	10 U	10 U	0.0

U = less than the minimum detection limit.

Appendix C – Continued.
Semivolatile Matrix Spike Results (Continued).

Compound	Spike	Duplicate	RPD
4-Chlorophenyl-Phenylether	10 U	10 U	0.0
Fluorene	10 U	10 U	0.0
4-Nitroaniline	50 U	50 U	0.0
4,6-Dinitro-2-Methylphenol	50 U	50 U	0.0
N-Nitrosodimethylamine	10 U	10 U	0.0
4-Bromophenyl-Phenylether	10 U	10 U	0.0
Hexachlorobenzene	10 U	10 U	0.0
Pentachlorophenol	50 U	50 U	0.0
Phenanthrene	10 U	10 U	0.0
Anthracene	10 U	10 U	0.0
Di-n-Butylphthalate	51	51	0.0
Fluoranthene	10 U	10 U	0.0
Pyrene	10 U	10 U	0.0
Butylbenzylphthalate	10 U	10 U	0.0
3,3'-Dichlorobenzidine	20 U	20 U	0.0
Benzo(a)Anthracene	10 U	10 U	0.0
Bis(2-Ethylhexyl)phthalate	10 U	10 U	0.0
Chrysene	10 U	10 U	0.0
Di-n-Octyl Phthalate	10 U	10 U	0.0
Benzo(b)Fluoranthene	10 U	10 U	0.0
Benzo(k)Fluoranthene	10 U	10 U	0.0
Benzo(a)Pyrene	10 U	10 U	0.0
Indeno(1,2,3-cd)Pyrene	10 U	10 U	0.0
Dibenzo(a,h)Anthracene	10 U	10 U	0.0
Benzo(g,h,i)Perylene	10 U	10 U	0.0

U = less than the minimum detection limit.

Appendix C – Continued.

Pesticide/PCB Matrix Spike Results – Kaiser, Trentwood, 5/90.

Compound	Spike	Duplicate	RPD
alpha-BHC	0.05 U	0.05 U	0.0
beta-BHC	0.05 U	0.05 U	0.0
delta-BHC	0.05 U	0.05 U	0.0
gamma-BHC (Lindane)	0.05 U	0.05 U	0.0
Heptachlor	0.05 U	0.05 U	0.0
Aldrin	0.05 U	0.05 U	0.0
Heptachlor Epoxide	0.05 U	0.05 U	0.0
Endosulfan I	0.05 U	0.05 U	0.0
Dieldrin	0.1 U	0.1 U	0.0
4,4'-DDE	0.1 U	0.1 U	0.0
Endrin	0.1 U	0.1 U	0.0
Endosulfan II	0.1 U	0.1 U	0.0
4,4'-DDD	0.1 U	0.1 U	0.0
Endosulfan Sulfate	0.1 U	0.1 U	0.0
4,4'-DDT	0.1 U	0.1 U	0.0
Methoxychlor	0.5 U	0.5 U	0.0
Endrin ketone	0.1 U	0.1 U	0.0
alpha-Chlordane	0.5 U	0.5 U	0.0
gamma-Chlordane	0.5 U	0.5 U	0.0
Toxaphene	1 U	1 U	0.0
Aroclor-1016	0.5 U	0.5 U	0.0
Aroclor-1221	0.5 U	0.5 U	0.0
Aroclor-1232	0.5 U	0.5 U	0.0
Aroclor-1242	0.5 U	0.5 U	0.0
Aroclor-1248	0.5 U	0.5 U	0.0
Aroclor-1254	1 U	1 U	0.0
Aroclor-1260	1 U	1 U	0.0

U = less than the minimum detection limit.

Appendix C - Results of Metals Method Blank - Kaiser, Trentwood, May 1990.

Parameter	Result (R)	True Value (TV)	*RPD
Aluminum	1.03	1.00	2.9
Antimony	0.846	1.00	16.7
Arsenic	0.010	0.010	---
Beryllium	1.05	1.00	4.8
Cadmium	1.03	1.00	2.9
Chromium	1.05	1.00	4.8
Copper	1.00	1.00	---
Lead	0.008	0.010	22.2
Nickel	1.13	1.00	12.2
Selenium	0.011	0.010	9.5
Silver	0.984	1.00	1.6
Thallium	1.05	1.00	4.8
Zinc	1.02	1.00	1.9
Mercury	0.0020	0.0020	---

*RPD = relative percent difference
 = $[(R - TV) / ((R + TV) / 2)] \times 100$

Appendix C – Continued.

