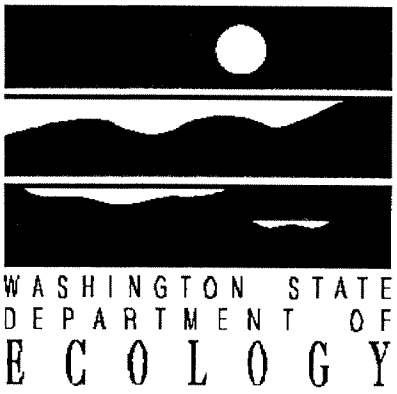
90-e25



CENTRAL KITSAP WASTEWATER TREATMENT PLANT
CLASS II INSPECTION
NOVEMBER 29-30, 1988

by
Marc Heffner

Washington Department of Ecology
Environmental Investigations and Laboratory Services Program
Compliance Monitoring Section
Olympia, Washington 98504-8711

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ABSTRACT

A class II inspection was conducted at the Central Kitsap Wastewater Treatment Plant (STP) on November 29-30, 1988. The plant is an activated sludge secondary facility discharging into Port Orchard Bay as regulated by NPDES Permit #WA-003052-0. The STP was upset during the inspection resulting in effluent exceeding NPDES permit biochemical oxygen demand (BOD_5), total suspended solids (TSS), and chlorine residual concentrations. Numerous priority pollutants were detected in one or more of the samples collected. Most were found in low concentrations. The STP effluent demonstrated some toxicity to rainbow trout and Microtox. The sediments were not toxic to amphipods (Rhepoxynius abronius) or Microtox.

INTRODUCTION

A class II inspection was conducted at the Central Kitsap Wastewater Treatment Plant (STP) on November 29-30, 1988. The plant is an activated sludge secondary facility discharging into Port Orchard Bay as regulated by NPDES Permit #WA-003052-0. Receiving water sediments were collected near the outfall on November 28, 1988, as part of the inspection. Objectives of the survey included:

1. Assess plant compliance with NPDES permit discharge limits.

2. Assess the permittee's self-monitoring by reviewing laboratory, sampling, and flow measurement procedures. The assessment will include sample splits for analysis by the Ecology and Central Kitsap labs.

3. Characterize effluent toxicity by conducting priority pollutant scans and bioassays.

4. Characterize loadings from the Navy bases including priority pollutant scans.

5. Assess impacts to receiving water sediments by conducting priority pollutant scans and bioassays.

The survey was conducted by Keith Seiders, Norm Glenn, and Marc Heffner of the Ecology Compliance Monitoring Section. Ralph Declements, operations supervisor at the plant, provided on-site assistance.

SETTING

The STP is operated by the Kitsap County Public Works Department. Plant loading includes influent and septage. Plant influent flow is approximately 2.3 MGD including domestic flow and flow from the Navy-Bangor and Navy-Keyport facilities. Septage flow is approximately 20,000 gpd.

The plant flow scheme is outlined in Figure 1. The treatment process includes primary clarification, activated sludge, secondary clarification, and chlorination. The activated sludge system is a complete mix mechanically aerated system. During the inspection all the clarifiers and two of the four aeration basins were being used. The system is set up to allow effluent from any activated sludge basin to be sent to either secondary clarifier, but the flow from any one basin cannot easily be divided equally between the two secondary clarifiers.

Primary and secondary waste sludges are sent to separate gravity thickeners. The thickened sludges are combined and digested in the primary digester, then held in the secondary digester. The sludge is dewatered using a filter press and sent to the Olympic View Sanitary Landfill where it is utilized as top cover material.

Septage is screened, comminuted, diluted, and degritted before being sent to a gravity thickener along with the waste activated sludge (Figure 1). The gravity thickener overflow is routed into the plant flow downstream of the influent monitoring station, while the solids are sent to the digester. Because the septage is mixed with the waste activated sludge in the gravity thickener, the septage load to the liquid stream portion of the plant cannot be measured.

PROCEDURES

Ecology sample collection included composites and grabs. Ecology Isco composite samplers were set up to collect influent, primary effluent, and final effluent samples at the STP (Figure 1) and effluent samples at the Navy-Bangor and Navy-Keyport bases near the respective effluent flumes. Samplers were set to collect equal volumes of sample every 30 minutes for 24 hours. Sampling quality assurance/quality control steps included priority pollutant cleaning samplers prior to the inspection and collecting a field transfer blank sample (Table 1). Samples collected, sampling times, and parameters analyzed are summarized in Table 2. Kitsap County also collected composite samples of STP influent and effluent, and effluent from the Navy bases. The Kitsap County samplers collected equal volumes of sample every 30 minutes for 24 hours. Ecology and Kitsap County samples were split for analysis by both the Ecology and Kitsap County labs (Table 2).

Receiving water sediments were collected with a van Veen grab sampler at three stations; two near the outfall diffuser and one at a background site (Figure 2). At each station, the top two centimeters of sample from two grabs were collected. One-half of a VOA bottle was filled from each grab while the remainder of the sample was put in a stainless steel bucket. After the second grab, the contents of the bucket were homogenized and put in appropriate containers. Sampling quality assurance/quality control steps included collecting only sediment not in direct contact with the sampler and pre-inspection priority pollutant cleaning of equipment that would touch the samples (Table 1). Sampling times and parameters analyzed are included in Table 2.

Samples for Ecology analysis were placed on ice and delivered to the Ecology Manchester Laboratory. Analytical procedures and the laboratories doing the analysis are summarized in Table 3.

RESULTS AND DISCUSSION

General Chemistry and NPDES Permit Parameters

The plant appeared to be in a partially upset condition during the inspection; plant performance was less than expected (Table 4). Effluent BOD_5, TSS, and chlorine residual concentrations exceeded NPDES permit limits (Table 5). Influent plant flow was approximately one-half of plant capacity while BOD_5 and TSS loads were approximately one-third of capacity. Operating one-half the plant (one primary clarifier, two aeration basins, and one secondary clarifier) could provide useful information about actual plant capacity.

Comparison of effluent BOD_5 (>60 mg/L) and effluent inhibited BOD_5 (14 mg/L) suggest nitrification was occurring; while the effluent NH_3-N concentration (approximately 20 mg/L) indicates that nitrification was not complete. The extent of nitrification was difficult to estimate. The inspection samples found a higher NH_3-N concentration in the primary effluent (34 mg/L) than in the plant influent (25 mg/L), presumably due to return flows entering the flow downstream of the influent sampling station (Figure 1). The total inorganic nitrogen concentration (TIN; NH_3-N + NO_2+NO_3-N) in the final effluent (23 mg/L) was less than in the primary effluent (34 mg/L) suggesting denitrification was occurring. The long detention time in the secondary clarifiers as a result of using both units when the flow was one-half of STP capacity suggests denitrification may have been occurring in the clarifiers. Denitrification may have contributed to the partially upset condition observed at the STP.

The plant influent flow meter appeared to be measuring accurately (Table 6).

General chemistry results from both the Bangor and Keyport samples suggest the discharges were similar to domestic influent (Table 4). None of the general chemistry parameters measured suggested the sewage was significantly different than the Central Kitsap STP influent, although both facilities had higher total solids (TS) concentrations and the Keyport sample had a higher NH_3-N concentration. Flow meters at both of the facilities did not appear accurate (Table 6). The Keyport meter appeared approximately 30 percent too high while the Bangor meter was very erratic and a reasonable flow estimate could not be made.

Priority Pollutants - Water and Sludge

Numerous priority pollutants were detected in one or more of the samples collected (Table 7). Most were found in low concentrations. A complete list of parameters analyzed, concentrations found, and detection limits is included in the Appendix. The Navy-Keyport sample had somewhat elevated concentrations of acetone, 4-methylphenol, benzoic acid, and zinc. The Navy-Bangor sample contained several VOA compounds (Benzene, Toluene, and Total Xylenes), copper, and cyanide in the 50-150 ug/L range. Acetone was present in several samples in the 90-140 ug/L range as well as in the transfer blank. Several of the parameters detected in the STP influent were not detected in either the Keyport or Bangor samples, suggesting the facilities were not the sole source of priority pollutants entering the STP. Inability to collect a Keyport composite makes the observation less conclusive. The data indicate in-plant reduction or removal of most of the parameters observed in the STP influent sample.

The list of priority pollutants found in the treatment plant samples and those found in the sludge sample are similar, although fewer parameters were detected in the sludge (Table 7). Similar detection lists suggest the compounds detected in the STP samples are routinely present. Central Kitsap results for metals commonly analyzed in the sludge show the Central Kitsap concentrations fall within the range found in previous inspections (Table 8 - Hallinan, 1988).

Bioassays - Water

Bioassays found some toxicity in the STP effluent (Table 9). Rainbow trout (Onocorhynchus mykiss) experienced 27 percent mortality in the 100 percent STP effluent. Acute mortality was not noted in the Daphnia magna test while suspected cultural difficulties made the chronic results inconclusive (Stinson, 1989). The "need to further investigate toxicity" based on Microtox results received a moderate priority ranking (EPA, 1980).

Effluent priority pollutant concentrations were less than acute toxicity criteria (Table 7; EPA, 1986). The cyanide and copper concentrations were the only priority pollutants approaching acute criteria. The STP effluent NH_3-N concentration (22 mg/L) exceeded the calculated toxicity criteria for trout bioassay test conditions (13 mg/L), possibly accounting for the observed trout mortality.

Priority Pollutants - Sediments

Priority pollutants detected were in low concentrations in the sediments (Table 10). Most of the parameters detected in the sediments were either metals or high molecular weight polynuclear aromatic hydrocarbons (HPAHs), whereas no HPAHs were detected in the STP effluent. A complete list of parameters analyzed, concentrations found, and detection limits is included in the Appendix. All concentrations were less than the Ecology Interim Sediment Quality Evaluation Process Chemical Criteria; thus, no adverse effects on Puget Sound biological resources would be expected (Ecology, 1989a).

Bioassays - Sediments

As predicted by the chemical data, neither the amphipod (Rhepoxynius abronius) nor Microtox were significantly effected by the test sediments (Table 11). All amphipod test survivals were greater than 88 percent; exceeding the 75 percent minimum survival required to pass the test (Ecology, 1989a). The Microtox test showed no measurable toxic effects.

