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NWS EARLE
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BIOSLURPER STATUS REPORT FOR DECEMBER 1998 THROUGH MARCH 1999 NWS
EARLE NJ
4/15/1999
FOSTER WHEELER ENVIRONMENTAL CORPORATION

CONTRACTOR DRAWINGS & INFORMATION SUBMITTAL
 NORTHNAVFACENGCOM 4335/3 (Rev. 6/80)

Prepare in quintuplicate (original and 4 copies)
 CONTROL NO. 21

CONTRACT NO. N62472-94-D-0398	DELIVERY ORDER 0017	ACTIVITY LOCATION Naval Weapons Station Earle, Colts Neck, NJ
PROJECT TITLE: BIOSLURPER		
FROM: Foster Wheeler Environmental Corp. - Program QCM: Mark Miller		DATE April 15, 1999
TO: S. LEHMAN (3 COPIES)		DATE April 15, 1999

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 FACILITIES ENGINEERING COMMAND

ITEM NO.	SUBMITTAL DESCRIPTION	PREPARED/SUBMITTED BY	APPROVED	DISAPPROVED	REMARKS
21	SD-18, Records: Biosluper Status Report for Dec. '98 through March '99	M. Miller			

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BIOSLURPER STATUS REPORT
DECEMBER 1998 THROUGH MARCH 1999
NAVAL WEAPONS STATION - EARLE
COLTS NECK, NEW JERSEY

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BIOSLURPER STATUS REPORT
DECEMBER 1998 THROUGH MARCH 1999
NAVAL WEAPONS STATION - EARLE
COLTS NECK, NEW JERSEY

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1.0 INTRODUCTION

This report summarizes the December 1998 and the first quarter results for the ongoing bioslurper operations at Site 16 at the Naval Weapons Station-Earle facility. The report summarizes the product recovered, groundwater treated, and the analytical results of the air and effluent discharges from the bioslurper systems. The operation period was from December 1, 1998 to March 31, 1999, however, the recovery numbers for the entire operational time are summarized in the report.

Bioslurper Unit #1 (located adjacent to Building C-16) recovers product from the following product extraction wells: 16MW-13, 16MW-14, 16MW-15, MW16-04, and vapor extraction wells: 16MW-22 and 16MW-23. Bioslurper Unit #2 (located north of Building C-50) extracts from 16MW-20, 16MW-16, C17/20MW-07, 16MW-17 and 16MW-19. Figure 1 depicts the locations of the extraction wells and bioslurping systems.

2.0 OPERATIONS AND DIFFICULTIES ENCOUNTERED

Appendix A provides a graphical representation of the amount of oil/groundwater extracted, and the operational hours for each Unit.

DECEMBER 1998

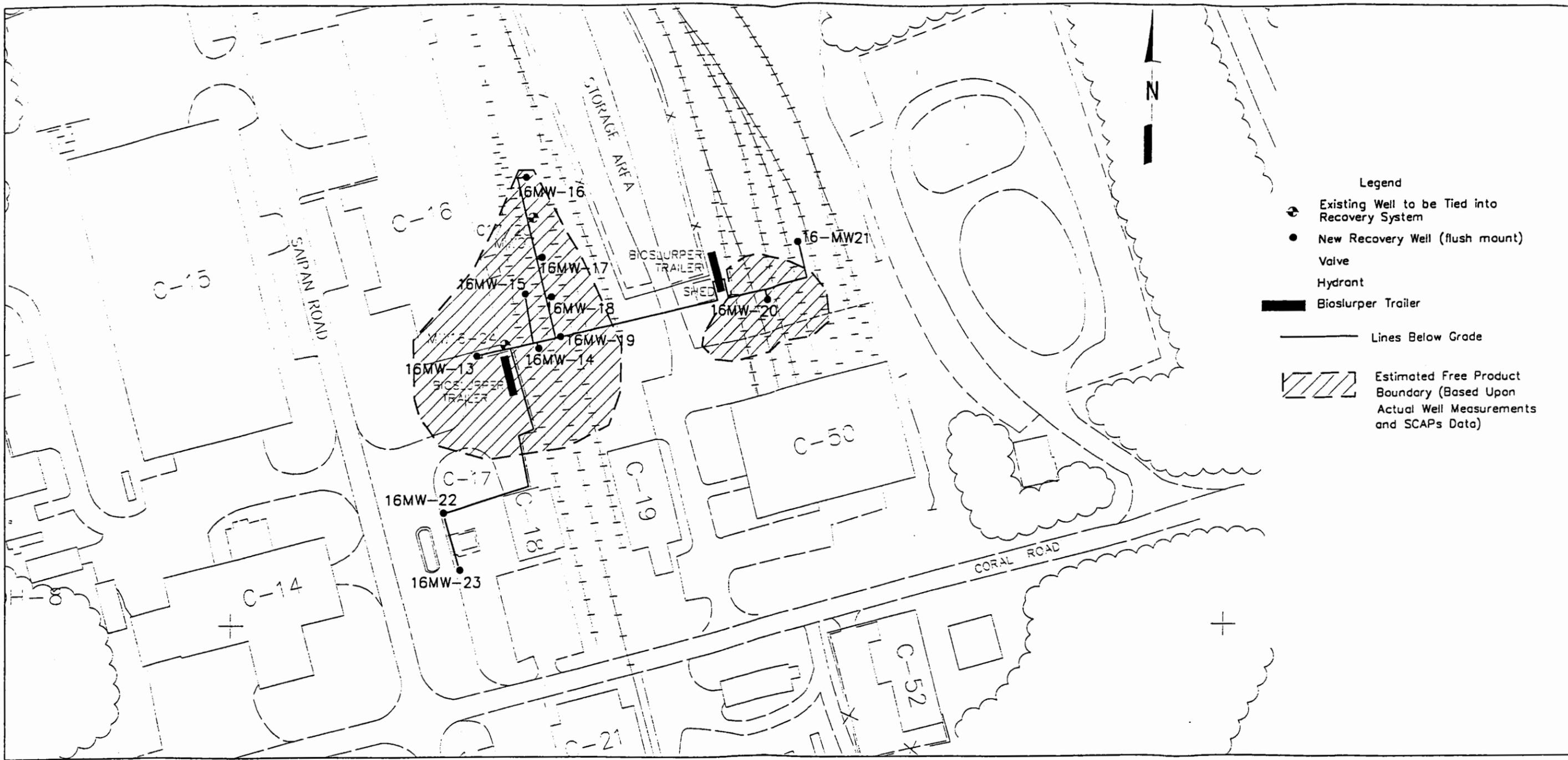
Bioslurper Unit #1 was operated for a total of 117 hours between December 1, 1998 and December 31, 1998, and Bioslurper Unit #2 was operated for a total of 32.5 hours. The total amount of groundwater extracted during this time period was 49,752 gallons, with approximately 255 gallons of free-phase oil removed.

Bioslurper Unit #1 was shut down for a total duration of one week due to O&M problems. The first problem was excessive back-pressure, which was eventually traced to a clogged diffuser in a clay groundwater treatment unit. The second problem was loss of vacuum in the liquid ring pump. Gaskets and strainers on the feed line to the liquid ring pump were replaced to correct the problem.

JANUARY 1999

Bioslurper Unit #1 was operated for a total of 93 hours between January 1, 1999 and January 31, 1999, and Bioslurper Unit #2 was operated for a total of 21 hours. The total amount of groundwater extracted during this time period was 43,921 gallons, with approximately 240 gallons of free-phase oil removed.

Bioslurper Unit #1 was down from January 1 through January 5, 1999 to fix damaged lines outside the unit due to freezing. Bioslurper Unit #2 was down from January 1 through January 12, 1999 to fix damaged lines outside the unit due to freezing. All damaged lines were replaced and re-wrapped with heat trace. Illuminated indicator lights were also connected to the heat trace and placed on the outside of the units in order to visually check to ensure the heat trace was operational.



- Legend
- Existing Well to be Tied into Recovery System
 - New Recovery Well (flush mount)
 - Valve
 - Hydrant
 - Bioslurper Trailer
 - Lines Below Grade
 - Estimated Free Product Boundary (Based Upon Actual Well Measurements and SCAPs Data)



U.S. Navy RAC
Naval Weapons Station - Earle

Recovery Well /System Layout

FOSTER WHEELER ENVIRONMENTAL CORPORATION

Figure 1 C. Tippmann

DRAWING NO.	DRAWN BY	APPROVED
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1"=100'		Issued for Construction			
SCALE	NO.	DATE	DESCRIPTION	PREP	CHECK APPROVED

SITEPLAN1

06/21/07

FEBRUARY 1999

Bioslurper Unit #1 was operated for a total of 14 hours from February 1, 1999 through February 28, 1999, and Bioslurper Unit #2 was operated for a total of 15 hours. The total amount of groundwater extracted during February was 7,072 gallons, with approximately 65 gallons of free-phase oil also removed.

Bioslurper Unit 1 was down from February 3 through February 9, 1999 to evaluate and then fix piping and replace heat exchanger associated with the liquid ring pump assembly. Iron deposits inside the piping assembly reduced the flow of seal water to the liquid ring pump causing the low level seal water alarm to activate. Upon investigation, it was discovered that the heat exchanger was clogged beyond repair. A new heat exchanger was ordered and installed. A spare heat exchanger was also purchased to decrease the down time if the problem re-occurs.

Bioslurper Unit No. 1 was down from February 15 through February 23, 1999 due to a damaged pressure transducer. There is a pressure transducer on the effluent side of the bag filter that measures pressure associated with the treatment vessels. The pressure transducer relays a signal to the control panel to shut the unit down in the event the pressure exceeds 100 psi. The pressure transducer was somehow damaged and needed to be replaced. A new pressure transducer was ordered and shipped, but the wrong unit was sent and had to be re-ordered, causing the delay in the installation.

MARCH 1999

Bioslurper Unit #1 was operated for a total of 103 hours from March 1, 1999 through March 31, 1999, and Bioslurper Unit #2 was operated for a total of 28 hours. The total amount of groundwater extracted during March was 62,790 gallons, with approximately 140 gallons of free-phase oil also removed.

The NJDEP sent back Revised Draft Air Permits for the bioslurper units, but the discharge requirements did not match what was in the Permit Application. A meeting was conducted between Greg Goepfert (NWS-Earle), John Kolicus (Northern Division), Mike Heffron and Dennis Sinauskas (FWENC), and NJDEP to discuss the air permit applications and the revisions. An agreement was met on the monitoring and discharge limits to be set, and NJDEP will re-issue the Draft Air Permits for review.

3.0 EVALUATION OF SITE CONDITIONS

Water level and product thickness measurements have been obtained periodically from the extraction wells since August 1997 to establish product thickness and groundwater elevation trends. Appendix B provides a graphical representation of the water levels and product thickness in the extraction wells. All of the product extraction wells contained measurable product, with the exception of 16MW-18 and 16MW-21. As expected, the

vapor extraction wells (16MW-22 and 16MW-23) located near the former gas station, did not contain measurable free-product.

As depicted on the graphs in Appendix C, groundwater levels have been rising since November due to seasonal changes.

The systems are being operated during working hours using the telemetry systems of the units. Bioslurper Unit #1 is being operated 7 to 9 hours a day, and Bioslurper Unit #2 is being operated 1 to 2 hours a day. As indicated on the graphs in Appendix A, increased system run times do not greatly increase the amount of free product recovered. By cycling the systems during the days and turning them off at night, the wells are allowed to recharge, and the O&M and disposal costs of the groundwater filter media are reduced.

4.0 PRODUCT RECOVERY DATA

Table 1 summarizes the amount of free-phase oil recovered from the Bioslurper Extraction Units. Appendix A provides a graphical representation of the amount of oil/groundwater extracted and the operational hours of the system. Table 2 summarizes the groundwater extracted/treated to date. Table 3 summarizes the volume of total petroleum hydrocarbons (TPH) removed via the groundwater treatment component of bioslurper systems. Table 4 summarizes the volume of TPH removed via the air extraction component of bioslurper systems.

5.0 EFFLUENT AND AIR ANALYSIS

The effluent and the air discharges from the bioslurper units are routinely sampled to ensure discharges are in compliance with the NJDEP air discharge permit and the requirements set forth by the Navy Weapons Station-Earle Sewer Treatment Plant. The air discharge is sampled for total volatile organics (including benzene) and total petroleum hydrocarbons (TPH). Appendix C summarizes the analytical results of the air discharge samples and the permit limits. Tables 4 and 5 summarize the TPH analytical results for the groundwater effluent discharge samples collected from the bioslurper treatment units. Laboratory results of the effluent samples are provided in Appendix D.

The effluent from the bioslurpers is analyzed weekly for TPH in order to ensure the discharge is within the NWS-Earle Sewer Treatment Plant's NJPDES Permit. The effluent is not sampled the week of clay and carbon change-out due to past analytical which historically demonstrates that the effluent concentration is non-detect for TPH immediately after the groundwater filter media change-out. The effluent is also occasionally sampled for a full range of organics, metals, PCBs, and pesticides to document that no elevated levels are being discharged to the sewer treatment plant. On January 15, 1999, the effluent of Unit #1 (16(A)EW-99-W90) and Unit #2 (16(B)EW-99-W79) were analyzed for volatile organic compounds (VOCs), semi-volatile organic compound (S-VOCs), PCBs/pesticides, and metals. No VOCs, S-VOCs, PCBs or pesticides were detected in the effluent samples collected in January 1999. Low levels of

some metals were detected in the effluent, but none of the analytes are above discharge criteria.