Volatile Organics Method Blank Results, Kaiser, Trentwood, 5/90.

Compound	Water (ppb)
Chloromethane	10 U
Bromomethane	10 U
Vinyl Chloride	10 U
Chloroethane	10 U
Methylene Chloride	5 U
Acetone	10 U
Carbon Disulfide	5 U
1,1-Dichloroethene	5 U
1,1-Dichloroethane	5 U
1,2-Dichloroethene(Tot)	5 U
Chloroform	5 U
1,2-Dichloroethane	5 U
2-Butanone (MEK)	10 U
1,1,1-Trichloroethane	5 U
Carbon Tetrachloride	5 U
Vinyl Acetate	10 U
Bromodichloromethane	5 U
1,2-Dichloropropane	5 U
cis-1,3-Dichloropropene	5 U
Trichloroethene	1 J
Dibromochloromethane	5 U
1,1,2-Trichloroethane	5 U
Benzene	5 U
trans-1,3-Dichloropropene	5 U
Bromoform	5 U
4-Methyl-2-Pentanone	10 U
2-Hexanone	10 U
Tetrachloroethene	5 U
1,1,2,2-Tetrachloroethane	5 U
Toluene	5 U
Chlorobenzene	5 U
Ethylbenzene	5 U
Ethenylbenzene (Styrene)	5 U
Total Xylenes	5 U

U = less than the minimum detection limit.

Appendix C – Continued.

Semivolatile Method Blank Results, Kaiser, Trentwood, 5/90.

Compound	Water (ppb)
Phenol	10 U
Bis(2-Chloroethyl)Ether	10 U
2-Chlorophenol	10 U
1,3-Dichlorobenzene	10 U
1,4-Dichlorobenzene	10 U
Benzyl Alcohol	10 U
1,2-Dichlorobenzene	10 U
2-Methylphenol	10 U
Bis(2-chloroisopropyl)ether	10 U
4-Methylphenol	10 U
N-Nitroso-Di-n-Propylamine	10 U
Hexachloroethane	10 U
Nitrobenzene	10 U
Isophorone	10 U
2-Nitrophenol	10 U
2,4-Dimethylphenol	10 U
Benzoic Acid	50 U
Bis(2-Chloroethoxy)Methane	10 U
2,4-Dichlorophenol	10 U
1,2,4-Trichlorobenzene	10 U
Naphthalene	10 U
4-Chloroaniline	10 U
Hexachlorobutadiene	10 U
4-Chloro-3-Methylphenol	10 U
2-Methylnaphthalene	10 U
Hexachlorocyclopentadiene	10 U
2,4,6-Trichlorophenol	10 U
2,4,5-Trichlorophenol	50 U
2-Chloronaphthalene	10 U
2-Nitroaniline	50 U
Dimethyl Phthalate	10 U
Acenaphthylene	10 U
2,6-Dinitrotoluene	10 U
3-Nitroaniline	50 U
Acenaphthene	10 U
2,4-Dinitrophenol	50 U
4-Nitrophenol	50 U
Dibenzofuran	10 U
2,4-Dinitrotoluene	10 U
Diethyl Phthalate	10 U

U = less than the minimum detection limit.

Appendix C – Continued.

Semivolatile Method Blank Results, Kaiser, Trentwood, 5/90.

Compound	Water (ppb)
4-Chlorophenyl-Phenylether	10 U
Fluorene	10 U
4-Nitroaniline	50 U
4,6-Dinitro-2-Methylphenol	50 U
N-Nitrosodimethylamine	10 U
4-Bromophenyl-Phenylether	10 U
Hexachlorobenzene	10 U
Pentachlorophenol	50 U
Phenanthrene	10 U
Anthracene	10 U
Di-n-Butylphthalate	10 U
Fluoranthene	10 U
Pyrene	10 U
Butylbenzylphthalate	10 U
3,3'-Dichlorobenzidine	20 U
Benzo(a)Anthracene	10 U
Chrysene	10 U
Bis(2-Ethylhexyl)phthalate	10 U
Di-n-Octyl Phthalate	10 U
Benzo(b)Fluoranthene	10 U
Benzo(k)Fluoranthene	10 U
Benzo(a)Pyrene	10 U
Indeno(1,2,3-cd)Pyrene	10 U
Dibenzo(a,h)Anthracene	10 U
Benzo(g,h,i)Perylene	10 U

U = less than the minimum detection limit.

Appendix C – Continued.

Pesticide/PCB Method Blank Results, Kaiser, Trentwood, 5/90.