Laboratory Discussion

In March 1988, the Kingston STP, another plant operated by the Kitsap County Public Works Department, was inspected and a laboratory review was conducted at the central lab (Hallinan, 1988a). Only minor suggestions were made at that time to bring the lab into conformance with approved techniques. A review of those suggestions during the Central Kitsap inspection found all suggestions had been implemented.

Split sample results generally compare well (Table 12). The in-plant samples appear representative and analytical results from the two laboratories are comparable. Two areas of some concern were the chlorine residual and the Bangor sample. The Ecology and Central Kitsap colorimetric chlorine residual results compared closely, but the Central Kitsap amperometric results were lower by a factor of ten. The two systems were checked by Central Kitsap after the inspection and minor changes were made to the amperometric system. A recheck of chlorine residual is suggested during a future plant visit. The Navy-Bangor composite sample collected by the STP had a substantially higher TSS concentration than the corresponding Ecology sample. The sampler and intake point should be checked to assure the sample is not biased.

CONCLUSIONS AND RECOMMENDATIONS

General Chemistry and NPDES Permit Parameters

The STP was upset during the inspection resulting in effluent exceeding NPDES permit BOD_5, TSS, and chlorine residual concentrations. Partial nitrification-denitrification appeared to be occurring, perhaps contributing to the upset condition.

Plant loading was approaching one-half capacity. Operating one-half of the plant (one primary clarifier, two activated sludge basins, and one secondary clarifier) may give useful insight into actual plant capacity.

Navy-Bangor and Navy-Keyport general chemistry parameters were similar to the fairly typical wastewater characteristics of the STP influent. Flow meters at both facilities needed adjustment.

Priority Pollutants - Water and Sludge

Numerous priority pollutants were detected in one or more of the samples collected. Most were found in low concentrations. The data indicate in-plant reduction or removal of most of the parameters observed in the STP influent sample. Several of the parameters detected in the STP influent were not detected in either the Keyport or Bangor samples suggesting the facilities were not the sole source of priority pollutants.

The list of priority pollutants found in the treatment plant samples and those found in the sludge sample are similar, although fewer parameters were detected in the sludge. Similar detection lists suggest the compounds detected in the STP samples are routinely present.

Bioassays - Water

The STP effluent demonstrated some toxicity to rainbow trout (acute) and Microtox. Ammonia was considered a possible cause.

Priority Pollutants - Sediments

All priority pollutants detected in the sediments were in concentrations less than Ecology Interim Sediment Quality Evaluation Process Chemical Criteria; thus, no adverse effects on Puget Sound biological resources would be expected (Ecology, 1989a).

Bioassays - Sediments

The sediments were not toxic to amphipods (Rhepoxynius abronius) or Microtox.

Laboratory Discussion

Procedural recommendations made during a previous lab review approximately a year earlier had all been implemented. Inspection of the Navy-Bangor composite sampler and a recheck of the chlorine residual during a field inspection are recommended.

REFERENCES

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

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

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

Ecology, 1988. Department of Ecology Laboratory Users Manual.

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

Ecology, 1989a. Interim Sediment Quality Evaluation Process for Puget Sound - Draft Copy, October 1989.

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

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

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

Hallinan, Pat. 1988. Metal Concentrations Found During Ecology Inspections of Municipal Wastewater Treatment Plants, memo to John Bernhardt, April 11, 1988.

Hallinan, Pat. 1988a. Kingston Wastewater Treatment Plant Class II Inspection, August 1988.

Stinson, Margaret, 1989. Central Kitsap STP Class II Inspection Results of Daphnia magna Bioassay, memo to Marc Heffner, February 15, 1989.

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

FIGURES

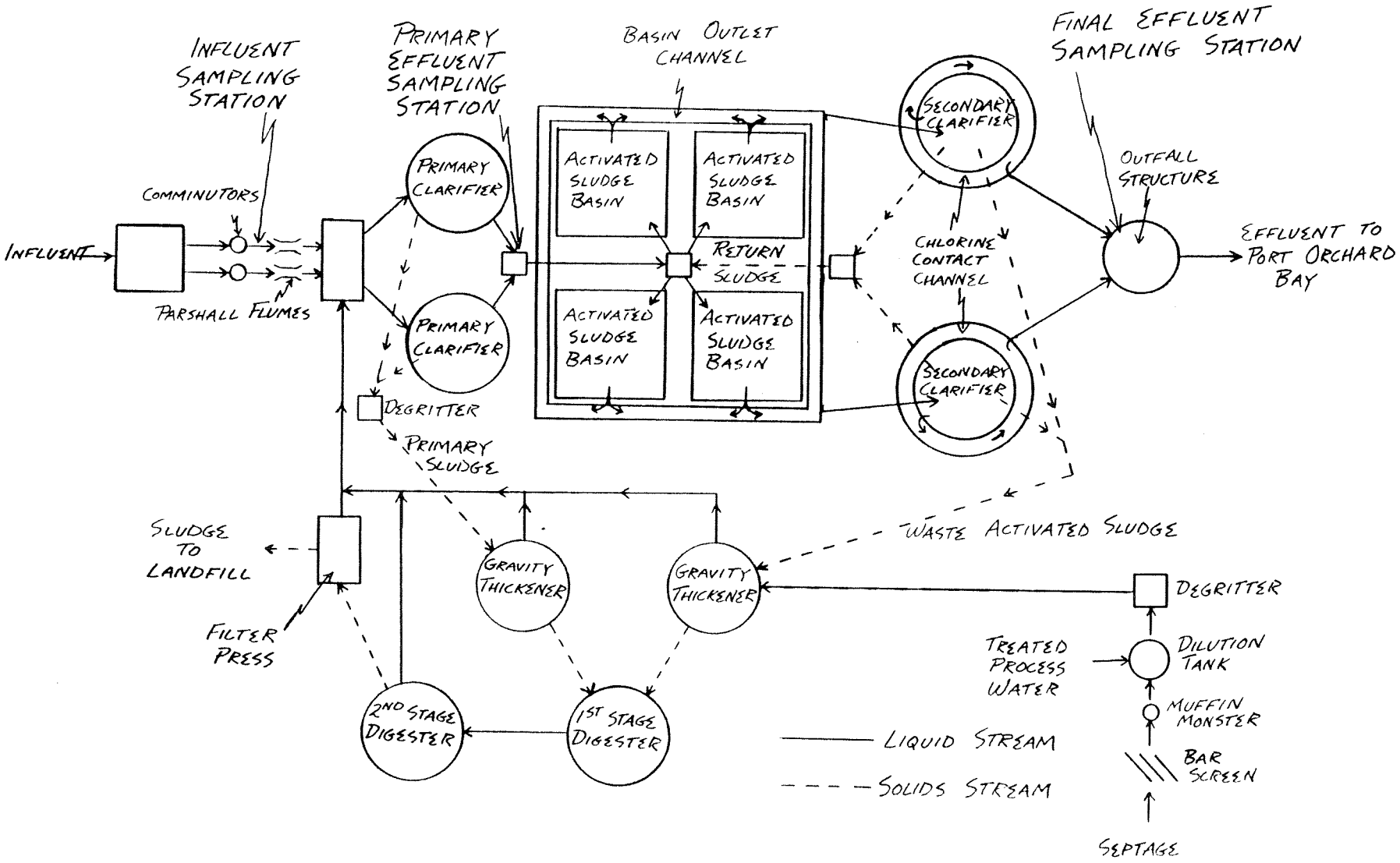

Figure 1 - Flow Scheme - Central Kitsap, November 1988.

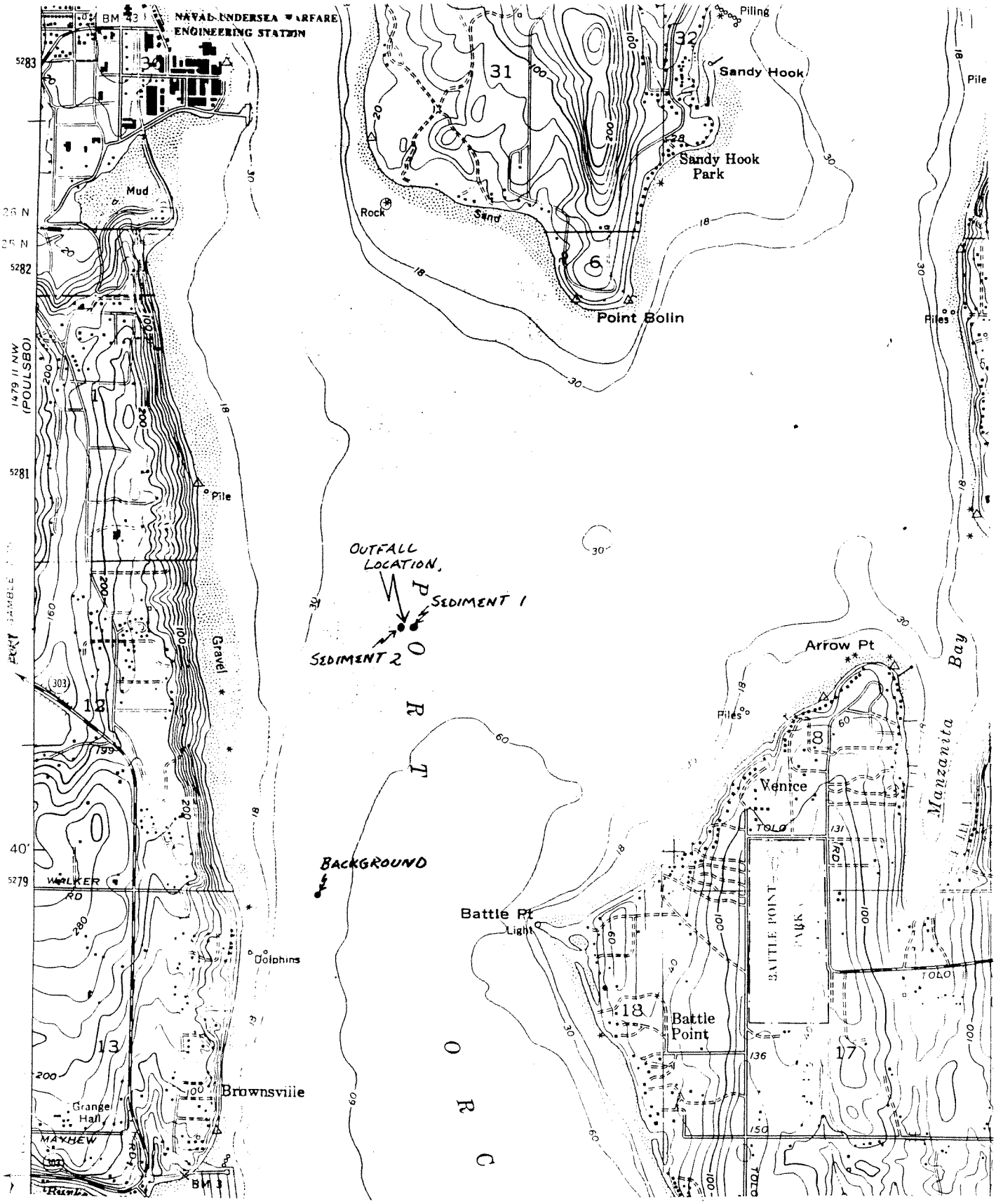

Figure 2 - Sediment Sampling Locations - Central Kitsap, November 1988.