As per the NJDEP Air Permits, the air discharge from the Bioslurper Units are sampled once a month and analyzed for volatile organics. The air discharge is also analyzed for TPH to evaluate the total TPH removed via the airstream. It should be noted that the January air samples were collected on February 1, 1999.

As indicated by the analytical results, both bioslurper units are operating within the permit requirements established for air and treated water discharge. The analytical results for the air samples are provided in Appendix C. The effluent analytical results are provided in Appendix D.

Air samples taken from the recovery wells indicated that oxygenation of the wells was continuing while the system is in operation and carbon dioxide and methane levels decrease with increased oxygen levels. It should be noted that although the oxygen levels increase during the operation of the recovery wells, the levels probably decrease again once the system is shut off due to the presence of free-phase oil and anaerobic conditions. Air samples prior to, and during system operation shall be obtained in order to evaluate the oxygen, carbon dioxide, and methane concentrations in the wells.

6.0 CONCLUSIONS

The bioslurper systems are continuing to operate within the design capabilities. The product recovery numbers have decreased over the duration of the systems operations. The decrease in the volume of oil recovered is a function of the volume of oil available within the radii of influence of the recovery wells. It should be noted that while the bioslurpers are removing the available product within the radii of influence of the recovery wells, the recovery well placements at this point in time do not provide sufficient coverage of the entire free-phase plume. As depicted in Appendix E, the product thickness' in the recovery wells increase if the systems are turned off for an extended time (2 months). The increase in the product thickness' in the recovery wells after the system is turned off indicates that additional free-phase product is migrating, under natural conditions, to those wells while the system is off. The recovery wells are situated on the downgradient portion of the free-phase plume such that the wells can eventually recover the free-phase product, but the duration of the system operation would be decreased if additional wells were to be installed. In accordance to the original scope-of-work, this evaluation shall be presented in more detail after the one year of systems operation is completed.

TABLE 1
NAVAL WEAPONS STATION-EARLE BIOSLURPER UNITS
OIL EXTRACTED TO DATE

1998	Free-Phase Oil Extracted								
	February (gallons)	March (gallons)	April (gallons)	May (gallons)	August (gallons)	September (gallons)	October (gallons)	November (gallons)	December (gallons)
Bioslurper System #1	400	375	275	300	225	250	250	140	225
Bioslurper System #2	25	50	50	20	55	30	40	20	30
Total	425	425	325	320	280	280	290	160	255

1999	Free-Phase Oil Extracted	Free-Phase Oil Extracted	Free-Phase Oil Extracted	Total Free-Product Extracted to Date
	January (gallons)	February (gallons)	March (gallons)	(gallons)
Bioslurper System #1	220	50	125	2835
Bioslurper System #2	20	15	15	370
Total	240	65	140	3,205

TABLE 2
NAVAL WEAPONS STATION-EARLE BIOSLURPER UNITS
GROUNDWATER EXTRACTED/TREATED TO DATE

1998	Ground-water Extracted								
	February (gallons)	March (gallons)	April (gallons)	May (gallons)	August (gallons)	September (gallons)	October (gallons)	November (gallons)	December (gallons)
Bioslurper System #1	2,675	26,169	23,898	12,799	16,498	34,612	29,974	20,503	40,611
Bioslurper System #2	5,282	20,586	22,607	6,584	13,537	14,451	27,805	16,196	9,141
Total	7,957	46,755	46,505	19,383	30,035	49,063	57,779	36,699	49,752

1999	Ground-water Extracted	Ground-water Extracted	Ground-water Extracted	Total Ground-water Extracted/ Treated to Date (gallons)
	January (gallons)	February (gallons)	March (gallons)	
Bioslurper System #1	35,078	6,536	49,834	299,187
Bioslurper System #2	8,843	536	12,956	158,524
Total	43,921	7,072	62,790	457,711

TABLE 3

NAVAL WEAPONS STATION-EARLE BIOSLURPER UNITS

TOTAL PETROLEUM HYDROCARBONS (TPH) REMOVED VIA GROUNDWATER TREATMENT

1998	TPH Extracted Ground- water Treatment								
	February (pounds)	March (pounds)	April (pounds)	May (pounds)	August (pounds)	September (pounds)	October (pounds)	November (pounds)	December (pounds)
Bioslurper System #1	60.75	125.14	306.42	135.56	47.3	---	175.99	179.16	192.96
Bioslurper System #2	4.25	14.17	32.40	9.61	---	13.99	2.37	4.26	11.48
Total	65.00	139.31	338.82	145.17	47.30	13.99	178.36	183.42	204.44

1999	TPH Extracted Ground- water Treatment	TPH Extracted Ground- water Treatment	TPH Extracted Ground- water Treatment	Total TPH Extracted via Groundwater to Date
	January (pounds)	February (pounds)	March (pounds)	(pounds)
Bioslurper System #1	60.48	56.18	394.28	1734.22
Bioslurper System #2	3.84	0.21	29.30	125.88
Total	64.32	56.39	423.58	1,860.10

TABLE 4
NAVAL WEAPONS STATION-EARLE BIOSLURPER UNITS
TOTAL PETROLEUM HYDROCARBONS (TPH) REMOVED VIA AIR EXTRACTION

1998	TPH Removed via Vapor Extraction								
	February (pounds)	March (pounds)	April (pounds)	May (pounds)	August (pounds)	September (pounds)*	October (pounds)	November (pounds)	December (pounds)
Bioslurper System #1	22.4	16.95	36.73	34.37	24.79	0	5.54	201.95	45.52
Bioslurper System #2	4.5	7.7	20.74	9.96	18.89	32.4	16.71	0	2.79
Total	26.9	24.65	57.47	44.33	43.68	32.4	22.25	201.95	48.31

1999	TPH Removed via Vapor Extraction	TPH Removed via Vapor Extraction	TPH Removed via Vapor Extraction	Total TPH Removed via Vapor Extraction to Date
	January (pounds)	February (pounds)	March (pounds)	(pounds)
Bioslurper System #1	0	0	0	388.24
Bioslurper System #2	2.60	1.53	1.09	118.91
Total	2.60	1.53		507.15

**TABLE 5:
BIOSLURPER UNIT NO.1
TOTAL PETROLEUM HYDROCARBON (TPH) EFFLUENT CONCENTRATIONS**

EFFLUENT SAMPLES December 4, 1998	TPH Concentration (ppm)	EFFLUENT SAMPLES December 11, 1998	TPH Concentration (ppm)	EFFLUENT SAMPLES January 6, 1999	TPH Concentration (ppm)	EFFLUENT SAMPLES January 15, 1999	TPH Concentration (ppm)
Untreated Effluent 16(A)EW-98-W109	690	Untreated Effluent 16(A)EW-98-W115	447	Untreated Effluent 16(A)EW-99-W01	425	Untreated Effluent 16(A)EW-99-W07	206
After 1st Clay Unit 16(A)EW-98-W110	243	After 1st Clay Unit 16(A)EW-98-W116	156	After 1st Clay Unit 16(A)EW-99-W02	1980	After 1st Clay Unit 16(A)EW-99-W08	208
After 2 Clay Units 16(A)EW-98-W111	79.4	After 2 Clay Units 16(A)EW-98-W117	88.5	After 2 Clay Units 16(A)EW-99-W03	1580	After 2 Clay Units 16(A)EW-99-W09	22.6
After 3 Clay Units 16(A)EW-98-W112	1.13	After 3 Clay Units 16(A)EW-98-W118	1.51	After 3 Clay Units 16(A)EW-99-W04	1040	After 3 Clay Units 16(A)EW-99-W10	1.67
After 2 Clay Units and 1 Carbon Unit 16(A)EW-98-W113	ND	After 2 Clay Units and 1 Carbon Unit 16(A)EW-98-W119	ND	After 3 Clay Units and 1 Carbon Unit 16(A)EW-99-W05	25.6	After 3 Clay Units and 1 Carbon Unit 16(A)EW-99-W11	ND
After 3 Clay Units and 2 Carbon Units 16(A)EW-98-W114	ND	After 3 Clay Units and 2 Carbon Units 16(A)EW-98-W120	ND	After 3 Clay Units and 2 Carbon Units 16(A)EW-99-W06	ND	After 3 Clay Units and 2 Carbon Units 16(A)EW-99-W12	ND

The NWS-Earle Sewer Treatment Plant NJPDES Permit Discharge Limit for TPH is 10 ppm.

ND-not detected above the laboratory detection limit

TABLE 5
(Page 2 of 2):
BIOSLURPER UNIT NO.1
TOTAL PETROLEUM HYDROCARBON (TPH) EFFLUENT CONCENTRATIONS

EFFLUENT SAMPLES January 26, 1999	TPH Concentration (ppm)	EFFLUENT SAMPLES February 25, 1999	TPH Concentration (ppm)	EFFLUENT SAMPLES March 11, 1999	TPH Concentration (ppm)	EFFLUENT SAMPLES March 18, 1999	TPH Concentration (ppm)
Untreated Effluent 16(A)EW-99-W13	80	Untreated Effluent 16(A)EW-99-W25	1030	Untreated Effluent 16(A)EW-99-W31	1810	Untreated Effluent 16(A)EW-99-W37	948
After 1st Clay Unit 16(A)EW-99-W14	1450	After 1st Clay Unit 16(A)EW-99-W26	258	After 1st Clay Unit No Sample Taken*	---	After 1st Clay Unit 16(A)EW-99-W38	264
After 2 Clay Units 16(A)EW-99-W15	1130	After 2 Clay Units 16(A)EW-99-W27	39	After 2 Clay Units 16(A)EW-99-W33	646	After 2 Clay Units 16(A)EW-99-W39	170
After 3 Clay Units 16(A)EW-99-W16	151	After 3 Clay Units 16(A)EW-99-W28	2.78	After 3 Clay Units 16(A)EW-99-W34	438	After 3 Clay Units 16(A)EW-99-W40	166
After 3 Clay Units and 1 Carbon Unit 16(A)EW-99-W17	17.5	After 3 Clay Units and 1 Carbon Unit 16(A)EW-99-W29	1.57	After 3 Clay Units and 1 Carbon Unit 16(A)EW-99-W35	111	After 3 Clay Units and 1 Carbon Unit 16(A)EW-99-W41	16.4
After 3 Clay Units and 2 Carbon Units 16(A)EW-99-W18	ND	After 3 Clay Units and 2 Carbon Units 16(A)EW-99-W30	ND	After 3 Clay Units and 2 Carbon Units No Sample Taken*	---	After 3 Clay Units and 2 Carbon Units 16(A)EW-99-W42	ND

The NWS-Earle Sewer Treatment Plant NJPDES Permit Discharge Limit for TPH is 10 ppm.

ND-not detected above the laboratory detection limit

Sample IDs 16(A)EW-99-19 through 16(A)EW-99-24, sequentially, do not exist.

* Bottles broken in shipment.

**TABLE 6:
BIOSLURPER UNIT NO.2
TOTAL PETROLEUM HYDROCARBON (TPH) EFFLUENT CONCENTRATIONS**

EFFLUENT SAMPLES December 4, 1998	TPH Concentration (ppm)	EFFLUENT SAMPLES December 11, 1998	TPH Concentration (ppm)	EFFLUENT SAMPLES January 6, 1999	TPH Concentration (ppm)	EFFLUENT SAMPLES January 15, 1999	TPH Concentration (ppm)
Untreated Effluent 16(B)EW-98-W92	65.9	Untreated Effluent 16(B)EW-98-W97	235	Untreated Effluent 16(B)EW-99-W01	4.84	Untreated Effluent 16(B)EW-99-W06	120
After 1st Clay Unit 16(B)EW-98-W93	1.09	After 1st Clay Unit 16(B)EW-98-W98	ND	After 1st Clay Unit 16(B)EW-99-W02	ND	After 1st Clay Unit 16(B)EW-99-W07	ND
After 2 Clay Units 16(B)EW-98-W94	ND	After 2 Clay Units 16(B)EW-98-W99	ND	After 2 Clay Units 16(B)EW-99-W03	ND	After 2 Clay Units 16(B)EW-99-W08	ND
After 3 Clay Units No Sample Taken	---	After 3 Clay Units No Sample Taken	---	After 3 Clay Units No Sample Taken	---	After 3 Clay Units No Sample Taken	---
After 2 Clay Units and 1 Carbon Unit 16(B)EW-98-W95	ND	After 2 Clay Units and 1 Carbon Unit 16(B)EW-98-W100	ND	After 3 Clay Units and 1 Carbon Unit 16(B)EW-99-W04	ND	After 3 Clay Units and 1 Carbon Unit 16(B)EW-99-W09	ND
After 3 Clay Units and 2 Carbon Units 16(B)EW-98-W96	ND	After 3 Clay Units and 2 Carbon Units 16(B)EW-98-W101	ND	After 3 Clay Units and 2 Carbon Units 16(B)EW-99-W05	ND	After 3 Clay Units and 2 Carbon Units 16(B)EW-99-W10	ND

The NWS-Earle Sewer Treatment Plant NJPDES Permit Discharge Limit for TPH is 10 ppm.