Compound	Water (ppb)
alpha-BHC	0.05 U
beta-BHC	0.05 U
delta-BHC	0.05 U
gamma-BHC (Lindane)	0.05 U
Heptachlor	0.05 U
Aldrin	0.05 U
Heptachlor Epoxide	0.05 U
Endosulfan I	0.05 U
Dieldrin	0.1 U
4,4'-DDE	0.1 U
Endrin	0.1 U
Endosulfan II	0.1 U
4,4'-DDD	0.1 U
Endosulfan Sulfate	0.1 U
4,4'-DDT	0.1 U
Methoxychlor	0.5 U
Endrin ketone	0.1 U
alpha-Chlordane	0.5 U
gamma-Chlordane	0.5 U
Toxaphene	1 U
Aroclor-1016	0.5 U
Aroclor-1221	0.5 U
Aroclor-1232	0.5 U
Aroclor-1242	0.5 U
Aroclor-1248	0.5 U
Aroclor-1254	1 U
Aroclor-1260	1 U

U = less than the minimum detection limit.

Appendix D – Organic Priority Pollutant Scan Results – Kaiser, Trentwood, 5/90.

	Station:	Eff-002	Eff-001	Intake
	Type:	composite	composite	composite
	Date:	5/22-23/90	5/22-23/90	5/22-23/90
	Time:	24 hrs	24 hrs	24 hrs
Parameter	Lab Sample #:	218157	218158	215159
<u>VOA Compounds (ug/l)</u>				
Chloromethane		10	10	10 U
Bromomethane		10	10	10 U
Vinyl Chloride		10	10	10 U
Chloroethane		10	10	10 U
Methylene Chloride		5	5	5 U
Acetone		220 E	2 J	10 U
Carbon Disulfide		5	5	5 U
1,1-Dichloroethene		5	5	5 U
1,1-Dichloroethane		5	5	5 U
1,2-Dichloroethene (total)		5	5	5 U
Chloroform		5	5	5 U
1,2-Dichloroethane		5	5	5 U
2-Butanone (MEK)		10	10	10 U
1,1,1-Trichloroethane		5	5	5 U
Carbon Tetrachloride		5	5	5 U
Vinyl Acetate		10	10	10 U
Bromodichloromethane		5	5	5 U
1,2-Dichloropropane		5	5	5 U
cis-1,3-Dichloropropene		5	5	5 U
Trichloroethene		5	5	5 U
Dibromochloromethane		5	5	5 U
1,1,2-Trichloroethane		5	5	5 U
Benzene		5	5	5 U
trans-1,3-Dichloropropene		5	5	5 U
Bromoform		5	5	5 U
4-Methyl-2-Pentanone		10	10	10 U
2-Hexanone		10	10	10 U
Tetrachloroethene		5	5	5 U
1,1,2,2-Tetrachloroethane		5	5	5 U
Toluene		5	5	5 U
Chlorobenzene		5	5	5 U
Ethylbenzene		5	5	5 U
Styrene		5	5	5 U
Xylene (total)		3 J	5	5 U
<u>BNA Compounds (ug/l)</u>				
Phenol		1000 E	10	10 U
Bis(2-Chloroethyl)Ether		10	10	10 U
2-Chlorophenol		10	10	10 U
1,3-Dichlorobenzene		10	10	10 U
1,4-Dichlorobenzene		10	10	10 U
Benzyl Alcohol		10	10	10 U
1,2-Dichlorobenzene		10	10	10 U
2-Methylphenol		10	10	10 U

Appendix D – Organic Priority Pollutant Scan Results – Continued.