TABLES

Table 1 - Priority Pollutant Cleaning and Field Transfer Blank Procedures
Central Kitsap, November 1988

PRIORITY POLLUTANT SAMPLING EQUIPMENT CLEANING PROCEDURES

1. Wash with laboratory detergent
2. Rinse several times with tap water
3. Rinse with 10 percent HNO_3 solution
4. Rinse three (3) times with distilled/deionized water
5. Rinse with high purity methylene chloride
6. Rinse with high purity acetone
7. Allow to dry and seal with aluminum foil

FIELD TRANSFER BLANK PROCEDURE

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

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

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

Table 2 - Sampling Schedule - Central Kitsap, November 1988.

	ECOLOGY GRAB SAMPLES									
Station:	Influent	Influent	Influent	Pri-Ef	Pri-Ef	Pri-Ef	Final-Ef	Final-Ef	Final-Ef	Final-Ef
Date:	11/29	11/29	11/30	11/29	11/29	11/30	11/29	11/29	11/30	11/30
Time:	1020	1615	0925	1010	1635	0950	1005	1700	0845	1315
Type:	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Lab Log #:		498230	498231		498232	498233		498234	498235	498236
--------Field Analyses--------										
pH	E	E	E	E	E	E	E	E	E	
Conductivity	E	E	E	E	E	E	E	E	E	
Temperature	E	E	E	E		E	E	E	E	
Chlorine Residual										
Free							E		E	
Total							E S		E	
-----Laboratory Analyses-----										
Turbidity										
Conductivity		E	E		E	E		E	E	
Alkalinity										
Hardness										
NH_3-N										
NO_3+NO_2-N										
Total-P										
TS										
TNVS										
TSS		E	E		E	E		E	E	
TNVSS										
COD		E	E		E	E		E	E	
BOD_5										
Inhib. BOD_5										
Fecal Coliform									E S	E
TOC										
% Solids										
Grain Size										
Cyanide										
VOA		E	E		E	E		E	E	
BNA										
Pest/PCB										
pp metals										
Trout										
Daphnia Magna										
Microtox										
Rhep. Abr.										

E - Ecology Laboratory Analysis
S - STP Laboratory Analysis
* - Cd, Cr, Cu, Pb, Ni, and Zn analyzed by the STP for all stations. Hg also analyzed at the Influent, Pri-Ef, and Final-Ef stations.
** - Grab composite sample. Equal volumes collected on 11/29 at 1005, on 11/29 at 1700, and on 11/30 at 0845.
*** - The composite sampler failed so a grab sample had to be collected. Field lab log numbers 498238 and 498252 are both grab samples collected at approximately the same time. All data are reported as lab log number 498238.
\+ - Blank sample collection is explained in Table 1.
++ - sample collected after the filter press

Table 2 - Sampling Schedule - Central Kitsap, November 1988.

	ECOLOGY GRAB SAMPLES									
Station:	Influent	Influent	Influent	Pri-Ef	Pri-Ef	Pri-Ef	Final-Ef	Final-Ef	Final-Ef	Final-Ef
Date:	11/29	11/29	11/30	11/29	11/29	11/30	11/29	11/29	11/30	11/30
Time:	1020	1615	0925	1010	1635	0950	1005	1700	0845	1315
Type:	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Lab Log #:		498230	498231		498232	498233		498234	498235	498236
--------Field Analyses--------										
pH	E	E	E	E	E	E	E	E	E	
Conductivity	E	E	E	E	E	E	E	E	E	
Temperature	E	E	E	E		E	E	E	E	
Chlorine Residual										
Free							E		E	
Total							E S		E	
-----Laboratory Analyses-----										
Turbidity										
Conductivity		E	E		E	E		E	E	
Alkalinity										
Hardness										
NH_3-N										
NO_3+NO_2-N										
Total-P										
TS										
TNVS										
TSS		E	E		E	E		E	E	
TNVSS										
COD		E	E		E	E		E	E	
BOD_5										
Inhib. BOD_5										
Fecal Coliform									E S	E
TOC										
% Solids										
Grain Size										
Cyanide										
VOA		E	E		E	E		E	E	
BNA										
Pest/PCB										
pp metals										
Trout										
Daphnia Magna										
Microtox										
Rhep. Abr.										

E - Ecology Laboratory Analysis
S - STP Laboratory Analysis
* - Cd, Cr, Cu, Pb, Ni, and Zn analyzed by the STP for all stations. Hg also analyzed at the Influent, Pri-Ef, and Final-Ef stations.
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++ - sample collected after the filter press

Table 2 (Continued)

	ECOLOGY GRAB SAMPLES								
Station:	Navy-Key	Navy-Key	Navy-Ban	Navy-Ban	Navy-Ban	AS	AS	Sludge ++	Blank
Date:	11/29	11/30	11/29	11/29	11/30	11/29	11/30	11/29	11/29
Time:	1400	1225	1130	1515	1135	1645	0955	1040	0900
Type:	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	+
Lab Log #:	498237	498238		498239	498240	498241	498242	498243	498254
--------Field Analyses--------									
pH	E	E	E	E	E				
Conductivity	E	E	E	E	E				
Temperature	E	E	E	E	E				
Chlorine Residual									
Free									
Total									
-----Laboratory Analyses-----									
Turbidity									
Conductivity	E	E		E	E				
Alkalinity									
Hardness									
NH_3-N									
NO_3+NO_2-N									
Total-P									
TS									
TNVS									
TSS	E	E		E	E	E	E		
TNVSS						E	E		
COD	E	E		E	E				
BOD_5									
Inhib. BOD_5									
Fecal Coliform									
TOC								E	
% Solids								E	
Grain Size								E	
Cyanide	E	E		E	E				
VOA	E	E		E	E			E	E
BNA								E	E
Pest/PCB								E	E
pp metals	E	E		E	E			E	E
Trout									
Daphnia Magna									
Microtox									
Rhep. Abr.									

E - Ecology Laboratory Analysis
S - STP Laboratory Analysis
* - Cd, Cr, Cu, Pb, Ni, and Zn analyzed by the STP for all stations. Hg also analyzed at the Influent, Pri-Ef, and Final-Ef stations.
** - Grab composite sample. Equal volumes collected on 11/29 at 1005, on 11/29 at 1700, and on 11/30 at 0845.
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++ - sample collected after the filter press

Table 2 (Continued)

	COMPOSITE SAMPLES									SEDIMENT SAMPLES		
Station:	Influent	Influent	Pri-Ef	Final-Ef	Final-Ef	Navy-Key	Navy-Key	Navy-Ban	Navy-Ban	Sed 1	Sed 2	Sed 3
Sampler:	Eco	STP	Eco	Eco	STP	Eco	STP	Eco	STP	Eco	Eco	Eco
Date:	11/29-30	11/29-30	11/29-30	11/29-30	11/29-30	11/30	11/29-30	11/30	11/29-30	11/28	11/28	11/28
Time:	0930-0930	0930-0930	0930-0930	0930-0930	0930-0930	1225	1400-1230	1145-1145	1145-1145	1440-1500	1530-1540	1615-1630
Type:	Comp.	Comp.	Comp.	Comp.	Comp.	Grab ***	Comp.	Comp.	Comp.	2 grabs	2 grabs	2 grabs
Lab Log #:	498247	498248	498249	498250	498251	498238		498253		498244	498245	498246
------Field Analyses-----												
pH	E		E	E				E				
Conductivity	E		E	E				E				
Temperature	E		E	E				E				
Chlorine Residual												
Free												
Total												
---Laboratory Analyses---												
Turbidity	E	E	E	E	E	E		E				
Conductivity	E	E	E	E	E	E		E				
Alkalinity	E	E	E	E	E	E		E				
Hardness	E	E	E	E	E	E		E				
NH3-N	E S	E S	E S	E S	E S	E		E				
NO3+NO2-N	E	E	E	E	E	E		E				
Total-P	E	E	E	E	E	E		E				
TS	E	E	E	E	E	E		E				
TNVS	E	E	E	E	E	E		E				
TSS	E S	E S	E S	E S	E S	E	S	E	S			
TNVSS	E	E	E	E	E	E		E				
COD	E	E	E	E	E	E		E				
BOD5	E S	E S	E S	E S	E S	E	S	E	S			
Inhib. BOD5	E	E	E	E S	E S	E		E				
Fecal Coliform												
TOC												
% Solids										E	E	E
Grain Size										E	E	E
Cyanide	E		E	E		E		E		E	E	E
VOA												
BNA	E		E	E		E		E		E	E	E
Pest/PCB	E		E	E		E		E		E	E	E
pp metals	E S *		E S *	E S *		E	S *	E	S *	E	E	E
Trout				E **								
Daphnia Magna				E **								
Microtox				E **								
Rhep. Abr.										E	E	E
										E	E	E

E - Ecology Laboratory Analysis
S - STP Laboratory Analysis
* - Cd, Cr, Cu, Pb, Ni, and Zn analyzed by the STP for all stations. Hg also analyzed at the Influent, Pri-Ef, and Final-Ef stations.
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++ - sample collected after the filter press

Table 3 - Ecology Analytical Methods - Central Kitsap, November 1988.