ND-not detected above the laboratory detection limit

TABLE 6
(Page 2 of 2)
BIOSLURPER UNIT NO.2
TOTAL PETROLEUM HYDROCARBON (TPH) EFFLUENT CONCENTRATIONS

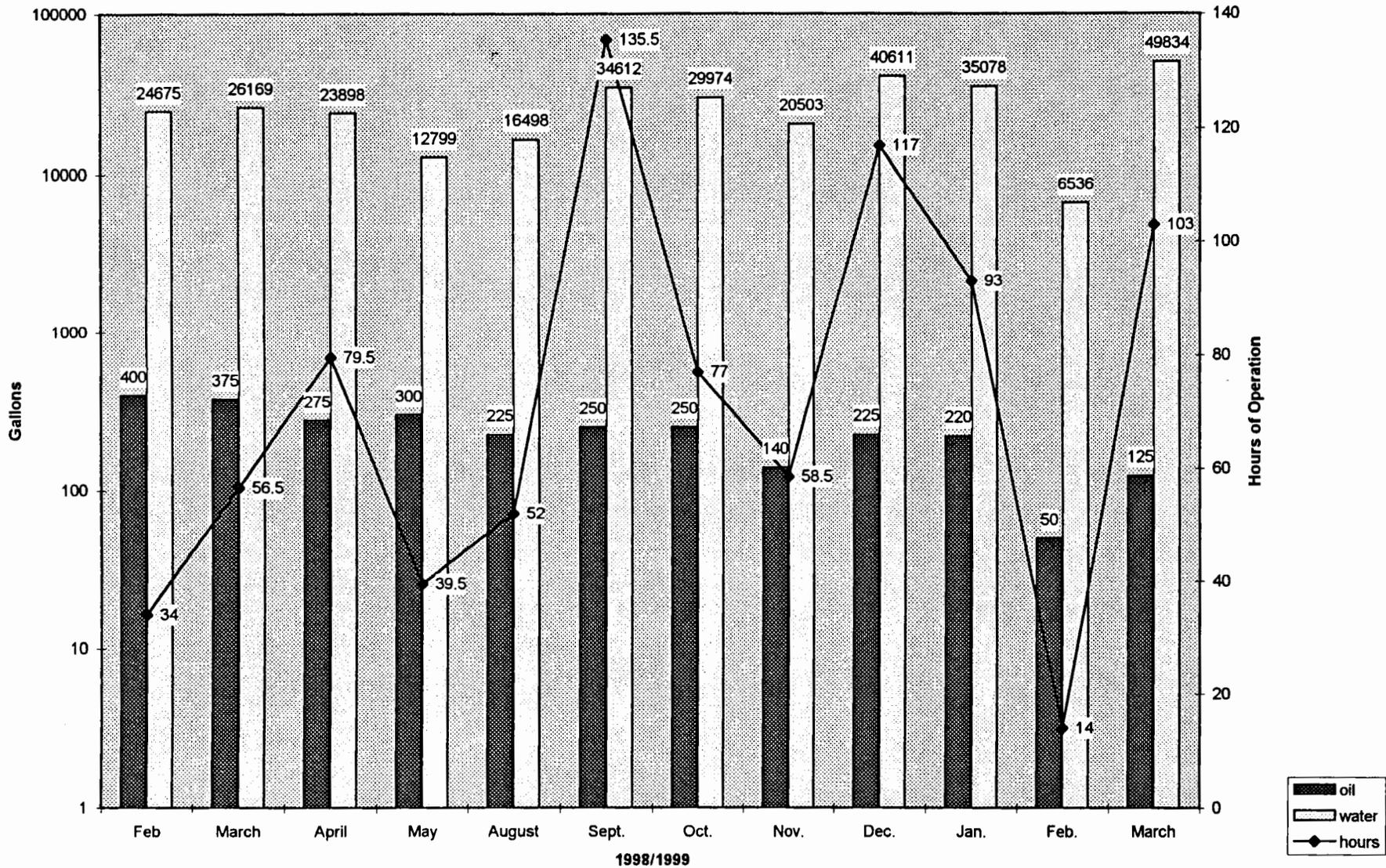
EFFLUENT SAMPLES January 26, 1999	TPH Concentration (ppm)	EFFLUENT SAMPLES February 25, 1999	TPH Concentration (ppm)	EFFLUENT SAMPLES March 11, 1999	TPH Concentration (ppm)	EFFLUENT SAMPLES March 18, 1999	TPH Concentration (ppm)
Untreated Effluent 16(B)EW-99-W11	31.5	Untreated Effluent 16(B)EW-99-W16	47.9	Untreated Effluent *No Sample Taken	---	Untreated Effluent 16(B)EW-99-W26	271
After 1st Clay Unit 16(B)EW-99-W12	1.48	After 1st Clay Unit 16(B)EW-99-W17	92.8	After 1st Clay Unit 16(B)EW-99-W22	135	After 1st Clay Unit 16(B)EW-99-W27	109
After 2 Clay Units 16(B)EW-99-W13	ND	After 2 Clay Units 16(B)EW-99-W18	ND	After 2 Clay Units *No Sample Taken	---	After 2 Clay Units 16(B)EW-99-W28	ND
After 3 Clay Units No Sample Taken	---	After 3 Clay Units No Sample Taken	---	After 3 Clay Units No Sample Taken	---	After 3 Clay Units No Sample Taken	---
After 3 Clay Units and 1 Carbon Unit 16(B)EW-99-W14	2.87	After 3 Clay Units and 1 Carbon Unit 16(B)EW-99-W19	ND	After 3 Clay Units and 1 Carbon Unit 16(B)EW-99-W24	ND	After 3 Clay Units and 1 Carbon Unit 16(B)EW-99-W29	ND
After 3 Clay Units and 2 Carbon Units 16(B)EW-99-W15	ND	After 3 Clay Units and 2 Carbon Units 16(B)EW-99-W20	ND	After 3 Clay Units and 2 Carbon Units 16(B)EW-99-W25	ND	After 3 Clay Units and 2 Carbon Units 16(B)EW-99-W30	ND

The NWS-Earle Sewer Treatment Plant NJPDES Permit Discharge Limit for TPH is 10 ppm.

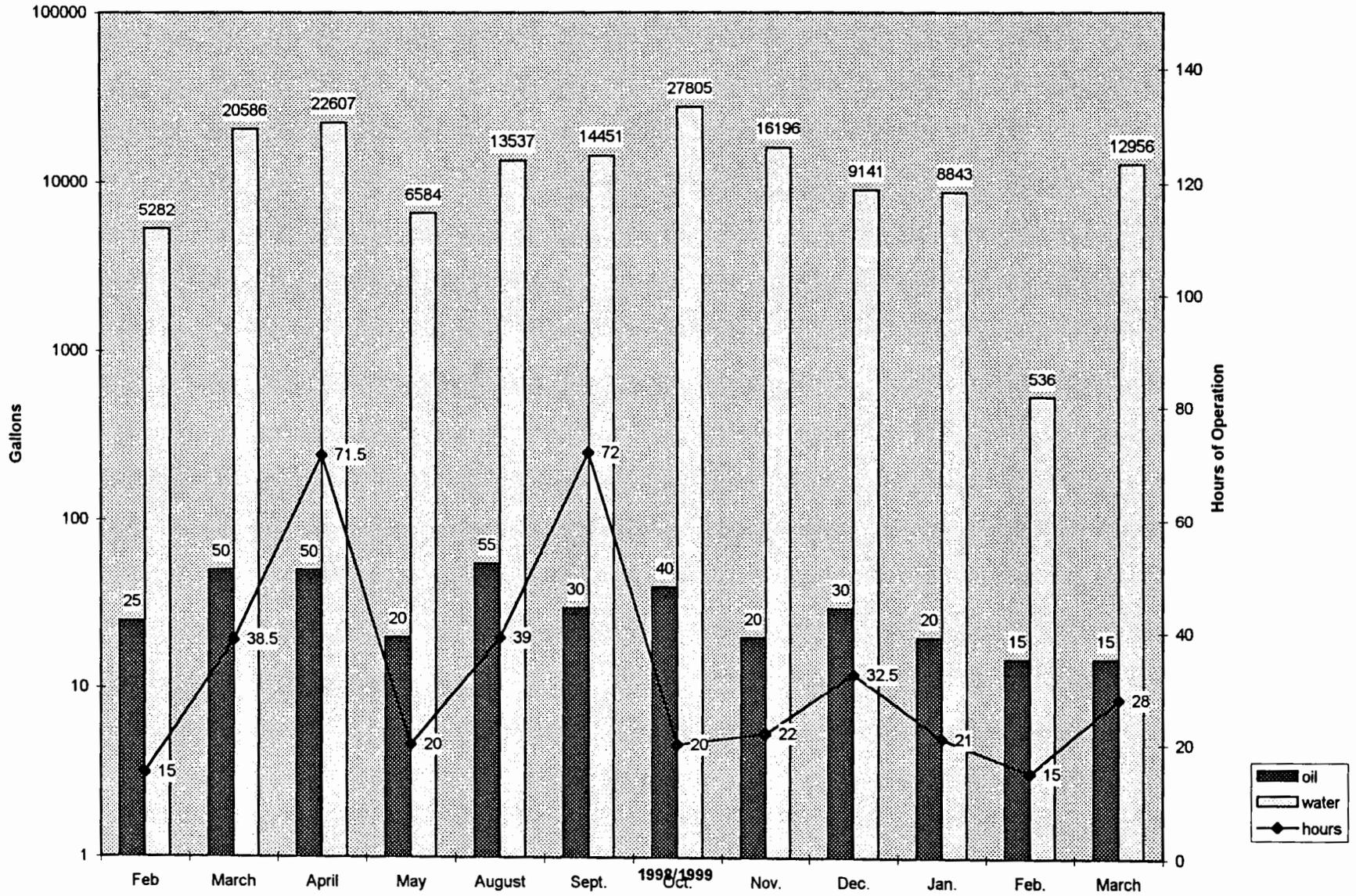
ND-not detected above the laboratory detection limit

* Bottles broken in shipment

BIOSLURPER UNIT #1: GROUNDWATER/OIL RECOVERY VERSUS OPERATION TIME



BIOSLURPER UNIT #2: GROUNDWATER/OIL RECOVERY VERSUS OPERATION TIME

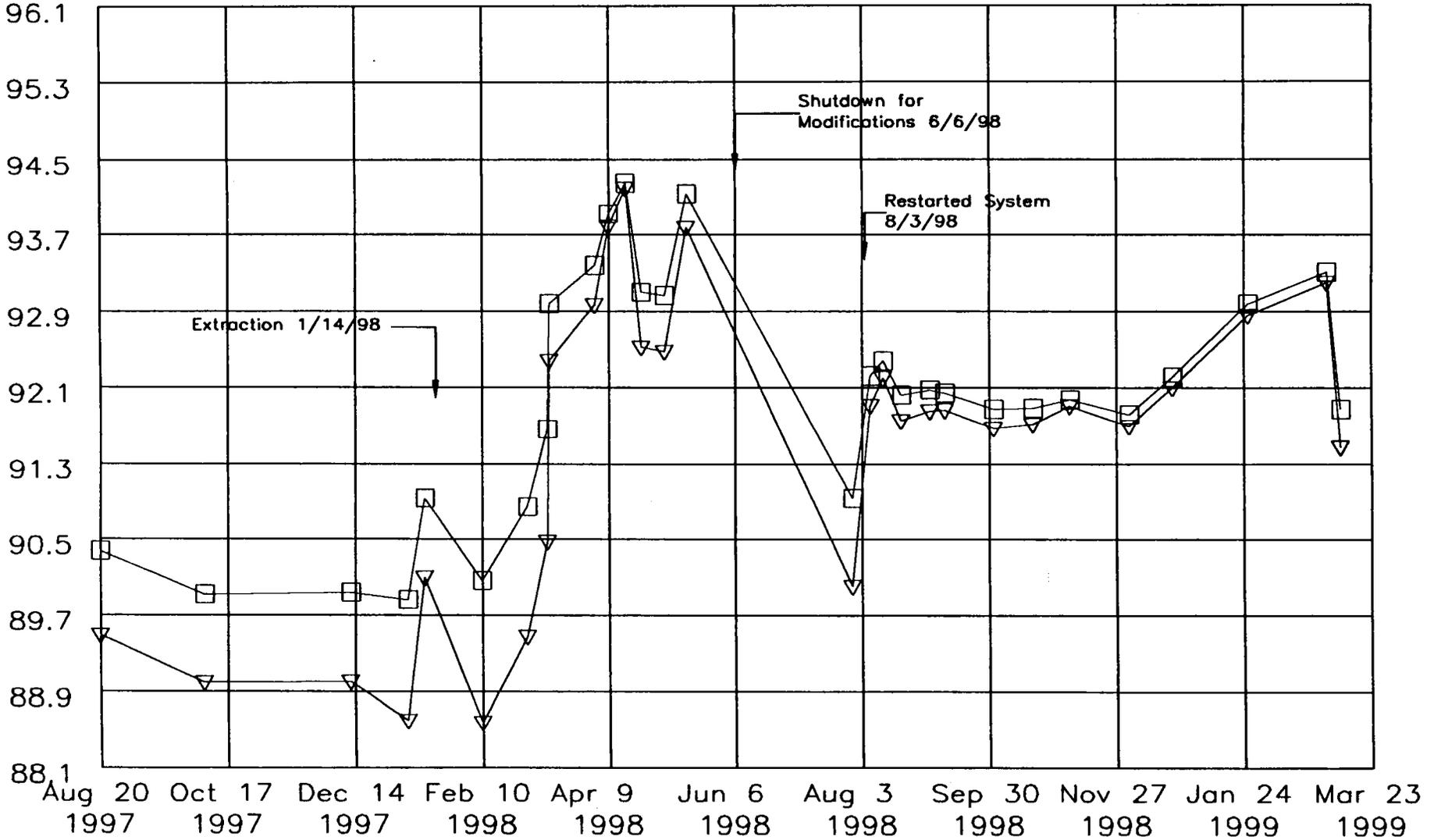


Well: 16MW-15

Elevation
(ft)