	Station:	Eff-002	Eff-001	Intake
	Type:	composite	composite	composite
	Date:	5/22-23/90	5/22-23/90	5/22-23/90
	Time:	24 hrs	24 hrs	24 hrs
Parameter	Lab Sample #:	218157	218158	215159
<u>BNA Compounds, Continued (ug/l)</u>				
4-Methylphenol		15	10	10 U
N-Nitroso-di-n-propylamine		10	10	10 U
Hexachloroethane		10	10	10 U
Nitrobenzene		10	10	10 U
Isophorone		10	10	10 U
2-Nitrophenol		10	10	10 U
2,4-Dimethylphenol		10	10	10 U
Benzoic Acid		240	50	50 U
Bis(2-Chloroethoxy)methane		10	10	10 U
2,4-Dichlorophenol		10	10	10 U
1,2,4-Trichlorobenzene		10	10	10 U
Naphthalene		13	10	10 U
4-Chloroaniline		10	10	10 U
Hexachlorobutadiene		10	10	10 U
4-Chloro-3-methylphenol		10	10	10 U
2-Methylnaphthalene		10	10	10 U
Hexachlorocyclopentadiene		10	10	10 U
2,4,6-Trichlorophenol		10	10	10 U
2,4,5-Trichlorophenol		50	50	50 U
2-Chloronaphthalene		10	10	10 U
2-Nitroaniline		50	50	50 U
Dimethyl Phthalate		10	10	10 U
Acenaphthylene		10	10	10 U
2,6-Dinitrotoluene		10	10	10 U
3-Nitroaniline		50	50	50 U
Acenaphthene		10	10	10 U
2,4-Dinitrophenol		50	50	50 U
4-Nitrophenol		50	50	50 U
Dibenzofuran		10	10	10 U
2,4-Dinitrotoluene		10	10	10 U
Diethylphthalate		10	10	10 U
4-Chlorophenyl-phenylether		10	10	10 U
Fluorene		10	10	10 U
4-Nitroaniline		50	50	50 U
4,6-Dinitro-2-methylphenol		50	50	50 U
N-Nitrosodiphenylamine*		10	10	10 U
4-Bromophenyl-phenylether		10	10	10 U
Hexachlorobenzene		10	10	10 U
Pentachlorophenol		50	50	50 U
Phenanthrene		10	10	10 U
Anthracene		10	10	10 U
Di-n-butylphthalate		10	10	10 U
Fluoranthene		10	10	10 U
Pyrene		10	10	10 U
Butylbenzylphthalate		10	10	10 U

Appendix D – Organic Priority Pollutant Scan Results – Continued.

	Station:	Eff-002	Eff-001	Intake
	Type:	composite	composite	composite
	Date:	5/22-23/90	5/22-23/90	5/22-23/90
	Time:	24 hrs	24 hrs	24 hrs
Parameter	Lab Sample #:	218157	218158	215159
<u>BNA Compounds, Continued (ug/l)</u>				
3,3'-Dichlorobenzidine		20	20	20 U
Benzo(a)anthracene		10	10	10 U
bis(2-Ethylhexyl)phthalate		10	10	10 U
Chrysene		10	10	10 U
Di-n-octylphthalate		10	10	10 U
Benzo(b)fluoranthene		10	10	10 U
Benzo(k)fluoranthene		10	10	10 U
Benzo(a)pyrene		10	10	10 U
Indeno(1,2,3-cd)pyrene		10	10	10 U
Dibenzo(a,h,)anthracene		10	10	10 U
Benzo(g,h,i)perylene		10	10	10 U
<u>Pesticide/PCB Compounds (ug/l)</u>				
alpha-BHC		0.050	0.050	0.050 U
beta-BHC		1.6	0.050	0.050 U
delta-BHC		0.050	0.050	0.050 U
gamma-BHC (Lindane)		0.11	0.050	0.050 U
Heptachlor		0.11	0.050	0.0072 J
Aldrin		0.050	0.050	0.020 J
Heptachlor epoxide		0.050	0.050	0.050 U
Endosulfan I		0.050	0.050	0.050 U
Dieldrin		0.13	0.10	0.10 U
4,4'-DDE		0.10	0.10	0.10 U
Endrin		0.10	0.10	0.10 U
Endosulfan II		0.10	0.10	0.10 U
4,4'-DDD		0.10	0.10	0.10 U
Endosulfan Sulfate		0.15	0.10	0.10 U
4,4'-DDT		0.10	0.10	0.10 U
Methoxychlor		0.50	0.50	0.50 U
Endrin ketone		0.10	0.10	0.10 U
alpha-Chlordane		0.50	0.50	0.50 U
gamma-Chlordane		0.50	0.50	0.50 U
Toxaphene		1.0	1.0	1.0 U
Aroclor-1016		0.50	0.50	0.50 U
Aroclor-1221		0.50	0.50	0.50 U
Aroclor-1232		0.50	0.50	0.50 U
Aroclor-1242		0.50	0.50	0.50 U
Aroclor-1248		0.50	0.50	0.50 U
Aroclor-1254		1.0	1.0	1.0 U
Aroclor-1260		1.0	1.0	1.0 U

*Cannot be separated from Diphenylamine

U - Indicates the compound was not detected at the given quantification limit.

J - Indicates an estimated value when the result is less than the quantification limit.

E - Indicates the concentration of the associated value exceeds the known calibration range.