	Method Used for Ecology Analysis (Ecology, 1988&89)	Laboratory Performing Analysis
---Laboratory Analyses---		
Turbidity	EPA #180.1	Ecology
Conductivity	EPA #120.1	Ecology
Alkalinity	EPA #310.1	Ecology
Hardness	EPA #130.2	Ecology
NH_3-N	EPA #350.1	Ecology
NO_3+NO_2-N	EPA #353.1	Ecology
Total-P	EPA #365.1	Ecology
TS	EPA #160.3	Ecology
TNVS	EPA #160	Ecology
TSS	EPA #160.2	Ecology
TNVSS	EPA #160	Ecology
COD	EPA #410.1	Ecology
BOD_5	EPA #405.1	Ecology
Inhib. BOD_5	EPA #405	Ecology
Fecal Coliform	APHA ,1985: #909C	Ecology
TOC	Tetra Tech, 1986	Laucks
% Solids	EPA #160.3	Laucks
Grain Size	Tetra Tech, 1986	Laucks
Cyanide	EPA #335.3	Ecology
VOA (water)	EPA #624	ARI
VOA (sediment)	EPA #8240	ARI
BNA (water)	EPA #625	ARI
BNA (sediment)	EPA #8270	ARI
Pest/PCB (water)	EPA #608	ARI
Pest/PCB (sediment)	EPA #8080	ARI
pp metals	EPA #200	Ecology
Trout	Ecology, 1981	Biomed
Daphnia Magna	EPA, 1987	Ecology
Microtox (water)	Beckman, 1982	Ecology
Microtox (sediment)	Tetra Tech, 1986	Ecology
Rhep. Abr.	Tetra Tech, 1986	Ecology
---Field Analyses--------		
pH	APHA, 1985: #423	
Conductivity	APHA, 1985: #205	
Temperature	APHA, 1985: #212	
Chlorine Residual	APHA, 1985: #408E	

ARI - Analytical Resources Inc.
Biomed - Biomed Research Laboratories, Inc.
Laucks - Laucks Testing Laboratories, Inc.

Table 4 - Ecology General Chemistry Results - Central Kitsap, November 1988.

ECOLOGY GRAB SAMPLES

Station:	Influent	Influent	Influent	Pri-Ef	Pri-Ef	Pri-Ef	Final-Ef	Final-Ef	Final-Ef	Final-Ef	Navy-Key	Navy-Key	Navy-Ban	Navy-Ban	Navy-Ban	AS	AS	Blank
Date:	11/29	11/29	11/30	11/29	11/29	11/30	11/29	11/29	11/30	11/30	11/29	11/30	11/29	11/29	11/30	11/29	11/30	11/29
Time:	1020	1615	0925	1010	1635	0950	1005	1700	0845	1315	1400	1225	1130	1515	1135	1645	0955	0900
Type:	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	
Lab Log #:		498230	498231		498232	498233		498234	498235	498236	498237	498238		498239	498240	498241	498242	498254
--Field Analyses-------																		
pH (S.U.)	6.8	6.7	6.8	6.9	6.8	6.9	7.1	6.9	7.2		7.6	8.6	7.0	6.8	7.0			
Conductivity (umhos/cm)	658	930	960	1240	1110	880	760	780	320		520	920	1142	2300	1750			
Temperature (C)	14.4	14.9	14.0	15.2		12.8	13.0	14.0	12.8		16.7	13.6	15.0	15.6	15.8			
Chlorine Residual																		
Free (mg/L)							0.1		0.1									
Total (mg/L)							0.8		0.6									
--Laboratory Analyses--																		
Conductivity (umhos/cm)		1080	1340		1300	1070		920	930		1580	1000		2550	1830			
TSS (mg/L)		96	160		54	68		23	4		160	130		130	100	1800	2000	
TNVSS (mg/L)																160	400	
COD (mg/L)		360	580		390	320		59	40		360	430		540	680			
Fecal Coliform (#/100mL)									6	11								
Cyanide (ug/L)											14	12		66	56			

COMPOSITE SAMPLES

Station:	Influent	Influent	Pri-Ef	Final-Ef	Final-Ef	Navy-Key	Navy-Ban
Sampler:	Eco	STP	Eco	Eco	STP	Eco	Eco
Date:	11/29-30	11/29-30	11/29-30	11/29-30	11/29-30	11/30	11/29-30
Time:	0930-0930	0930-0930	0930-0930	0930-0930	0930-0930	1225	1145-1145
Type:	Comp.	Comp.	Comp.	Comp.	Comp.	Grab ***	Comp.
Lab Log #:	498247	498248	498249	498250	498251	498238	498253
----Field Analyses-------							
pH (S.U.)	7.1		7.0	7.3			7.0
Conductivity (umhos/cm)	760		880	750			1710
Temperature (C)	2.4		4.4	2.1			3.6
----Laboratory Analyses--							
Turbidity (NTU)	28	53	31	3	12	30	48
Conductivity (umhos/cm)	1000	980	1060	930	920	2380	1790
Alkalinity (mg/L as CaCO3)	210	180	210	160	140	210	150
Hardness (mg/L as CaCO3)	120	110	110	110	110	190	170
NH3-N (mg/L)	25	23	34	22	19	43	21
NO3+NO2-N (mg/L)	0.09	0.01	0.06	1.4	2.9	1.2	0.05
Total-P (mg/L)	6.6	7.2	6.7	6.7	7.3	7.7	7.0
TS (mg/L)	730	730	650	510	520	1390	1200
TNVS (mg/L)	420	380	400	400	400	1100	760
TSS (mg/L)	160	200	72	34	39	93	140
TNVSS (mg/L)	18	32	14	20	14	33	19
COD (mg/L)	510	450	340	81	95	360	460
BOD5 (mg/L)	200	180	160	60 P	58 P	140	180
Inhib. BOD5 (mg/L)	170	180	140	14	10	110	160
Cyanide (ug/L)	8		10	14			50

*** - The composite sampler failed so a grab sample had to be collected. Field lab log numbers 498238 and 498252 are both grab samples collected at approximately the same time. All data are reported as lab log number 498238.

P - greater than

Table 5 - Comparison of Inspection Results with NPDES Permit Limits - Central Kitsap, November 1988.

Parameter	NPDES Permit Limits Monthly Average	NPDES Permit Limits Weekly Average	NPDES Permit Capacity (average for max month)	Inspection Data * Ecology Composite	Inspection Data * STP Composite	Inspection Data * Grab Samples
Influent BOD_5						
(mg/L)				200	180	
(lbs/D)			10700	3836	3453	
Effluent BOD_5						
(mg/L)	30	45		68	67	
(lbs/D)	1200	1800		1304	1285	
(% removal)	85			66	63	
Influent TSS						
(mg/L)				160	200	
(lbs/D)			13400	3069	3836	
Effluent TSS						
(mg/L)	30	45		34	39	
(lbs/D)	1200	1800		652	748	
(% removal)	85			79	81	
Fecal coliform (#/100 mL)	200	400				6; 11
pH (S.U.)	not outside range of 6.0 - 9.0					7.1; 6.9; 7.2
Flow (MGD)			4.8	2.3	2.3	
Chlorine Residual (mg/L)	0.25 maximum					0.8; 0.6

* Ecology analytical results except for effluent BOD5 which are Central Kitsap analytical results.

Table 6 - Flow Measurements - Central Kitsap, November 1988.

BANGOR - 12" Parshall flume

Date			Totalizer	Instantaneous Flow (MGD)		Flow for time increment
Month	Day	Time	reading	Meter	Ecology	(MGD)
11	29	1150	350142	0.40	0.69	2.23
11	30	1115	371947	1.7	0.69	

Meter appeared inaccurate:
Average inspection flow unknown

KEYPORT - 3" Parshall flume

Date			Totalizer	Instantaneous Flow (MGD)		Flow for time increment
Month	Day	Time	reading	Meter	Ecology	(MGD)
11	29	1400	7090954	0.22	0.17	0.33
11	30	1205	7393151	0.19	0.12	

Meter appeared to be approximately 30% too high:
Estimated average inspection flow rate - 0.23 MGD

CENTRAL KITSAP - two 18" Parshall flumes

Date				Instantaneous Flow (MGD)	
Month	Day	Time	Flume	Meter	Ecology
11	30	1030	East	1.35	1.34
			West	1.68	1.68

Average inspection flow (from plant meter) = 2.3 MGD

Table 7 - Priority Pollutants Detected in Water and Sludge Samples - Central Kitsap, November,1988.

Station:	Field Blank	Navy-Key	Navy-Key	Navy-Ban	Navy-Ban	Influent	Influent	Pri-Ef	Pri-Ef	Final-Ef	Final-Ef	Freshwater Toxicity Criteria (EPA, 1986)		Sludge
Date:	11/29	11/29	11/30	11/29	11/30	11/29	11/30	11/29	11/30	11/29	11/30			11/29
Time:	0900	1400	1225	1515	1135	1615	0925	1635	0950	1700	0845			1040
Lab Log #:	498254	498237	498238	498239	498240	498230	498231	498232	498233	498234	498235	Acute	Chronic	498243
--VOA Compounds (ug/L)--														(ug/Kg dry wt)
Chloromethane	2.9 U	-	-	-	-	-	2.3 M	-	5.0	6.7	-			300
Methylene Chloride	2.8 B	11 B	5.2 B	1.1 B	1.5 B	2.4 B	3.1 B	4.5 B	5.1 B	3.2 B	1.0 B			591
Acetone	14 B	130 B	140 B	51 B	34 B	110 B	110 B	92 B	100 B	27 B	-			3200
Carbon Disulfide	2.0 U	-	-	-	-	4.9	7.8	3.3	3.8	-	-			-
Cis-1,2-Dichloroethene	1.2 U	-	-	-	-	1.1 J	0.7 J	0.6 J	0.5 J	-	-	11600+		56+++
Chloroform	0.9 U	20	8.5	11	9.2	6.8	6.8	6.9	5.8	2.8	2.9	28900*	1240*	-
2-Butanone	1.0 U	-	-	-	-	4.6	5.2	-	-	-	-			-
1,2-Dichloroethane	0.6 U	-	-	2.4	2.6	0.7 M	0.7 M	-	-	-	-	118000*	20000*	-
1,1,1-Trichloroethane	1.0 U	2.1	1.1	1.3	2.2	0.9 M	1.2 M	0.9 J	1.5	-	-			-
Bromodichloromethane	0.2 U	0.4	0.6	11	3.7	2.1	0.4	0.7	0.5	0.4	0.5			-
Trichloroethene	0.8 U	5.0	4.5	-	-	3.3	2.1	2.0	1.7	-	-	45000*	21900*	-
Benzene	0.4 U	-	-	55	70	21	16	10	9.7	0.6 M	-	5300*		37
Dibromochloromethane	0.9 U	-	-	3.2	0.7 J	0.8 J	-	-	-	-	-			-
Tetrachloroethene	0.6 U	0.7	-	-	0.4 J	24	69	50	130	9.5	15	5280*	840*	-
Toluene	0.8 B	4.5 B	1.9 B	130 B	170 B	52 B	47 B	37 B	32 B	5.2 B	3.5 B	17500*		3700
Chlorobenzene	0.6 U	-	-	-	-	-	-	0.9	-	-	-	250***	50***	2200
Ethylbenzene	1.0 U	-	-	12	17	4.3	4.3	2.7	-	-	-	32000*		280
Total Xylenes	1.5 U	3.7	3.7	120	170	41	41	27	26	1.0 M	-			2100
Cyanide (ug/L)		14	12	66	56							22	5.2	