Water Level & Product Surface Elevation

□ = Product
▽ = Water Level

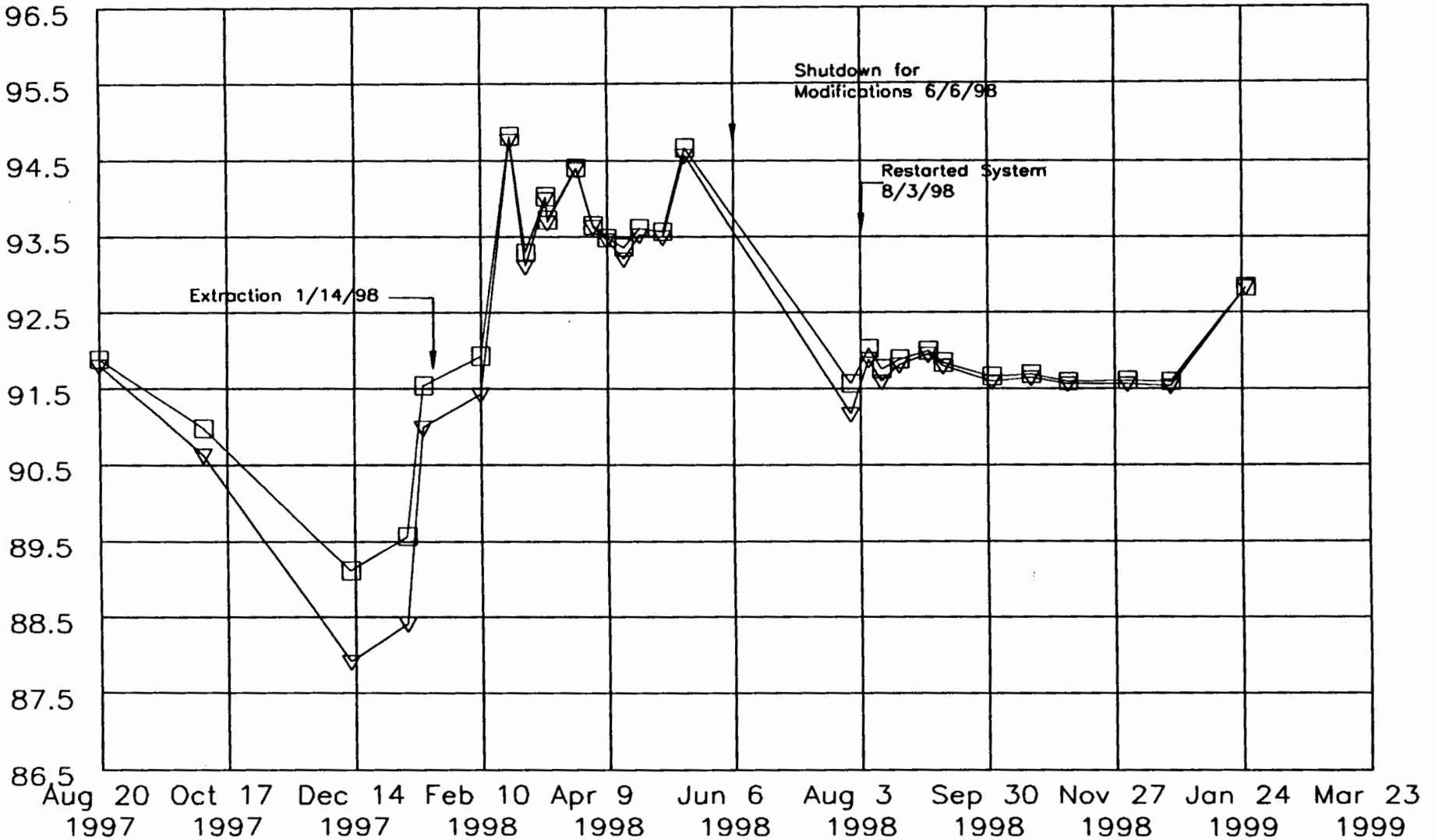


Well: 16MW-16

□ = Product
▽ = Water Level

Elevation
(ft)

Water Level & Product Surface Elevation

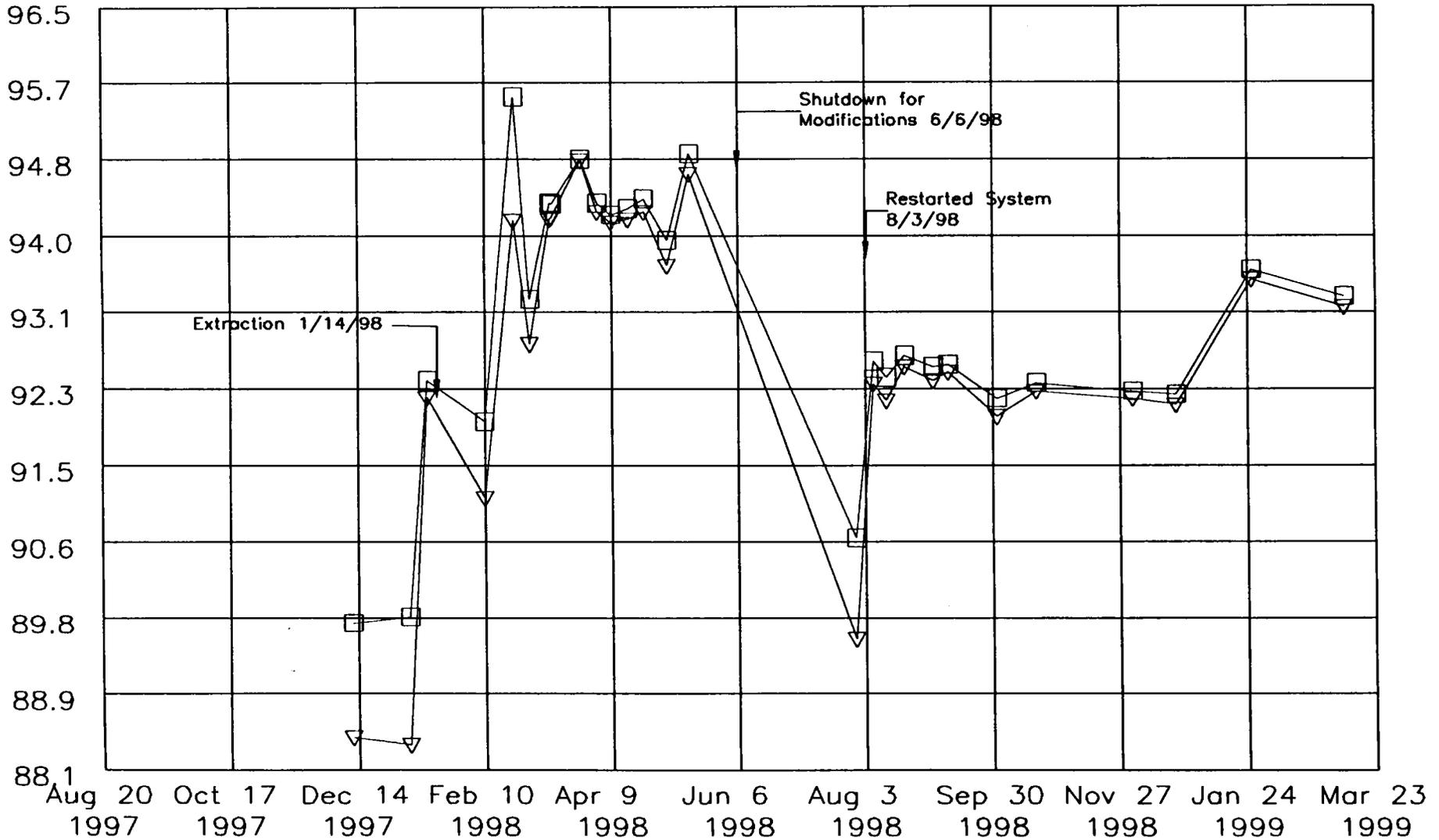


Well: C17MW-07

Elevation
(ft)

Water Level & Product Surface Elevation

□ = Product
▽ = Water Level

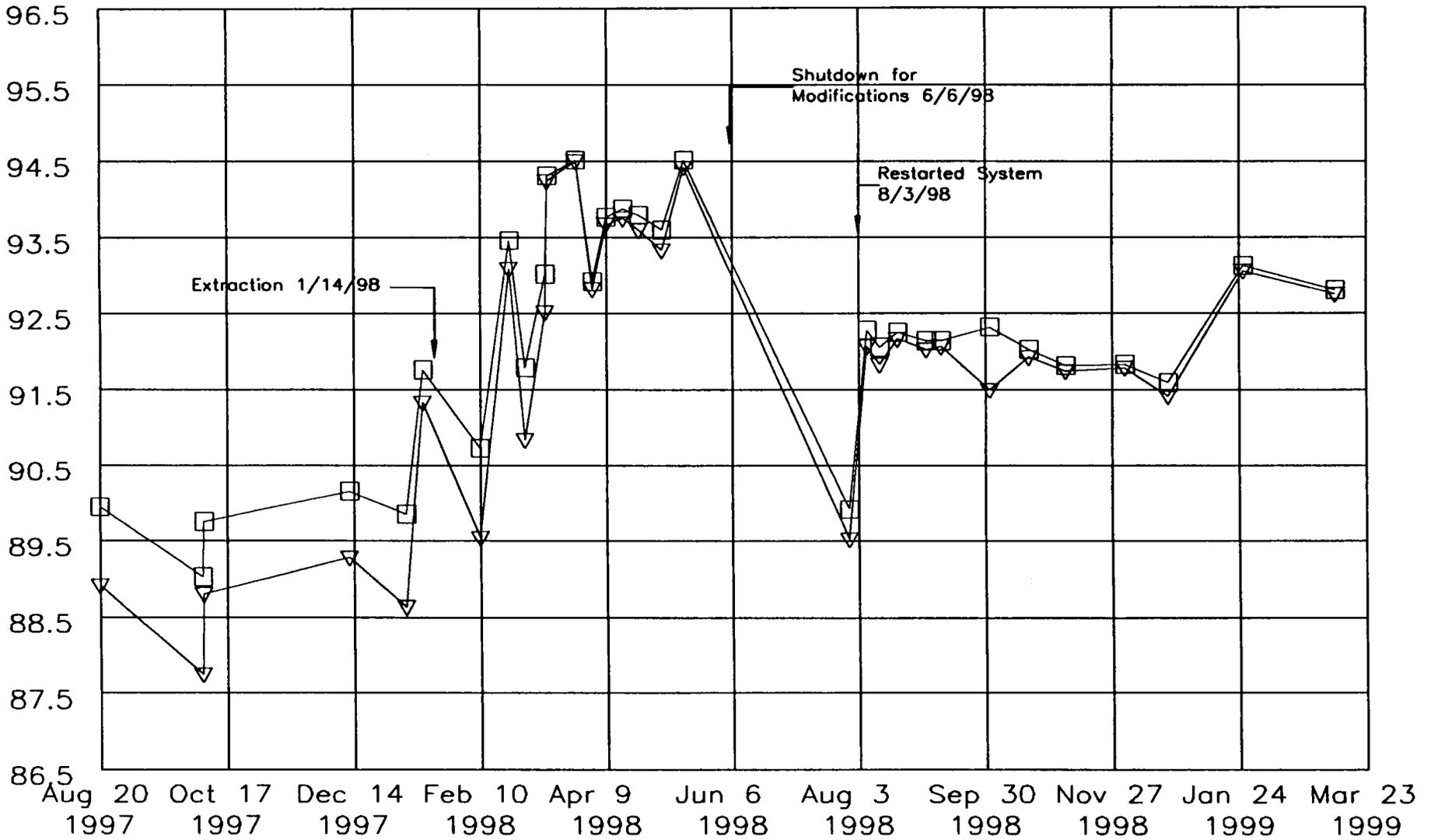


Well: 16MW-17

Elevation
(ft)

Water Level & Product Surface Elevation

□ = Product
▽ = Water Level

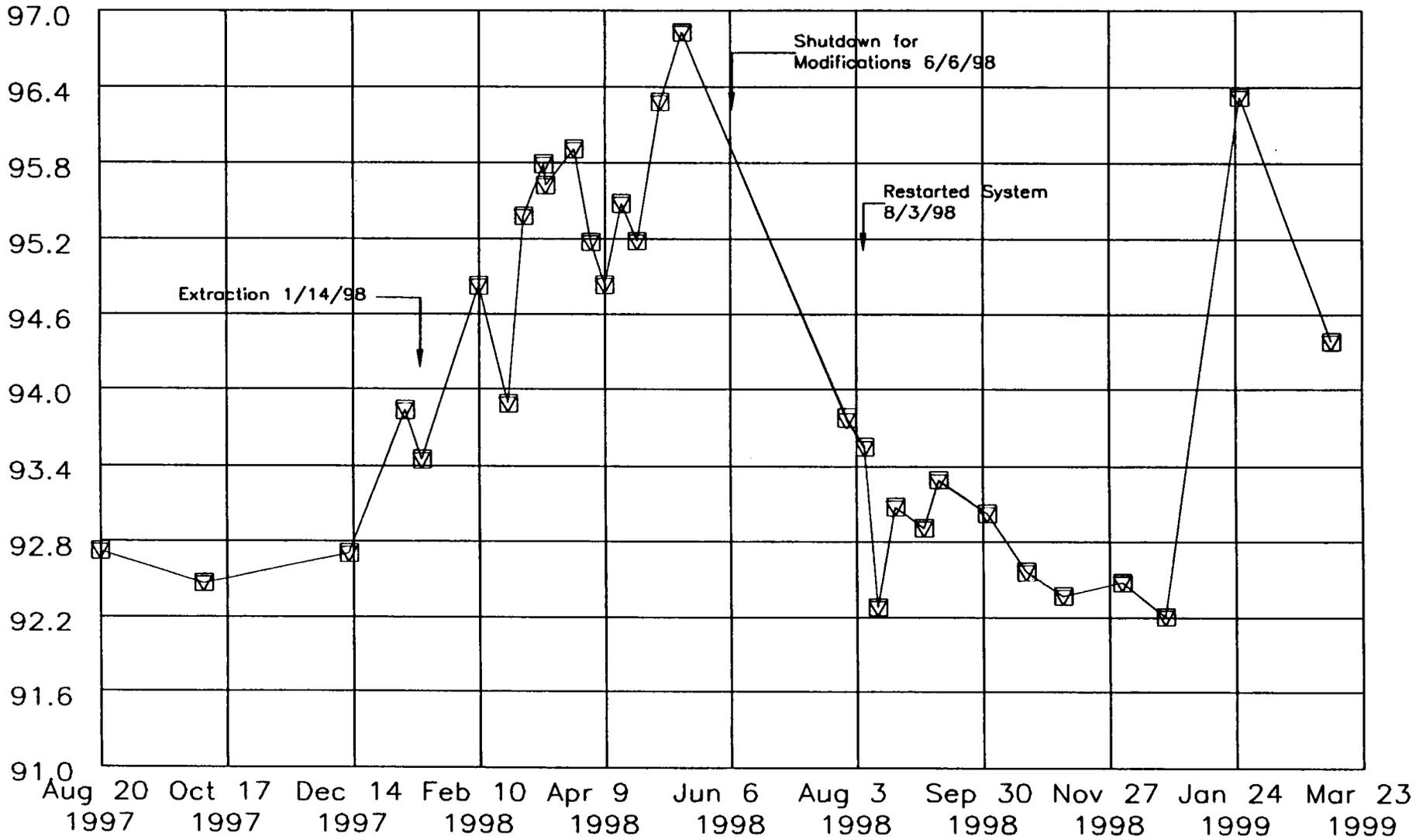


Well: 16MW-18

Water Level & Product Surface Elevation

□ = Product
▽ = Water Level

Elevation
(ft)

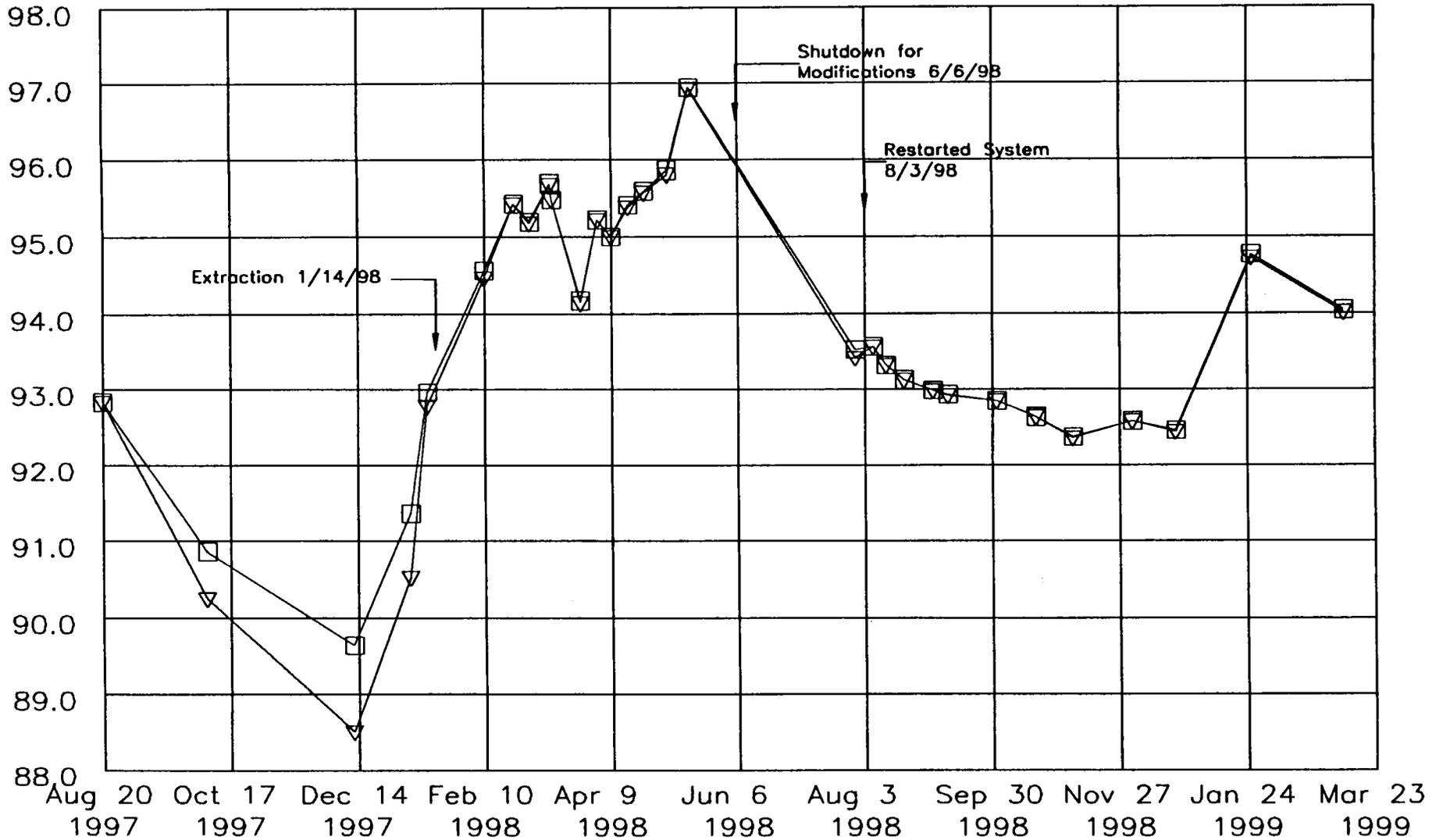


Well: 16MW-19

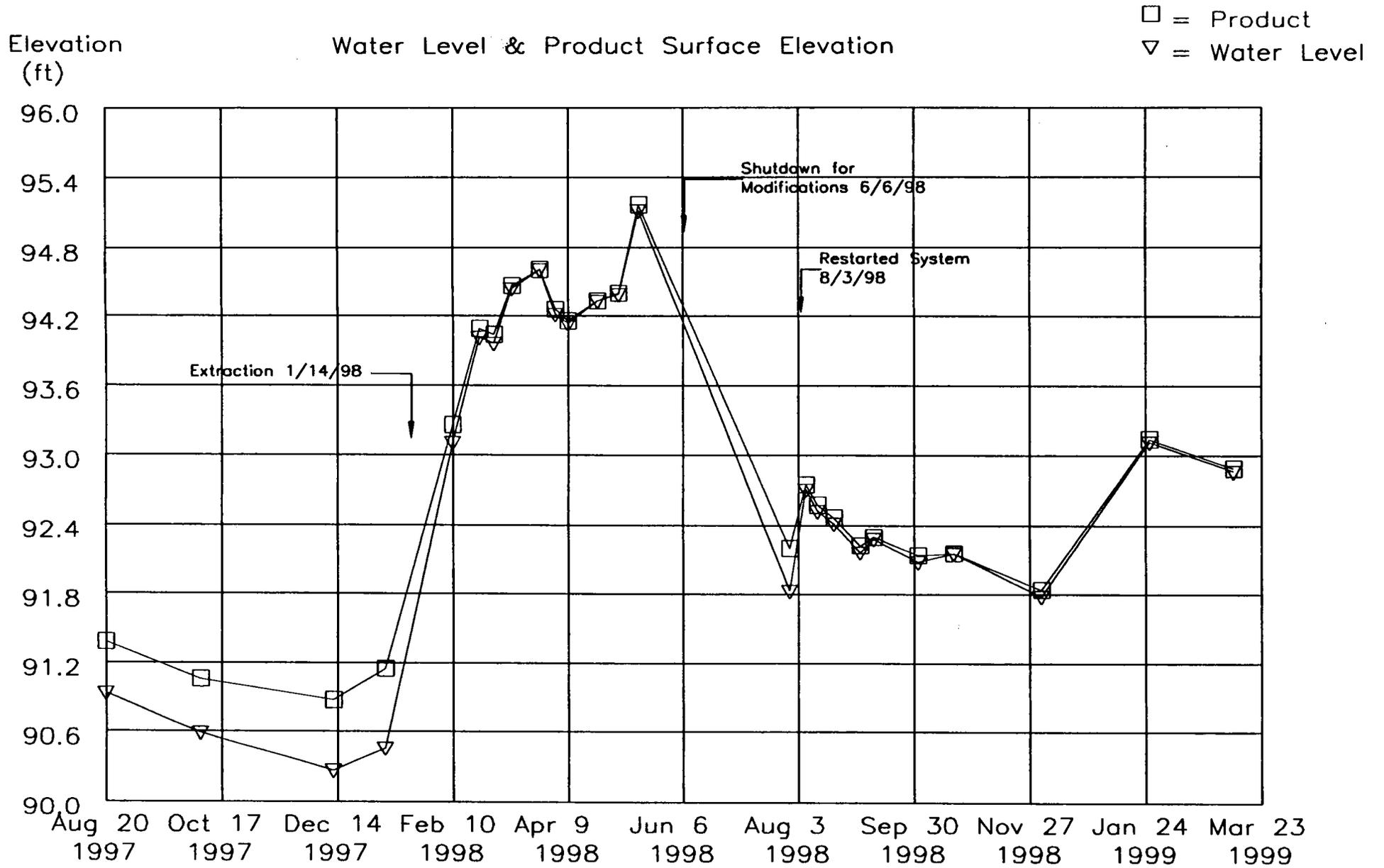
□ = Product
▽ = Water Level

Elevation
(ft)