\+ - LOEL for total dichloroethenes
++ - criteria for total dichlorobenzenes
+++ - total 1,2-Dichloroethene
* - Insufficient data to develop criteria. Value presented is the LOEL - Lowest Observed Effect Level.
** - penta(tri) - penta concentrations are LOEL
*** - LOEL for chlorinated benzenes
+* - Benzo(b+k)Fluoranthene
*+ - hex(tri) - tri concentrations based on hardness
*++ - criteria calculation based on hardness
B - This flag is used when the analyte is found in the blank as well as the sample. Indicates possible/probable blank contamination
F - analytical difficulty; may not be accurate
J - indicates an estimated value when result is less than specified detection limit
M - indicates an estimated value of analyte found and confirmed by analyst but with low spectral match parameters
U - indicates compound was analyzed for but not detected at the given detection limit

Table 7 (continued)

Station:	Field Blank	Navy-Key	Nav-Key	Nav-Ban	Nav-Ban	Nav-Ban	Influent	Pri-Ef	Final-Ef	Freshwater Toxicity Criteria (EPA, 1986)		Sludge
Date:	11/29	11/29	11/30	11/29-30	11/29	11/30	11/29-30	11/29-30	11/29-30			11/29
Time:	0900	1400	1225	1145-1145	1515	1135	0930-0930	0930-0930	0930-0930	----------		1040
Lab Log #:	498254	498237	498238	498253	498239	498240	498247	498249	498250	Acute	Chronic	498243
Cyanide (ug/L)				50			8	10	14	22	5.2	
--BNA Compounds (ug/L)--												(ug/Kg dry wt)
Phenol	1 U		5	7			11	11	1 M	10200*	2560*	2100 M
1,4-Dichlorobenzene	1 U		6	-			3	2	-	1120*++	763*++	1100 M
Benzyl Alcohol	5 U		1 M	10 J			41	33	-			-
2-Methylphenol	1 U		-	3			1 M	1 M	-			-
4-Methylphenol	1 U		41	22			51	58 M	-			1500 M
2,4-Dimethylphenol	2 U		-	-			-	1 M	-	2120*		-
Benzoic Acid	10 U		76	-			-	15	-			-
4-Chloroaniline	3 U		-	-			5	3	-			-
2-Methylnaphthalene	1 U		5	5			4	2	-			6300
Low Molecular Weight Polynuclear Aromatic Hydrocarbons (LPAH)												
Naphthalene	1 U		2	8			4	3	-	2300*	620*	7000
Acenaphthene	1 U		-	-			-	-	-			2000
Fluorene	1 U		2	1 J			-	-	-			1500
Phenanthrene	1 U		4	2			1	-	-			5700
Anthracene	1 U		-	-			-	-	-			510 M
High Molecular Weight Polynuclear Aromatic Hydrocarbons (HPAH)												
Fluoranthene	1 U		-	2			-	-	-	3980*		-
Pyrene	1 U		-	1			-	-	-			-
Benzo(a)Anthracene	1 U		-	1 J			-	-	-			-
Chrysene	1 U		-	1 J			-	-	-			-
Benzo(b)Fluoranthene	1 U		-				-	-	-			-
Benzo(k)Fluoranthene	1 U		-	2 M+*			-	-	-			-
Benzo(a)Pyrene	1 U		-	1 J			-	-	-			-
Phthalate Esters												
Diethyl Phthalate	1 U		1	5			8	6	-			-
Di-n-Butyl Phthalate	1 U		34	17			13	-	-			-
Butylbenzylpthalate	1 U		2	7			5	3	-			1600
Bis(2-Ethylhexyl)phthalate	2 B		9 B	12 B			23 B	17 B	2 B			75000
Di-n-Octyl Phthalate	1 U		-	1			3	2	-			3900
Phthlate Esters (total)	6 U		47	42			52	38	-	940*	3*	
--Pest/PCB Compounds (ug/L)--												
gamma-BHC (Lindane)	0.05 U		-	-			0.10	0.07	0.04 J			-
--Priority pollutant metals (total metal analysis - ug/L)--												(mg/Kg dry wt)
Arsenic	1.0 U	1.3	1.0	7.0	1.8	3.7	2.8	3.1	3.1	850(360)**	48(190)**	10.6
Beryllium	1.0 U	-	-	-	-	-	-	-	-			0.26
Cadmium	5.0 U	15	26	-	-	-	-	-	-	4.4*++	1.2*++	-
Chromium	10 U	-	58	-	-	-	-	-	-	16(1900)*+	11(220)*+	45.6
Copper	2.0 U	70	56.2	124	124	120	52.7	47.9	16	19*++	13*++	637
Lead	3 U	14	8.7	15	7.1	11	11	8.2	-	92*++	3.6*++	140
Mercury	0.094	0.097 B	0.117 B	0.198 B	0.133 B	0.149 B	0.867 B	0.869 B	0.083 B	2.4	0.012	7.1 J
Nickel	10 U	-	12	15	32	24	11	11	-	1500*++	170*++	38.4
Selenium	2.0 U	-	-	-	-	-	-	-	-			7.68
Silver	0.3 U	2.1	24.9	4.8	6.1	4.3	15.6	11.4	3.1	4.8*++	0.12	74.3
Zinc	4.0 U	304	207	158	161	158	121	107	55	130*++	110*++	16.3 F
Total solids (%)												26.9
Grain size (% dry basis)												
Sand												14.1
Silt												<0.5
Clay												85.9
TOC (% dry basis)												30

Table 8 - Central Kitsap Sludge Metals Comparison - Central Kitsap, November 1988.

Metal	STP** sample (mg/kg dry wt)	Data from previous inspections* Range (mg/kg dry wt)	Geometric mean (mg/kg dry wt)	Number of samples
Cadmium	<5.9	<0.1 - 25	7.6	34
Chromium	45.6	15 - 300	62	34
Copper	637	75 - 1700	398	34
Lead	140	34 - 600	207	34
Nickel	38.4	<0.1 - 62	26	29
Zinc	16.3F	165 - 3370	1200	33

* Summary of data for digested activated sludge plant samples collected during previous Class II inspections in the state (Hallinan, 1988).

** percent solids = 26.9%

F - analytical difficulty; may not be accurate

Table 9 - Effluent Bioassay Results - Central Kitsap, November 1988

Daphnia (Daphnia magna)

Sample	Statistical Analysis	Data: Concentration (percent)	# Tested	# Surviving	Ave. # Young per Adult**
Control		-	10	10	1.7
STP Effluent	Acute Test (Mortality)	1	10	10	0.9
	NOEC - 100%	3	10	10	0.5
	LC50 - >100%	10	10	10	1.2
	Chronic Test (Reproduction)	30	10	10	0.3
	**	100	10	9	4.5

** Use of the reproduction data is not recommended (Stinson, 1989). Poor reproduction was observed in all tests including the control. Shortly after the test the stock culture was lost. Upon checking with other labs, loss of stock cultures during that time period was common leading to the suspicion that a seasonal problem was occurring.

Microtox

Sample	EC50 (percent solution) * 5 min.	15 min.	30 min.
STP Effluent **	35.2	25.7	24.5

* - calculated using Microbics "Microtox Calculation Program for the IBM-PC"
** - EC50s indicate need for further toxicity evaluation is a moderate priority (EPA, 1980)

Rainbow Trout (Oncorhynchus mykiss)

Sample	# Tested	# Survived	Percent Mortality	Percent Survival
Control	45	45	0	100
100% STP Effluent	30	22	27	73

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 10 - Priority Pollutants Detected in Sediments - Central Kitsap, November 1988.

Station:	Sed-1		Sed-2		Background		Draft **
Date:	11/28		11/28		11/28		Interim
Time:	1440-1500		1530-1540		1615-1630		Sediment
Lab Log #:	498244		498245		498246		Criteria
Number of grabs	2		2		2		
Sample depth (ft)	52-51		51-52		45-47		
Latitude (deg-min-sec)	47-40-35		47-40-35		47-39-54		
Longitude (deg-min-sec)	122-36-04		122-36-06		122-36-25		
Total solids (%)	35.2		35.2		33.9		
Grain size (% dry basis)							
Sand	7.7		7.8		10.5		
Silt	69.2		71.7		66.4		
Clay	23.1		20.5		23.1		
TOC (% dry basis)	2.1		1.8		2.1		
		(mg/Kg TOC)*+		(mg/Kg TOC)*+		(mg/Kg TOC)*+	
-------- VOA Compounds (ug/Kg dry wt) --------							
Methylene Chloride	5.6 J		9.9 U		10 U		
Toluene	2.3		2.0 U		2.1 U		
Ethylbenzene	2.1		2.0 U		2.1 U		
-------- BNA Compounds (ug/Kg dry wt) --------							
Low Molecular Weight Polynuclear Aromatic Hydrocarbons (LPAH)							
Phenanthrene	20 J	1.0 J	17 J	0.9 J	56 J	2.7 J	100 *
LPAH (total)		1.0 J		0.9 J		2.7 J	370 *
High Molecular Weight Polynuclear Aromatic Hydrocarbons (HPAH)							
Fluoranthene	45	2.1	45	2.5	150 U	7.1 U	160 *
Pyrene	45	2.1	43	2.4	97	4.6	1000 *
Benzo(a)Anthracene	21 J	1.0 J	20 J	1.1 J	46 M	2.2 M	110 *
Chrysene	27	1.3	25 J	1.4 J	70 J	3.3 J	110 *
Benzo(b+k)Fluoranthene	46	2.2	43	2.4	120	5.7	230 *
Benzo(a)Pyrene	24 J	1.1 J	22 J	1.2 J	67	3.2	99 *
Indeno(1,2,3-cd)Pyrene	31	1.5	26	1.4	53 M	2.5 M	33 *
Benzo(g,h,i)Perylene	26 U	1.2 U	19 M	1.1 M	42 M	2.0 M	31 *
HPAH (total)		12.6		13.5		30.7	960 *
Phthalate Esters							
Di-n-Butyl Phthalate	26 U	1.2 U	26 U	1.4 U	46 M	2.2 M	220 *
Bis(2-Ethylhexyl)phthalate	35	1.7	85	4.7	120	5.7	4.9 *
-------- Pest/PCB Compounds (ug/Kg dry wt) --------							
Aroclor-1254	25	1.2	23	1.3	25 UJ	1.2 UJ	12 *++
-------- Priority pollutant metals (mg/Kg dry wt) --------							
Arsenic	9.31		9.72		8.78		57
Beryllium	0.58		0.55		0.65		
Chromium	79.4		59.6		48.2		260
Copper	44.9		44.7		44.4		390
Lead	34		34		34.9		450
Mercury	0.24		0.27		0.29		0.4
Nickel	48.9		42.0		39.8		
Selenium	0.67		0.61		0.56		
Silver	0.52		0.51		0.37		6.1
Thallium	0.27		0.10 U		0.13		
Zinc	102 F		102 F		105 F		410