Water Level & Product Surface Elevation



Well: 16MW-20

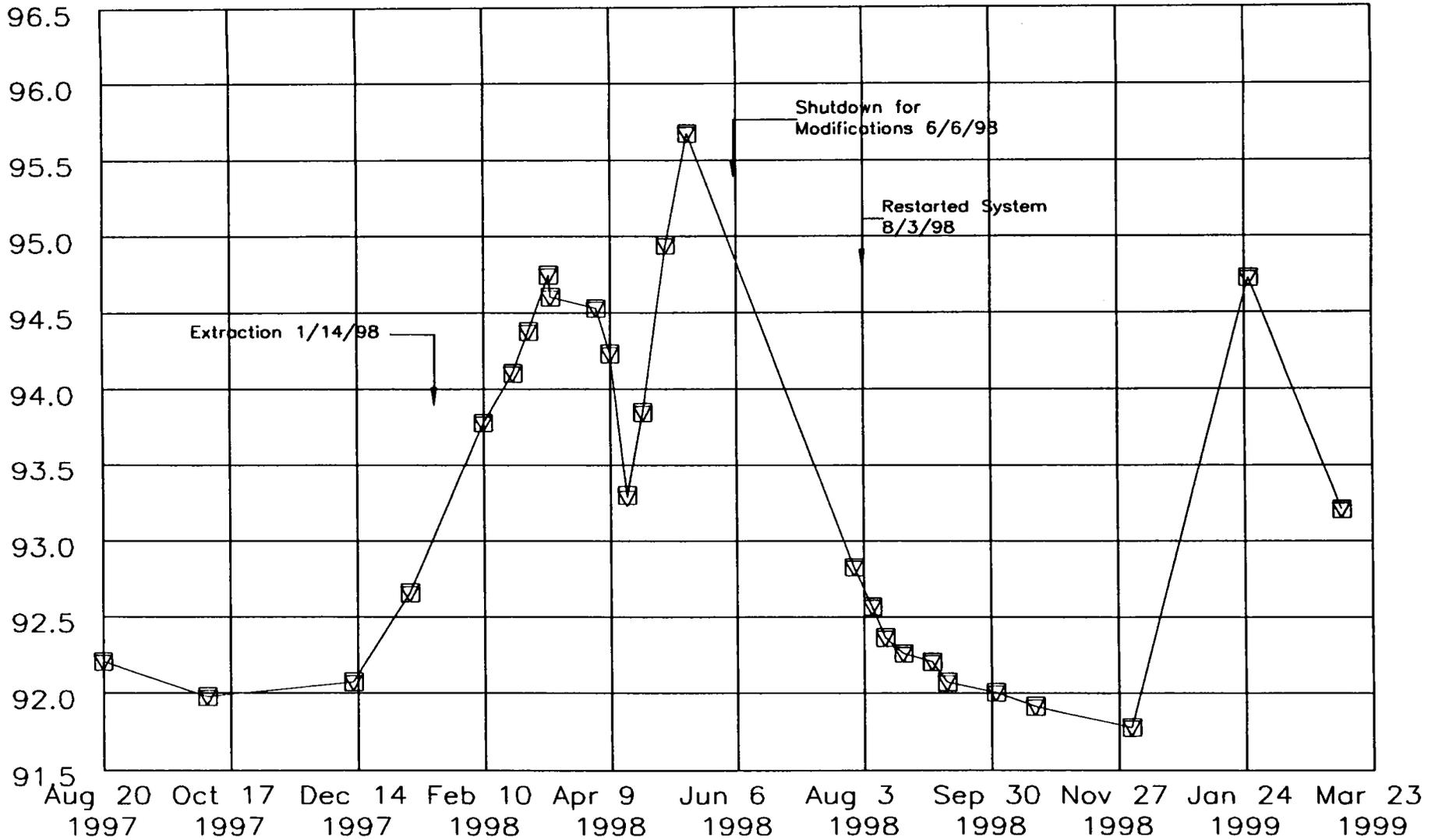


Well: 16MW-21

Elevation
(ft)

Water Level & Product Surface Elevation

□ = Product
▽ = Water Level

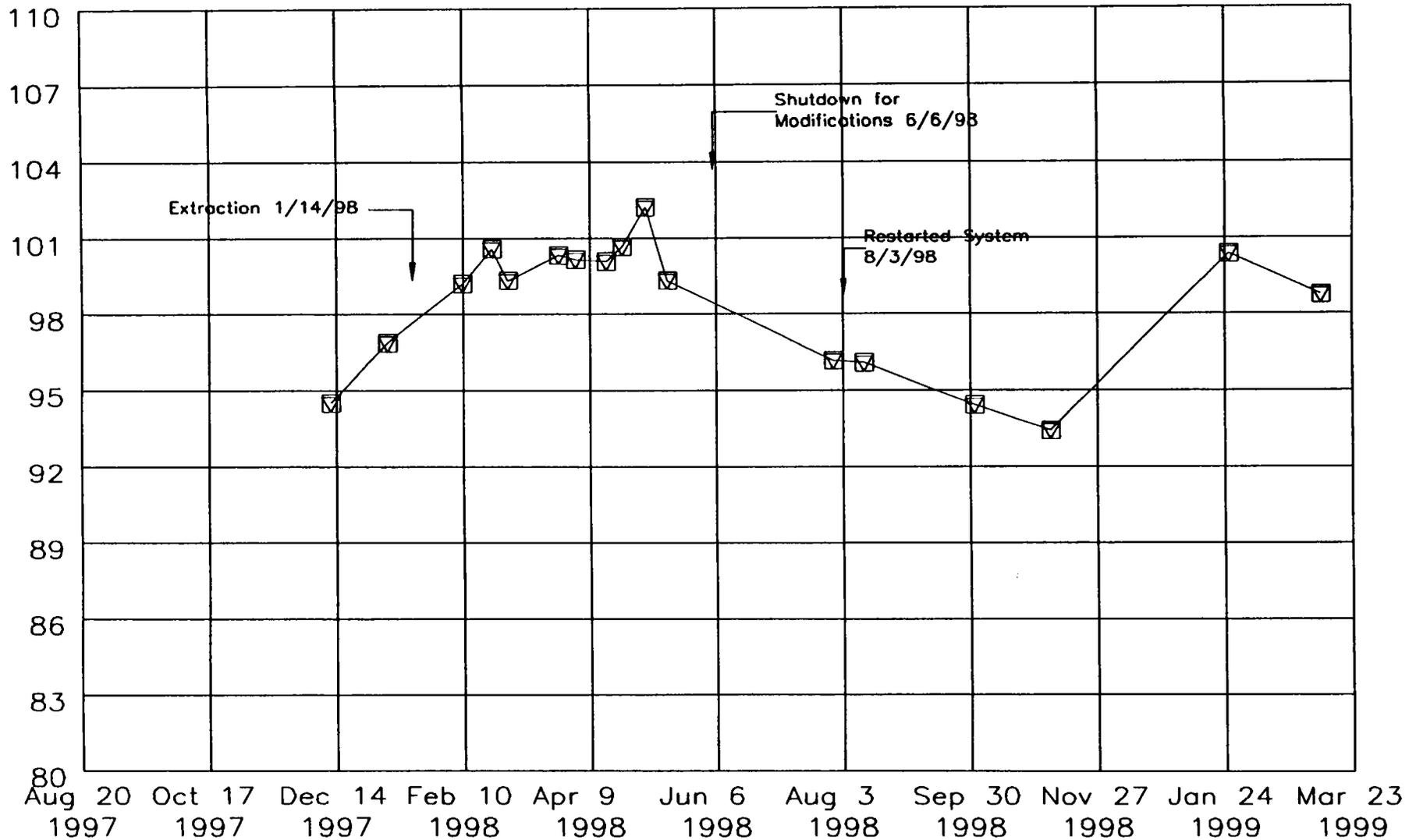


Well: 16MW-22

Elevation
(ft)

Water Level & Product Surface Elevation

□ = Product
▽ = Water Level

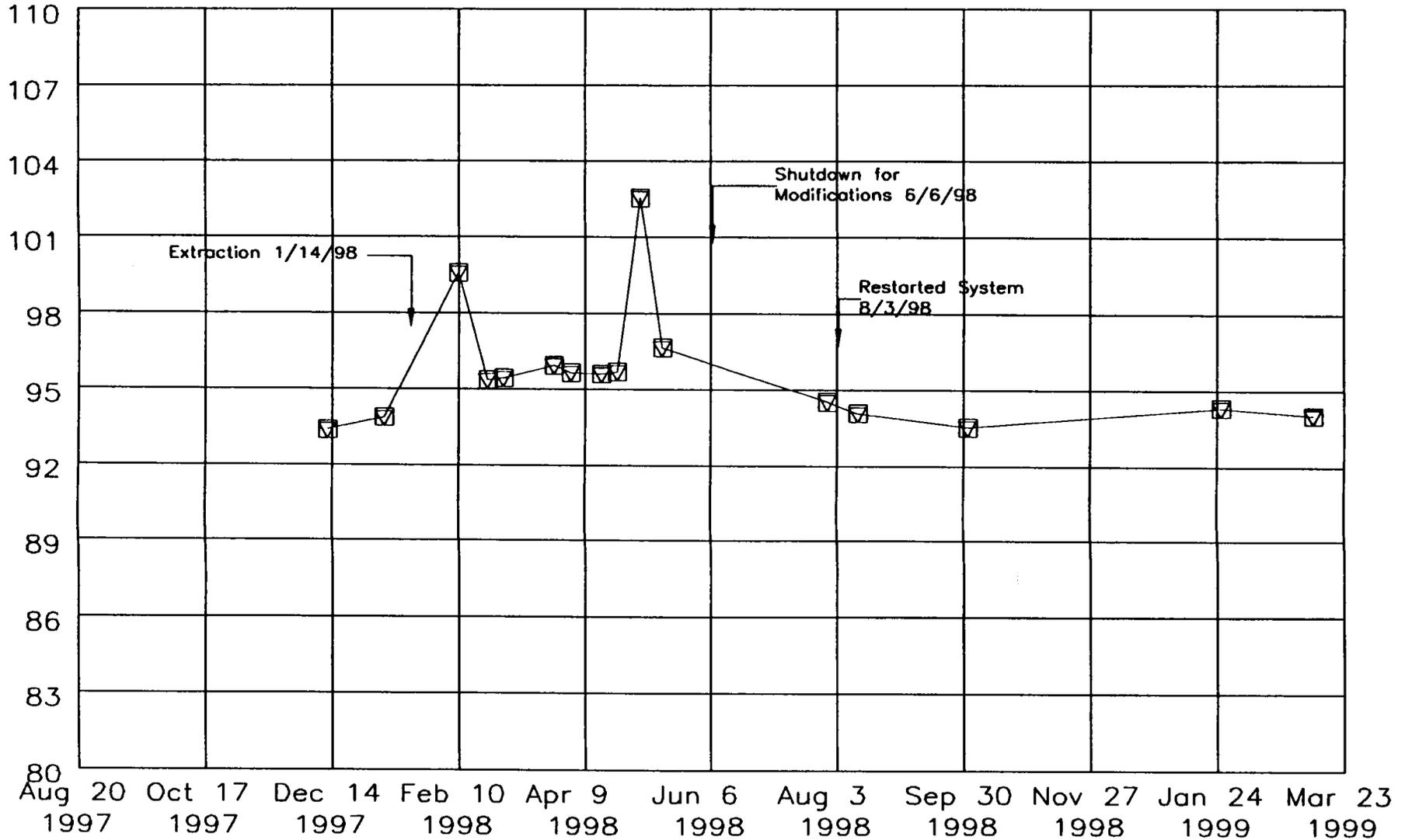


Well: 16MW-23

Elevation
(ft)

Water Level & Product Surface Elevation

□ = Product
▽ = Water Level



Water Level Product Thickness Data

Date: 03/29/99

SITE	DATE	MP ELEVATION ⁽¹⁾ (feet)	TIME	DEPTH TO WATER (feet)	FLOATING PRODUCT THICKNESS (feet)	WATER ELEV. ⁽¹⁾ (feet)	△ WATER ELEV. ⁽¹⁾ (feet)	EQUIV. FRESH WATER HEAD ⁽²⁾ (feet)
16MW-04	08/20/97	101.23000	11:34	13.65	0.57	87.58	NA	88.06
16MW-04	12/12/97	101.23000	00:00	11.55	0.78	89.68	2.10	90.35
16MW-04	01/07/98	101.23000	11:02	11.85	1.03	89.38	-0.30	90.26
16MW-04	02/10/98	101.23000	00:00	10.78	0.93	90.45	1.07	91.24
16MW-04	02/24/98	101.23000	00:00	8.78	0.56	92.45	2.00	92.93
16MW-04	03/03/98	101.23000	00:00	10.45	1.00	90.78	-1.67	91.63
16MW-04	03/12/98	101.23000	00:00	9.60	0.88	91.63	0.85	92.38
16MW-04	03/13/98	101.23000	00:00	9.15	0.71	92.08	0.45	92.69
16MW-04	03/26/98	101.23000	00:00	6.76	0.05	94.47	2.39	94.51
16MW-04	04/03/98	101.23000	00:00	8.40	0.44	92.83	-1.64	93.20
16MW-04	04/09/98	101.23000	00:00	6.90	0.01	94.33	1.50	94.34
16MW-04	04/17/98	101.23000	00:00	7.06	0.04	94.17	-0.16	94.20
16MW-04	04/24/98	101.23000	00:00	6.76	0.57	94.47	0.30	94.96
16MW-04	05/05/98	101.23000	00:00	8.40	0.48	92.83	-1.64	93.31
16MW-04	05/15/98	101.23000	00:00	8.20	0.65	93.03	0.20	93.58
16MW-04	07/30/98	101.23000	00:00	10.15	0.81	91.08	-1.95	91.77
16MW-04	08/07/98	101.23000	00:00	9.17	0.27	92.06	0.98	92.29
16MW-04	08/13/98	101.23000	00:00	8.50	0.02	92.73	0.67	92.74
16MW-04	08/21/98	101.23000	00:00	9.20	0.19	92.03	-0.70	92.19
16MW-04	09/03/98	101.23000	00:00	9.94	0.23	91.29	-0.74	91.48
16MW-04	09/10/98	101.23000	00:00	9.57	0.24	91.66	0.37	91.86
16MW-04	10/02/98	101.23000	00:00	9.65	0.20	91.58	-0.08	91.75
16MW-04	10/20/98	101.23000	00:00	9.85	0.26	91.38	-0.20	91.60
16MW-04	11/06/98	101.23000	00:00	9.66	0.16	91.57	0.19	91.70
16MW-04	12/03/98	101.23000	00:00	9.93	0.23	91.30	-0.27	91.50
16MW-04	12/23/98	101.23000	00:00	9.40	0.08	91.83	0.53	91.89
16MW-04	01/26/99	101.23000	00:00	8.26	0.07	92.97	1.14	93.03
16MW-04	03/03/99	101.23000	00:00	8.49	0.06	92.74	-0.23	92.79
16MW-04	03/09/99	101.23000	00:00	8.28	0.02	92.95	0.21	92.96
16MW-13	08/20/97	100.97000	00:00	10.90	0.80	90.07	NA	90.75
16MW-13	08/20/97	100.97000	08:45	10.90	0.80	90.07	0.00	90.75
16MW-13	10/06/97	100.97000	10:45	11.10	0.74	89.87	-0.20	90.50
16MW-13	12/12/97	100.97000	08:30	10.50	0.64	90.47	0.60	91.01
16MW-13	01/07/98	100.97000	09:35	10.22	0.73	90.75	0.28	91.37
16MW-13	01/15/98	100.97000	07:30	10.29	0.74	90.68	-0.07	91.31