B - This flag is used when the analyte is found in the blank as well as the sample. Indicates possible/probable blank contamination.
F - Analytical difficulty; may not be accurate.
J - Indicates an estimated value when result is less than specified detection limit.
M - Indicates an estimated value of analyte found and confirmed by analyst but with low spectral match parameters.
U - Indicates compound was analyzed for but not detected at the given detection limit.
UJ - Compound was analyzed for but not detected. The number is the estimated minimum detection limit.
* - Sediment criteria normalized to TOC (mg/Kg TOC).
** - Draft Interim Sediment Quality Chemical Criteria (Ecology, 1989a) Criteria are in the same units as the compound or element unless otherwise noted.
*+ - Data converted to mg/KG TOC for comparison to sediment criteria.
++ - Criteria for total PCBs.

Table 11 - Sediment Bioassay Results - Central Kitsap, November 1988

Amphipod - (Rhepoxynius abronius)

Station	% survival *
Control	98%
Sediment 1	94%
Sediment 2	89%
Background	94%

* average of 5 replicates of 20 organisms each.

Microtox

Station	EC50 *
Sediment 1	> 100%
Sediment 2	> 100%
Background	> 100%

* EC50 - effect concentration for 50% of the organisms

Table 12 - Comparison of Ecology and STP Laboratory Results - Central Kitsap, November 1988.

Station:	Influent	Influent	Influent	Influent	Pri-Ef	Pri-Ef	Final-Ef	Final-Ef	Final-Ef	Final-Ef	Final-Ef	Final-Ef	Final-Ef	Final-Ef	Navy-Ban	Navy-Ban	Navy-Key	Navy-Key
Lab Log #:	498247		498248		498249		498250		498251		498235		**	**	498253		498238	
Type:	Comp.	Comp.	Comp.	Comp.	Comp.	Comp.	Comp.	Comp.	Comp.	Comp.	Grab	Grab	Grab	Grab	Comp.	Comp.	Grab	Comp.
Sampler:	Eco	Eco	STP	STP	Eco	Eco	Eco	Eco	STP	STP	Eco	Eco	Eco	STP	Eco	STP	Eco	STP
Lab:	Eco	STP	Eco	STP	Eco	STP	Eco	STP	Eco	STP	Eco	STP	Eco	STP	Eco	STP	Eco	STP
NH_3-N (mg/L)	25	21.2	23	19.9	34	32.7	22	18.3	19	15.3								
TSS (mg/L)	160	156	200	176	72	60	34	26	39	14					140	296	93	152
BOD_5 (mg/L)	200	265	180	218	160	164	60 P	68	58 P	67					180	140	140	164
Inhib. BOD_5 (mg/L)							14	14	10	14								
F. Coli. (#/100mL)											6	36						
Cadmium (ug/L)	5 U	5 U			5 U	5 U	5 U	5 U							5 U	5 U	26	17
Chromium (ug/L)	10 U	25 U			10 U	25 U	10 U	25 U							10 U	25 U	58	25 U
Copper (ug/L)	53	48			48	45	16	21							124	164	56	59
Lead (ug/L)	11	50 U			8	50 U	3 U	50 U							15	50 U	9	50 U
Nickel (ug/L)	11	25 U			11	25 U	10 U	25 U							15	25 U	12	25 U
Zinc (ug/L)	121	168			107	69	55	63							158	294	207	179
Mercury (ug/L)	0.867B	0.64			0.869B	0.64	0.083B	0.29										
Cl_2 Residual (mg/L)																		
Colorimetric													0.8	0.6				
Amperometric														0.06				

U - Indicates compound was analyzed for but not detected at the given detection limit.
B - This flag is used when the analyte is found in the blank as well as the sample. Indicates possible/probable blank contamination.
P - Greater than.
** - Both samples collected 11/29 - AM.

APPENDICES

Appendix A - Results of VOA, BNA, Pest/PCB and metal priority pollutant scans of sediment samples and sludge - Central Kitsap, November 1988.

Station:	Sed-1	Sed-2	Background	Sludge	Method Blank
Date:	11/28	11/28	11/28	11/29	
Time:	1440-1500	1530-1540	1615-1630	1040	
Lab Log #:	498244	498245	498246	498243	
Number of grabs	2	2	2		
Sample depth (ft)	52-51	51-52	45-47		
Latitude (deg-min-sec)	47-40-35	47-40-35	47-39-54		
Longitude (deg-min-sec)	122-36-04	122-36-06	122-36-25		
Total solids (%)	35.2	35.2	33.9	26.9	
Grain size (% dry basis)					
Sand	7.7	7.8	10.5	14.1	
Silt	69.2	71.7	66.4	<0.5	
Clay	23.1	20.5	23.1	85.9	
TOC (% dry basis)	2.1	1.8	2.1	30	
-------- VOA Compounds (ug/Kg dry wt) --------					
Chloromethane	10 U	9.7 U	10 U	300	3.8 U
Bromomethane	8.0 U	7.9 U	8.2 U	48 U	3.1 U
Vinyl Chloride	5.2 U	5.1 U	5.3 U	31 U	2.0 U
Chloroethane	8.5 U	8.4 U	8.8 U	52 U	3.3 U
Methylene Chloride	5.6 J	9.9 U	10 U	591	3.9 U
Acetone	18 U	18 U	18 U	3200	6.9 U
Carbon Disulfide	3.1 U	3.1 U	3.2 U	19 U	1.2 U
1,1-Dichloroethene	1.8 U	1.8 U	1.9 U	11 U	0.7 U
1,1-Dichloroethane	1.6 U	1.5 U	1.6 U	9.4 U	0.6 U
1,2-Dichloroethene (total)	2.1 U	2.0 U	2.1 U	56	0.8 U
Chloroform	2.8 U	2.8 U	2.9 U	17 U	1.1 U
2-Butanone	16 U	16 U	17 U	97 U	6.2 U
1,2-Dichloroethane	1.3 U	1.3 U	1.3 U	7.8 U	0.5 U
1,1,1-Trichloroethane	1.6 U	1.5 U	1.6 U	9.4 U	0.6 U
Carbon Tetrachloride	2.3 U	2.3 U	2.4 U	14 U	0.9 U
Vinyl Acetate	8.0 U	7.9 U	8.2 U	48 U	3.1 U
Bromodichloromethane	0.8 U	0.8 U	0.8 U	4.7 U	0.3 U
1,2-Dichloropropane	1.8 U	1.8 U	1.9 U	11 U	0.7 U
Trichloroethene	1.6 U	1.5 U	1.6 U	9.4 U	0.6 U
Benzene	2.6 U	2.6 U	2.7 U	37	1.0 U
Dibromochloromethane	1.8 U	1.8 U	1.9 U	11 U	0.7 U
1,1,2-Trichloroethane	1.8 U	1.8 U	1.9 U	11 U	0.7 U
Bromoform	6.5 U	6.4 U	6.6 U	39 U	2.5 U
4-Methyl-2-Pentanone	9.1 U	8.9 U	9.3 U	55 U	3.5 U
2-Hexanone	8.3 U	8.2 U	8.5 U	50 U	3.2 U
1,1,2,2-Tetrachloroethane	7.0 U	6.9 U	7.2 U	42 U	2.7 U
Tetrachloroethene	1.3 U	1.3 U	1.3 U	7.8 U	0.5 U
Toluene	2.3	2.0 U	2.1 U	3700	0.8 U
Chlorobenzene	2.3 U	2.3 U	2.4 U	2200	0.9 U
trans-1,3-Dichloropropene	4.9 U	4.8 U	5.1 U	30 U	1.9 U
Ethylbenzene	2.1	2.0 U	2.1 U	280	0.8 U
cis-1,3-Dichloropropene	4.7 U	4.6 U	4.8 U	28 U	1.8 U
Styrene	2.8 U	2.8 U	2.9 U	17 U	1.1 U
Total Xylenes	4.7 U	4.6 U	4.8 U	2100	1.8 U
2-Chloroethylvinylether	7.0 U	6.9 U	7.2 U	42 U	2.7 U

Appendix A (Continued)

Station:	Sed-1	Sed-2	Background	Sludge	Method Blank
Date:	11/28	11/28	11/28	11/29	
Time:	1440-1500	1530-1540	1615-1630	1040	
Lab Log #:	498244	498245	498246	498243	
-------- BNA Compounds (ug/Kg dry wt) --------					
Phenol	26 U	26 U	39 U	2100 M	17 U
Aniline					
Bis(2-Chloroethyl)Ether	26 U	26 U	39 U	820 U	17 U
2-Chlorophenol	26 U	26 U	39 U	820 U	17 U
1,3-Dichlorobenzene	26 U	26 U	39 U	820 U	17 U
1,4-Dichlorobenzene	26 U	26 U	39 U	1100 M	17 U
Benzyl Alcohol	130 U	130 U	200 U	4100 U	80 U
1,2-Dichlorobenzene	26 U	26 U	39 U	820 U	17 U
2-Methylphenol	26 U	26 U	39 U	820 U	17 U
Bis(2-chloroisopropyl)ether	26 U	26 U	39 U	820 U	17 U
4-Methylphenol	26 U	26 U	39 U	1500 M	17 U
N-Nitroso-Di-n-Propylamine	26 U	26 U	39 U	820 U	17 U
Hexachloroethane	50 U	50 U	80 U	1600 U	30 U
Nitrobenzene	26 U	26 U	39 U	820 U	17 U
Isophorone	26 U	26 U	39 U	820 U	17 U
2-Nitrophenol	130 U	130 U	200 U	4100 U	80 U
2,4-Dimethylphenol	50 U	50 U	80 U	1600 U	30 U
Benzoic Acid	260 U	260 U	390 U	8200 U	170 U
Bis(2-Chloroethoxy)Methane	26 U	26 U	39 U	820 U	17 U
2,4-Dichlorophenol	80 U	80 U	120 U	2400 U	50 U
1,2,4-Trichlorobenzene	26 U	26 U	39 U	820 U	17 U
Naphthalene	26 U	26 U	39 U	7000	17 U
4-Chloroaniline	26 U	80 U	120 U	2400 U	50 U
Hexachlorobutadiene	50 U	50 U	80 U	1600 U	30 U
4-Chloro-3-Methylphenol	50 U	50 U	80 U	1600 U	30 U
2-Methylnaphthalene	26 U	26 U	39 U	6300	17 U
Hexachlorocyclopentadiene	130 U	130 U	200 U	4100 U	80 U
2,4,6-Trichlorophenol	130 U	130 U	200 U	4100 U	80 U
2,4,5-Trichlorophenol	130 U	130 U	200 U	4100 U	80 U
2-Chloronaphthalene	26 U	26 U	39 U	820 U	17 U
2-Nitroaniline	130 U	130 U	200 U	4100 U	80 U
Dimethyl Phthalate	26 U	26 U	39 U	820 U	17 U
Acenaphthylene	26 U	26 U	39 U	820 U	17 U
3-Nitroaniline	130 U	130 U	200 U	4100 U	80 U
Acenaphthene	26 U	26 U	39 U	2000	17 U
2,4-Dinitrophenol	260 U	260 U	390 U	8200 U	170 U
4-Nitrophenol	130 U	130 U	200 U	4100 U	80 U
Dibenzofuran	26 U	26 U	39 U	820 U	17 U
2,4-Dinitrotoluene	130 U	130 U	200 U	4100 U	80 U
2,6-Dinitrotoluene	130 U	130 U	200 U	4100 U	80 U
Diethyl Phthalate	26 U	26 U	39 U	820 U	17 U
4-Chlorophenyl-Phenylether	26 U	26 U	39 U	820 U	17 U
Fluorene	26 U	26 U	39 U	1500	17 U
4-Nitroaniline	130 U	130 U	200 U	4100 U	80 U
4,6-Dinitro-2-Methylphenol	260 U	260 U	390 U	8200 U	170 U
N-Nitrosodiphenylamine	26 U	26 U	39 U	820 U	17 U
1,2-Diphenylhydrazine					
4-Bromophenyl-Phenylether	26 U	26 U	39 U	820 U	17 U

Appendix A (Continued)

Station:	Sed-1	Sed-2	Background	Sludge	Method Blank
Date:	11/28	11/28	11/28	11/29	
Time:	1440-1500	1530-1540	1615-1630	1040	
Lab Log #:	498244	498245	498246	498243	
Hexachlorobenzene	26 U	26 U	39 U	820 U	17 U
Pentachlorophenol	130 U	130 U	200 U	4100 U	80 U
Phenanthrene	20 J	17 J	56 J	5700	17 U
Anthracene	26 U	26 U	39 U	510 M	17 U
Di-n-Butyl Phthalate	26 U	26 U	46 M	820 U	17 U
Fluoranthene	45	45	150 U	820 U	17 U
Pyrene	45	43	97	820 U	17 U
Benzidine					
Butylbenzylpthalate	26 U	26 U	39 U	1600	17 U
3,3'-Dichlorobenzidine	129 U	131 U	196 U	4100 U	80 U
Benzo(a)Anthracene	21 J	20 J	46 M	820 U	17 U
Chrysene	27	25 J	70 J	820 U	17 U
Bis(2-Ethylhexyl)phthalate	35	85	120	75000	17 U
Di-n-Octyl Phthalate	26 U	26 U	39 U	3900	17 U
Benzo(b)Fluoranthene				820 U	17 U
Benzo(k)Fluoranthene	46 *	43 *	120 *	820 U	17 U
Benzo(a)Pyrene	24 J	22 J	67	820 U	17 U
Indeno(1,2,3-cd)Pyrene	31	26	53 M	820 U	17 U
Dibenzo(a,h)Anthracene	26 U	26 U	39 U	820 U	17 U
Benzo(g,h,i)Perylene	26 U	19 M	42 M	820 U	17 U
-------- Pest/PCB Compounds (ug/Kg dry wt) --------					
alpha-BHC	0.4 U	0.4 U	0.6 U	1.2 U	0.5 U
beta-BHC	0.4 U	0.4 U	0.6 U	1.2 U	0.5 U
delta-BHC	0.4 U	0.4 U	0.6 U	1.2 U	0.5 U
gamma-BHC (Lindane)	0.4 U	0.4 U	0.6 U	1.2 U	0.5 U
Heptachlor	0.4 U	0.4 U	0.6 U	1.2 U	0.5 U
Aldrin	0.4 U	0.4 U	0.6 U	1.2 U	0.5 U
Heptachlor Epoxide	0.4 U	0.4 U	0.6 U	1.2 U	0.5 U
Endosulfan I	1.2 U	1.2 U	1.8 U	3.7 U	1.5 U
Dieldrin	0.8 U	0.8 U	1.2 U	2.5 U	1.0 U
4,4'-DDE	0.8 U	0.8 U	1.2 U	2.5 U	1.0 U
Endrin	0.8 U	0.8 U	1.2 U	2.5 U	1.0 U
Endosulfan II	0.8 U	0.8 U	1.2 U	2.5 U	1.0 U
4,4'-DDD	0.8 U	0.8 U	1.2 U	2.5 U	1.0 U
Endosulfan Sulfate	0.8 U	0.8 U	1.2 U	2.5 U	1.0 U
4,4'-DDT	0.8 U	0.8 U	1.2 U	2.5 U	1.0 U
Methoxychlor	1.5 U	1.6 U	2.3 U	4.9 U	2.0 U
Endrin Ketone	0.8 U	0.8 U	1.2 U	2.5 U	1.0 U
alpha-Chlordane	0.8 U	0.8 U	1.2 U	2.5 U	1.0 U
gamma-Chlordane	0.8 U	0.8 U	1.2 U	2.5 U	1.0 U
Toxaphene	40 U	40 U	60 U	120 U	50 U
Aroclor-1016 and 1242	8.0 U	8.0 U	12 U	24 U	10 U
Aroclor-1221					
Aroclor-1232					
Aroclor-1242					
Aroclor-1248	8.0 U	8.0 U	12 U	24 U	10 U
Aroclor-1254	25	23	25 UJ	24 U	10 U
Aroclor-1260-	8.0 U	8.0 U	12 U	24 U	10 U
Endrin Aldehyde					

Appendix A (Continued)

Station:	Sed-1	Sed-2	Background	Sludge	Method Blank
Date:	11/28	11/28	11/28	11/29	
Time:	1440-1500	1530-1540	1615-1630	1040	
Lab Log #:	498244	498245	498246	498243	
-------- Priority pollutant metals (mg/Kg dry wt) --------					
Antimony	0.60 UJ	0.60 UJ	0.60 UJ	2.7 J	
Arsenic	9.31	9.72	8.78	10.6	
Beryllium	0.58	0.55	0.65	0.26	
Cadmium	2.0 UJ	2.0 UJ	2.0 UJ	5.9 J	
Chromium	79.4	59.6	48.2	45.6	
Copper	44.9	44.7	44.4	637	
Lead	34	34	34.9	140	
Mercury	0.24	0.27	0.29	7.1 J	
Nickel	48.9	42.0	39.8	38.4	
Selenium	0.67	0.61	0.56	7.68	
Silver	0.52	0.51	0.37	74.3	
Thallium	0.27	0.10 U	0.13	0.10 U	
Zinc	102 F	102 F	105 F	16.3 F	

B - This flag is used when the analyte is found in the blank as well as the sample. Indicates possible/probable blank contamination.
F - Analytical difficulty; may not be accurate.
J - Indicates an estimated value when result is less than specified detection limit.
M - Indicates an estimated value of analyte found and confirmed by analyst but with low spectral match parameters.
U - Indicates compound was analyzed for but not detected at the given detection limit.
UJ - Compound was analyzed for but not detected. The number is the estimated minimum detection limit.
* - Benzo(b+k)Fluoranthene.

Appendix B - Results of VOA, BNA, Pest/PCB and metal priority pollutant scans of water samples - Central Kitsap, November 1988.