(1) Change in Water Elevation since last reported measurement
(1)Change in Water Elevation since last reported measurement
(2)Measurements Based on Mean Sea Level

D = Dry NA = Not Available

Water Level Product Thickness Data

SITE	DATE	MP ELEVATION ⁽¹⁾ (feet)	TIME	DEPTH TO WATER (feet)	FLOATING PRODUCT THICKNESS (feet)	WATER ELEV. ⁽¹⁾ (feet)	△ WATER ELEV. ⁽¹⁾ (feet)	EQUIV. FRESH WATER HEAD ⁽¹⁾ (feet)
16MW-13	02/10/98	100.97000	00:00	10.01	0.87	90.96	0.28	91.70
16MW-13	02/24/98	100.97000	00:00	8.82	0.71	92.15	1.19	92.76
16MW-13	03/03/98	100.97000	00:00	10.02	1.04	90.95	-1.20	91.83
16MW-13	03/12/98	100.97000	00:00	9.67	1.02	91.30	0.35	92.17
16MW-13	03/13/98	100.97000	00:00	9.02	0.80	91.95	0.65	92.63
16MW-13	03/26/98	100.97000	00:00	7.05	0.30	93.92	1.97	94.17
16MW-13	04/03/98	100.97000	00:00	7.72	0.41	93.25	-0.67	93.60
16MW-13	04/09/98	100.97000	00:00	7.34	0.26	93.63	0.38	93.85
16MW-13	04/17/98	100.97000	00:00	6.95	0.18	94.02	0.39	94.17
16MW-13	04/24/98	100.97000	00:00	8.16	0.57	92.81	-1.21	93.29
16MW-13	05/05/98	100.97000	00:00	8.85	0.55	92.12	-0.69	92.67
16MW-13	05/15/98	100.97000	00:00	7.09	0.51	93.88	1.76	94.39
16MW-13	07/30/98	100.97000	00:00	10.25	0.81	90.72	-3.16	91.41
16MW-13	08/07/98	100.97000	00:00	8.57	0.26	92.40	1.68	92.62
16MW-13	08/13/98	100.97000	00:00	8.36	0.14	92.61	0.21	92.72
16MW-13	08/21/98	100.97000	00:00	8.84	0.27	92.13	-0.48	92.36
16MW-13	09/03/98	100.97000	00:00	8.69	0.20	92.28	0.15	92.45
16MW-13	09/10/98	100.97000	00:00	8.71	0.15	92.26	-0.02	92.38
16MW-13	10/02/98	100.97000	00:00	9.23	0.27	91.74	-0.52	91.97
16MW-13	10/20/98	100.97000	00:00	8.88	0.14	92.09	0.35	92.20
16MW-13	11/06/98	100.97000	00:00	9.01	0.13	91.96	-0.13	92.07
16MW-13	12/03/98	100.97000	00:00	8.95	0.10	92.02	0.06	92.10
16MW-13	12/23/98	100.97000	00:00	9.29	0.20	91.68	-0.34	91.85
16MW-13	01/26/99	100.97000	00:00	8.10	0.18	92.87	1.19	93.02
16MW-13	03/03/99	100.97000	00:00	8.13	0.11	92.84	-0.03	92.93
16MW-13	03/09/99	100.97000	00:00	8.17	0.14	92.80	-0.04	92.92
16MW-14	08/20/97	100.66000	00:00	10.64	0.82	90.02	NA	90.72
16MW-14	08/20/97	100.66000	08:48	10.64	0.80	90.02	0.00	90.70
16MW-14	10/06/97	100.66000	10:45	11.61	0.99	89.05	-0.97	89.89
16MW-14	12/12/97	100.66000	08:30	11.55	0.79	89.11	0.06	89.78
16MW-14	01/07/98	100.66000	09:49	10.52	0.86	90.14	1.03	90.87
16MW-14	01/07/98	100.66000	09:56	10.52	0.86	90.14	0.00	90.87
16MW-14	01/15/98	100.66000	07:30	9.61	0.63	91.05	0.91	91.59
16MW-14	02/10/98	100.66000	00:00	10.36	1.07	90.30	-0.75	91.21
16MW-14	03/03/98	100.66000	00:00	8.90	0.83	91.76	1.46	92.47

(1) Change in Water Elevation since last reported measurement
(1)Change in Water Elevation since last reported measurement
(2)Measurements Based on Mean Sea Level

D = Dry NA = Not Available

Water Level Product Thickness Data

SITE	DATE	MP ELEVATION ⁽¹⁾ (feet)	TIME	DEPTH TO WATER (feet)	FLOATING PRODUCT THICKNESS (feet)	WATER ELEV. ⁽¹⁾ (feet)	 WATER ELEV. ⁽¹⁾ (feet)	EQUIV. FRESH WATER HEAD ⁽¹⁾ (feet)
16MW-14	03/12/98	100.66000	00:00	8.29	0.74	92.37	0.61	93.00
16MW-14	03/13/98	100.66000	00:00	7.15	0.28	93.51	1.14	93.75
16MW-14	03/26/98	100.66000	00:00	5.70	0.03	94.96	1.45	94.98
16MW-14	04/03/98	100.66000	00:00	6.66	0.20	94.00	-0.96	94.17
16MW-14	04/09/98	100.66000	00:00	5.38	0.09	95.28	1.28	95.35
16MW-14	04/17/98	100.66000	00:00	6.05	0.09	94.61	-0.67	94.69
16MW-14	04/24/98	100.66000	00:00	7.82	0.54	92.84	-1.77	93.30
16MW-14	05/05/98	100.66000	00:00	7.41	0.46	93.25	0.41	93.64
16MW-14	05/15/98	100.66000	00:00	5.20	0.10	95.46	2.21	95.54
16MW-14	07/30/98	100.66000	00:00	10.05	0.85	90.61	-4.85	91.33
16MW-14	08/07/98	100.66000	00:00	7.40	0.05	93.26	2.65	93.30
16MW-14	08/13/98	100.66000	00:00	7.71	0.05	92.95	-0.31	92.99
16MW-14	08/21/98	100.66000	00:00	8.60	0.27	92.06	-0.89	92.29
16MW-14	09/03/98	100.66000	00:00	8.29	0.16	92.37	0.31	92.50
16MW-14	09/10/98	100.66000	00:00	8.41	0.15	92.25	-0.12	92.37
16MW-14	10/02/98	100.66000	00:00	8.62	0.18	92.04	-0.21	92.19
16MW-14	10/20/98	100.66000	00:00	8.57	0.13	92.09	0.05	92.20
16MW-14	11/06/98	100.66000	00:00	8.65	0.11	92.01	-0.08	92.10
16MW-14	12/03/98	100.66000	00:00	8.71	0.12	91.95	-0.06	92.05
16MW-14	12/23/98	100.66000	00:00	9.33	0.14	91.33	-0.62	91.45
16MW-14	01/26/99	100.66000	00:00	7.62	0.15	93.04	1.71	93.16
16MW-14	03/03/99	100.66000	00:00	8.41	0.12	92.25	-0.79	92.35
16MW-14	03/09/99	100.66000	00:00	7.45	0.03	93.21	0.96	93.24
16MW-15	08/20/97	100.98000	00:00	11.49	0.89	89.49	NA	90.25
16MW-15	08/20/97	100.98000	08:55	11.49	0.89	89.49	0.00	90.25
16MW-15	08/20/97	100.98000	09:12	11.49	0.89	89.49	0.00	90.25
16MW-15	10/06/97	100.98000	10:45	11.98	0.93	89.00	-0.49	89.79
16MW-15	12/12/97	100.98000	08:30	11.96	0.92	89.02	0.02	89.80
16MW-15	01/07/98	100.98000	10:05	12.38	1.27	88.60	-0.42	89.68
16MW-15	01/15/98	100.98000	07:30	10.88	0.84	90.10	1.50	90.81
16MW-15	02/10/98	100.98000	00:00	12.40	1.49	88.58	-1.52	89.85
16MW-15	03/03/98	100.98000	00:00	11.50	1.37	89.48	0.90	90.65
16MW-15	03/12/98	100.98000	00:00	10.50	1.19	90.48	1.00	91.49
16MW-15	03/13/98	100.98000	00:00	8.60	0.60	92.38	1.90	92.89
16MW-15	04/03/98	100.98000	00:00	8.01	0.41	92.97	0.59	93.32

(1) Change in Water Elevation since last reported measurement

D = Dry NA = Not Available

(1) Change in Water Elevation since last reported measurement

(2) Measurements Based on Mean Sea Level

Water Level Product Thickness Data

SITE	DATE	MP ELEVATION ⁽¹⁾ (feet)	TIME	DEPTH TO WATER (feet)	FLOATING PRODUCT THICKNESS (feet)	WATER ELEV. ⁽¹⁾ (feet)	△ WATER ELEV. ⁽¹⁾ (feet)	EQUIV. FRESH WATER HEAD ⁽¹⁾ (feet)
C17MW-07	07/30/98	100.16000	00:00	10.61	1.12	89.55	-5.11	90.50
C17MW-07	08/07/98	100.16000	00:00	7.80	0.24	92.36	2.81	92.56
C17MW-07	08/13/98	100.16000	00:00	7.98	0.25	92.18	-0.18	92.39
C17MW-07	08/21/98	100.16000	00:00	7.61	0.11	92.55	0.37	92.64
C17MW-07	09/03/98	100.16000	00:00	7.76	0.15	92.40	-0.15	92.52
C17MW-07	09/10/98	100.16000	00:00	7.67	0.08	92.49	0.09	92.56
C17MW-07	10/02/98	100.16000	00:00	8.16	0.20	92.00	-0.49	92.17
C17MW-07	10/20/98	100.16000	00:00	7.88	0.10	92.28	0.28	92.36
C17MW-07	12/03/98	100.16000	00:00	7.96	0.08	92.20	-0.08	92.26
C17MW-07	12/23/98	100.16000	00:00	8.03	0.12	92.13	-0.07	92.23
C17MW-07	01/26/99	100.16000	00:00	6.65	0.10	93.51	1.38	93.59
C17MW-07	03/09/99	100.16000	00:00	6.95	0.11	93.21	-0.30	93.30

(1) Change in Water Elevation since last reported measurement
 (1)Change in Water Elevation since last reported measurement
 (2)Measurements Based on Mean Sea Level

D = Dry NA = Not Available

U.S. Navy RAC Contract No. 62472-94-D-0398
 Naval Weapons Station-Earle: Bioslurper No. 1
 Analytical Results of Air Samples

Bioslurper Unit #1

SAMPLE NO. 16(A)VD15 Sample Date: 12/31/99	Molecular Weight (lbs/lbs-mol)	Conversion Constant (cu. ft/lbs-mol)	Time Conversion (min/hr)	Weekly Flow Rate (cu. ft/min)	Compound Conc. (ppm(v))	Compound	Output Rate (lbs/hr)	Emission Limits (lbs/hr)
						Emission Limit ppm(v)		
Acetone	58.1	384.6	60.0	67.0	0.0	N/A	0.00E+00	
Benzene	78.0	384.6	60.0	67.0	0.000	7.0	0.00E+00	8.00E-03
Toluene	92.0	384.6	60.0	67.0	0.0	N/A	0.00E+00	
Ethylbenzene	106.0	384.6	60.0	67.0	0.0	N/A	0.00E+00	
m,p-Xylenes	106.0	384.6	60.0	67.0	0.000	N/A	0.00E+00	
o-Xylene	106.0	384.6	60.0	67.0	0.0	N/A	0.00E+00	
1,3,5-Trimethylbenzene	120.0	384.6	60.0	67.0	0.000	N/A	0.00E+00	
1,2,4-Trimethylbenzene	120.0	384.6	60.0	67.0	0.0	N/A	0.00E+00	
Total Emissions:					0.000	27.5	0.00E+00	3.50E-02