Station:	Influent	Influent	Pri-Ef	Pri-Ef	Final-Ef	Final-Ef	Navy-Key	Navy-Key	Navy-Ban	Navy-Ban	Field Blank
Date:	11/29	11/30	11/29	11/30	11/29	11/30	11/29	11/30	11/29	11/30	11/29
Time:	1615	0925	1635	0950	1700	0845	1400	1225	1515	1135	0900
Lab Log #:	498230	498231	498232	498233	498234	498235	498237	498238	498239	498240	498254
-------- VOA Compounds (ug/L) --------											
Chloromethane	2.9 U	2.3 M	2.9 U	5.0	6.7	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U
Bromomethane	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
Vinyl Chloride	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Chloroethane	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
Methylene Chloride	2.4 B	3.1 B	4.5 B	5.1 B	3.2 B	1.0 B	11 B	5.2 B	1.1 B	1.5 B	2.8 B
Acetone	110 B	110 B	92 B	100 B	27 B	0.6 U	130 B	140 B	51 B	34 B	14 B
Carbon Disulfide	4.9	7.8	3.3	3.8	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,1-Dichloroethene	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U
1,1-Dichloroethane	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Trans-1,2-Dichloroethene	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Cis-1,2-Dichloroethene	1.1 J	0.7 J	0.6 J	0.5 J	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Chloroform	6.8	6.8	6.9	5.8	2.8	2.9	20	8.5	11	9.2	0.9 U
2-Butanone	4.6	5.2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	0.7 M	0.7 M	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	2.4	2.6	0.6 U
1,1,1-Trichloroethane	0.9 M	1.2 M	0.9 J	1.5	1.0 U	1.0 U	2.1	1.1	1.3	2.2	1.0 U
Carbon Tetrachloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Vinyl Acetate	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
Bromodichloromethane	2.1	0.4	0.7	0.5	0.4	0.5	0.4	0.6	11	3.7	0.2 U
1,2-Dichloropropane	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
Trichloroethene	3.3	2.1	2.0	1.7	0.8 U	0.8 U	5.0	4.5	0.8 U	0.8 U	0.8 U
Benzene	21	16	10	9.7	0.6 M	0.4 U	0.4 U	0.4 U	55	70	0.4 U
Dibromochloromethane	0.8 J	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	3.2	0.7 J	0.9 U
1,1,2-Trichloroethane	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Bromoform	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
4-Methyl-2-Pentanone	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
2-Hexanone	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U
1,1,2,2-Tetrachloroethane	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
Tetrachloroethene	24	69	50	130	9.5	15	0.7	0.6 U	0.6 U	0.4 J	0.6 U
Toluene	52 B	47 B	37 B	32 B	5.2 B	3.5 B	4.5 B	1.9 B	130 B	170 B	0.8 B
Chlorobenzene	0.6 U	0.6 U	0.9	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
trans-1,3-Dichloropropene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	4.3	4.3	2.7	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	12	17	1.0 U
cis-1,3-Dichloropropene	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
Styrene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Total Xylenes	41	41	27	26	1.0 M	1.5 U	3.7	3.7	120	170	1.5 U
2-Chloroethylvinylether	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U

Cyanide (ug/L)							14	12	66	56	

Appendix B (Continued)

Station:	Influent	Pri-Ef	Final-Ef	Navy-Key	Navy-Ban	Field Blank
Date:	11/29-30	11/29-30	11/29-30	11/30	11/29-30	11/29
Time:	0930-0930	0930-0930	0930-0930	1225	1145-1145	0900
Lab Log #:	498247	498249	498250	498238	498253	498254
Hexachlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U
Pentachlorophenol	5 U	5 U	5 U	5 U	5 U	5 U
Phenanthrene	1	1 U	1 U	4	2	1 U
Anthracene	1 U	1 U	1 U	1 U	1 U	1 U
Di-n-Butyl Phthalate	13	10 U	1 U	34	17	1 U
Fluoranthene	1 U	1 U	1 U	1 U	2	1 U
Pyrene	1 U	1 U	1 U	1 U	1	1 U
Benzidine						
Butylbenzylpthalate	5	3	1 U	2	7	1 U
3,3'-Dichlorobenzidine	5 U	5 U	5 U	5 U	5 U	5 U
Benzo(a)Anthracene	1 U	1 U	1 U	1 U	1 J	1 U
Chrysene	1 U	1 U	1 U	1 U	1 J	1 U
Bis(2-Ethylhexyl)phthalate	23 B	17 B	2 B	9 B	12 B	2 B
Di-n-Octyl Phthalate	3	2	1 U	1 U	1	1 U
Benzo(b)Fluoranthene	1 U	1 U	1 U	1 U		1 U
Benzo(k)Fluoranthene	1 U	1 U	1 U	1 U	2 M**	1 U
Benzo(a)Pyrene	1 U	1 U	1 U	1 U	1 J	1 U
Indeno(1,2,3-cd)Pyrene	1 U	1 U	1 U	1 U	1 U	1 U
Dibenzo(a,h)Anthracene	1 U	1 U	1 U	1 U	1 U	1 U
Benzo(g,h,i)Perylene	1 U	1 U	1 U	1 U	1 U	1 U
--------- Pest/PCB Compounds (ug/L) --------						
alpha-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
beta-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
delta-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
gamma-BHC (Lindane)	0.10	0.07	0.04 J	0.05 U	0.05 U	0.05 U
Heptachlor	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Aldrin	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor Epoxide	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan I	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
Dieldrin	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
4,4'-DDE	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endrin	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan II	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDD	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan Sulfate	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDT	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Methoxychlor	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Endrin Ketone	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
alpha-Chlordane	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
gamma-Chlordane	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Toxaphene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Aroclor-1016 and 1242	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1221						
Aroclor-1232						
Aroclor-1242						
Aroclor-1248	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1254	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1260	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Endrin Aldehyde						

Appendix B (Continued)

Station:	Influent	Pri-Ef	Final-Ef	Navy-Key	Navy-Ban	Field Blank
Date:	11/29-30	11/29-30	11/29-30	11/30	11/29-30	11/29
Time:	0930-0930	0930-0930	0930-0930	1225	1145-1145	0900
Lab Log #:	498247	498249	498250	498238	498253	498254
Cyanide (ug/L)	8	10	14		50	
---BNA Compounds (ug/L)---						
Phenol	11	11	1 M	5	7	1 U
Aniline						
Bis(2-Chloroethyl)Ether	1 U	1 U	1 U	1 U	1 U	1 U
2-Chlorophenol	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	3	2	1 U	6	1 U	1 U
Benzyl Alcohol	41	33	5 U	1 M	10 J	5 U
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U
2-Methylphenol	1 M	1 M	1 U	1 U	3	1 U
Bis(2-chloroisopropyl)ether	1 U	1 U	1 U	1 U	1 U	1 U
4-Methylphenol	51	58 M	1 U	41	22	1 U
N-Nitroso-Di-n-Propylamine	1 U	1 U	1 U	1 U	1 U	1 U
Hexachloroethane	2 U	2 U	2 U	2 U	2 U	2 U
Nitrobenzene	1 U	1 U	1 U	1 U	1 U	1 U
Isophorone	1 U	1 U	1 U	1 U	1 U	1 U
2-Nitrophenol	5 U	5 U	5 U	5 U	5 U	5 U
2,4-Dimethylphenol	2 U	1 M	2 U	2 U	2 U	2 U
Benzoic Acid	10 U	15	10 U	76	10 U	10 U
Bis(2-Chloroethoxy)Methane	1 U	1 U	1 U	1 U	1 U	1 U
2,4-Dichlorophenol	3 U	3 U	3 U	3 U	3 U	3 U
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U
Naphthalene	4	3	1 U	2	8	1 U
4-Chloroaniline	5	3	3 U	3 U	3 U	3 U
Hexachlorobutadiene	2 U	2 U	2 U	2 U	2 U	2 U
4-Chloro-3-Methylphenol	2 U	2 U	2 U	2 U	2 U	2 U
2-Methylnaphthalene	4	2	1 U	5	5	1 U
Hexachlorocyclopentadiene	5 U	5 U	5 U	5 U	5 U	5 U
2,4,6-Trichlorophenol	5 U	5 U	5 U	5 U	5 U	5 U
2,4,5-Trichlorophenol	5 U	5 U	5 U	5 U	5 U	5 U
2-Chloronaphthalene	1 U	1 U	1 U	1 U	1 U	1 U
2-Nitroaniline	5 U	5 U	5 U	5 U	5 U	5 U
Dimethyl Phthalate	1 U	1 U	1 U	1 U	1 U	1 U
Acenaphthylene	1 U	1 U	1 U	1 U	1 U	1 U
3-Nitroaniline	5 U	5 U	5 U	5 U	5 U	5 U
Acenaphthene	1 U	1 U	1 U	1 U	1 U	1 U
2,4-Dinitrophenol	10 U	10 U	10 U	10 U	10 U	10 U
4-Nitrophenol	5 U	5 U	5 U	5 U	5 U	5 U
Dibenzofuran	1 U	1 U	1 U	1 U	1 U	1 U
2,4-Dinitrotoluene	5 U	5 U	5 U	5 U	5 U	5 U
2,6-Dinitrotoluene	5 U	5 U	5 U	5 U	5 U	5 U
Diethyl Phthalate	8	6	1 U	1	5	1 U
4-Chlorophenyl-Phenylether	1 U	1 U	1 U	1 U	1 U	1 U
Fluorene	1 U	1 U	1 U	2	1 J	1 U
4-Nitroaniline	5 U	5 U	5 U	5 U	5 U	5 U
4,6-Dinitro-2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitrosodiphenylamine	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Diphenylhydrazine						
4-Bromophenyl-Phenylether	1 U	1 U	1 U	1 U	1 U	1 U

Appendix B (Continued)

Station:	Influent	Pri-Ef	Final-Ef	Navy-Key	Nav-Key	Nav-Ban	Nav-Ban	Nav-Ban	Field Blank
Date:	11/29-30	11/29-30	11/29-30	11/29	11/30	11/29-30	11/29	11/30	11/29
Time:	0930-0930	0930-0930	0930-0930	1400	1225	1145-1145	1515	1135	0900
Lab Log #:	498247	498249	498250	498237	498238	498253	498239	498240	498254
--------- Priority pollutant metals (total metal analysis - ug/L) ---------									
Antimony	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
Arsenic	2.8	3.1	3.1	1.3	1.0	7.0	1.8	3.7	1.0 U
Beryllium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cadmium	5.0 U	5.0 U	5.0 U	15	26	5.0 U	5.0 U	5.0 U	5.0 U
Chromium	10 U	10 U	10 U	10 U	58	10 U	10 U	10 U	10 U
Copper	52.7	47.9	16	70	56.2	124	124	120	2.0 U
Lead	11	8.2	3 U	14	8.7	15	7.1	11	3 U
Mercury	0.867 B	0.869 B	0.083 B	0.097 B	0.117 B	0.198 B	0.133 B	0.149 B	0.094
Nickel	11	11	10 U	10 U	12	15	32	24	10 U
Selenium	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Silver	15.6	11.4	3.1	2.1	24.9	4.8	6.1	4.3	0.3 U
Thallium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Zinc	121	107	55	304	207	158	161	158	4.0 U

U - Indicates compound was analyzed for but not detected at the given detection limit.
J - Indicates an estimated value when result is less than specified detection limit.
B - This flag is used when the analyte is found in the blank as well as the sample. Indicates possible/probable blank contamination.
M - Indicates an estimated value of analyte found and confirmed by analyst but with low spectral match parameters.
** - Benzo(b+k)Fluoranthene