Formula: Output Rate per Compound = $\frac{(\text{Mol. Wt.}) \times (\text{Time Conv.}) \times (\text{Concentration}) \times (\text{Flow Rate})}{(\text{Conv. Constant}) \times 10^6}$

U.S. Navy RAC Contract No. 62472-94-D-0398
 Naval Weapons Station-Earle: Bioslurper No. 2
 Analytical Results of Air Samples

Bioslurper Unit # 2

SAMPLE NO. 16(B)VD15 SAMPLE DATE: 12/31/98	Molecular Weight (lbs/lbs-mol)	Conversion Constant (cu. ft/lbs-mol)	Time Conversion (min/hr)	Weekly Flow Rate (cu. ft/min)	Compound Conc.	Compound Emission Limit	Output Rate	Emission Limits
					(ppm(v))	ppm(v)	(lbs/hr)	(lbs/hr)
Acetone	58.1	384.6	60.0	79.0	0.0	N/A	0.00E+00	
Benzene	78.0	384.6	60.0	79.0	0.00	7.0	0.00E+00	8.00E-03
Toluene	92.0	384.6	60.0	79.0	0.00	N/A	0.00E+00	
Ethylbenzene	106.0	384.6	60.0	79.0	0.0	N/A	0.00E+00	
m,p-Xylenes	106.0	384.6	60.0	79.0	0.0	N/A	0.00E+00	
o-Xylene	106.0	384.6	60.0	79.0	0.0	N/A	0.00E+00	
1,3,5-Trimethylbenzene	120.0	384.6	60.0	79.0	0.0	N/A	0.00E+00	
1,2,4-Trimethylbenzene	120.0	384.6	60.0	79.0	0.0	N/A	0.00E+00	
Total Emissions:					0.0	27.5	0.00E+00	3.50E-02

Formula: Output Rate per Compound = $\frac{(\text{Mol. Wt.}) \times (\text{Time Conv.}) \times (\text{Concentration}) \times (\text{Flow Rate})}{(\text{Conv. Constant}) \times 10^6}$

U.S. Navy RAC Contract No. 62472-94-D-0398
 Naval Weapons Station-Earle: Bioslurper No. 1
 Analytical Results of Air Samples

Bioslurper Unit #1

SAMPLE NO.: 16(A)99VD01									
SAMPLE DATE: 2/1/99		Molecular Weight (lbs/lbs-mol)	Conversion Constant (cu. ft/lbs-mol)	Time Conversion (min/hr)	Weekly Flow Rate (cu. ft/min)	Compound Conc. (ppm(v))	Compound Emission Limit ppm(v)	Output Rate (lbs/hr)	Emission Limits (lbs/hr)
Compound									
Acetone	58.1	384.6	60.0	66.1	0.000	N/A	0.00E+00		
Benzene	78.0	384.6	60.0	66.1	0.000	7.0	0.00E+00	8.00E-03	
Toluene	92.0	384.6	60.0	66.1	0.000	N/A	0.00E+00		
Ethylbenzene	106.0	384.6	60.0	66.1	0.000	N/A	0.00E+00		
m,p-Xylenes	106.0	384.6	60.0	66.1	0.000	N/A	0.00E+00		
o-Xylene	106.0	384.6	60.0	66.1	0.000	N/A	0.00E+00		
1,3,5-Trimethylbenzene	120.0	384.6	60.0	66.1	0.000	N/A	0.00E+00		
1,2,4-Trimethylbenzene	120.0	384.6	60.0	66.1	0.000	N/A	0.00E+00		
Total Emissions:						0.000	27	0.00E+00	3.50E-02

Formula: Output Rate per Compound = $\frac{(\text{Mol. Wt.}) \times (\text{Time Conv.}) \times (\text{Concentration}) \times (\text{Flow Rate})}{(\text{Conv. Constant}) \times 10^6}$

U.S. Navy RAC Contract No. 62472-94-D-0398
 Naval Weapons Station-Earle: Bioslurper No. 2
 Analytical Results of Air Samples

Bioslurper Unit # 2

SAMPLE NO.: 16(B)99VD01 SAMPLE DATE: 2/1/99									
Compound	Molecular Weight (lbs/lbs-mol)	Conversion Constant (cu. ft/lbs-mol)	Time Conversion (min/hr)	Weekly Flow Rate (cu. ft/min)	Compound Conc. (ppm(v))	Compound Emission Limit ppm(v)	Output Rate (lbs/hr)	Emission Limits (lbs/hr)	
Acetone	58.1	384.6	60.0	75.0	0.023	N/A	1.56E-05		
Benzene	78.0	384.6	60.0	75.0	0.550	7.0	5.02E-04	8.00E-03	
Toluene	92.0	384.6	60.0	75.0	0.038	N/A	4.09E-05		
Ethylbenzene	106.0	384.6	60.0	75.0	0.000	N/A	0.00E+00		
m,p-Xylenes	106.0	384.6	60.0	75.0	0.000	N/A	0.00E+00		
o-Xylene	106.0	384.6	60.0	75.0	0.710	N/A	8.81E-04		
1,3,5-Trimethylbenzene	120.0	384.6	60.0	75.0	0.300	N/A	4.21E-04		
1,2,4-Trimethylbenzene	120.0	384.6	60.0	75.0	0.064	N/A	8.99E-05		
Total Emissions:					1.685	27	1.95E-03	3.50E-02	

Formula: Output Rate per Compound = $\frac{(\text{Mol. Wt.}) \times (\text{Time Conv.}) \times (\text{Concentration}) \times (\text{Flow Rate})}{(\text{Conv. Constant}) \times 10^6}$

U.S. Navy RAC Contract No. 62472-94-D-0398
 Naval Weapons Station-Earle: Bioslurper No. 1
 Analytical Results of Air Samples

Bioslurper Unit #1

SAMPLE NO.: 16(A)99VD02 SAMPLE DATE: 2/25/99		Molecular Weight (lbs/lbs-mol)	Conversion Constant (cu. ft/lbs-mol)	Time Conversion (min/hr)	Weekly Flow Rate (cu. ft/min)	Compound Conc. (ppm(v))	Compound Emission Limit ppm(v)	Output Rate (lbs/hr)	Emission Limits (lbs/hr)
Compound									
Acetone	58.1	384.6	60.0	70.5	0.000	N/A	0.00E+00		
Benzene	78.0	384.6	60.0	70.5	0.000	7.0	0.00E+00	8.00E-03	
Toluene	92.0	384.6	60.0	70.5	0.000	N/A	0.00E+00		
Ethylbenzene	106.0	384.6	60.0	70.5	0.000	N/A	0.00E+00		
m,p-Xylenes	106.0	384.6	60.0	70.5	0.000	N/A	0.00E+00		
o-Xylene	106.0	384.6	60.0	70.5	0.000	N/A	0.00E+00		
1,3,5-Trimethylbenzene	120.0	384.6	60.0	70.5	0.000	N/A	0.00E+00		
1,2,4-Trimethylbenzene	120.0	384.6	60.0	70.5	0.000	N/A	0.00E+00		
Total Emissions:						0.000	27	0.00E+00	3.50E-02

Formula: Output Rate per Compound = $\frac{(\text{Mol. Wt.}) \times (\text{Time Conv.}) \times (\text{Concentration}) \times (\text{Flow Rate})}{(\text{Conv. Constant}) \times 10^6}$

U.S. Navy RAC Contract No. 62472-94-D-0398
 Naval Weapons Station-Earle: Bioslurper No. 2
 Analytical Results of Air Samples

Bioslurper Unit # 2

SAMPLE NO.: 16(B)99VD02 SAMPLE DATE: 2/25/99	Molecular Weight (lbs/lbs-mol)	Conversion Constant (cu. ft/lbs-mol)	Time Conversion (min/hr)	Weekly Flow Rate (cu. ft/min)	Compound	Compound	Output	Emission
					Conc. (ppm(v))	Emission Limit ppm(v)	Rate (lbs/hr)	Limits (lbs/hr)
	58.1	384.6	60.0	91.0	0.000	N/A	0.00E+00	
	78.0	384.6	60.0	91.0	0.280	7.0	3.10E-04	8.00E-03
	92.0	384.6	60.0	91.0	0.130	N/A	1.70E-04	
	106.0	384.6	60.0	91.0	0.230	N/A	3.46E-04	
	106.0	384.6	60.0	91.0	0.330	N/A	4.97E-04	
	106.0	384.6	60.0	91.0	0.100	N/A	1.50E-04	
	120.0	384.6	60.0	91.0	0.006	N/A	9.71E-06	
	120.0	384.6	60.0	91.0	0.020	N/A	3.41E-05	
Total Emissions:					1.096	27	1.52E-03	3.50E-02

Formula: Output Rate per Compound = $\frac{(\text{Mol. Wt.}) \times (\text{Time Conv.}) \times (\text{Concentration}) \times (\text{Flow Rate})}{(\text{Conv. Constant}) \times 10^6}$

U.S. Navy RAC Contract No. 62472-94-D-0398
 Naval Weapons Station-Earle: Bioslurper No. 1
 Analytical Results of Air Samples

Bioslurper Unit #1

SAMPLE NO.: 16(B)99VD03 SAMPLE DATE: 3/31/99									
Compound	Molecular Weight (lbs/lbs-mol)	Conversion Constant (cu. ft/lbs-mol)	Time Conversion (min/hr)	Weekly Flow Rate (cu. ft/min)	Compound Conc. (ppm(v))	Compound Emission Limit (ppm(v))	Output Rate (lbs/hr)	Emission Limits (lbs/hr)	
Acetone	58.1	384.6	60.0	97.0	0.000	N/A	0.00E+00		
Benzene	78.0	384.6	60.0	97.0	0.240	7.0	2.83E-04	8.00E-03	
Toluene	92.0	384.6	60.0	97.0	0.000	N/A	0.00E+00		
Ethylbenzene	106.0	384.6	60.0	97.0	0.400	N/A	6.42E-04		
m,p-Xylenes	106.0	384.6	60.0	97.0	0.550	N/A	8.82E-04		
o-Xylene	106.0	384.6	60.0	97.0	0.340	N/A	5.45E-04		
1,3,5-Trimethylbenzene	120.0	384.6	60.0	97.0	0.000	N/A	0.00E+00		
1,2,4-Trimethylbenzene	120.0	384.6	60.0	97.0	0.000	N/A	0.00E+00		
Total Emissions:					1.530	27	2.35E-03	3.50E-02	

Formula: Output Rate per Compound = $\frac{(\text{Mol. Wt.}) \times (\text{Time Conv.}) \times (\text{Concentration}) \times (\text{Flow Rate})}{(\text{Conv. Constant}) \times 10^6}$

U.S. Navy RAC Contract No. 62472-94-D-0398
 Naval Weapons Station-Earle: Bioslurper No. 1
 Analytical Results of Air Samples

Bioslurper Unit #1

SAMPLE NO.: 16(A)99VD03 SAMPLE DATE: 3/31/99	Molecular Weight (lbs/lbs-mol)	Conversion Constant (cu. ft/lbs-mol)	Time Conversion (min/hr)	Weekly Flow Rate (cu. ft/min)	Compound			
					Compound Conc. (ppm(v))	Emission Limit ppm(v)	Output Rate (lbs/hr)	Emission Limits (lbs/hr)
Acetone	58.1	384.6	60.0	66.1	0.000	N/A	0.00E+00	
Benzene	78.0	384.6	60.0	66.1	0.000	7.0	0.00E+00	8.00E-03
Toluene	92.0	384.6	60.0	66.1	0.000	N/A	0.00E+00	
Ethylbenzene	106.0	384.6	60.0	66.1	0.000	N/A	0.00E+00	
m,p-Xylenes	106.0	384.6	60.0	66.1	0.000	N/A	0.00E+00	
o-Xylene	106.0	384.6	60.0	66.1	0.000	N/A	0.00E+00	
1,3,5-Trimethylbenzene	120.0	384.6	60.0	66.1	0.000	N/A	0.00E+00	
1,2,4-Trimethylbenzene	120.0	384.6	60.0	66.1	0.000	N/A	0.00E+00	
Total Emissions:					0.000	27	0.00E+00	3.50E-02

Formula: Output Rate per Compound = $\frac{(\text{Mol. Wt.}) \times (\text{Time Conv.}) \times (\text{Concentration}) \times (\text{Flow Rate})}{(\text{Conv. Constant}) \times 10^6}$

VOLATILE ORGANIC ANALYSIS

CLIENT NAME:	Foster Wheeler Environmental	CLIENT SAMPLE ID: 16 (A) VD 15
PROJECT #:	—	AAI RFS# 9900701
PROJECT NAME:	NWS-Earle	AAI ID#: 9900701-001
MATRIX:	Air/Canister	
SAMPLE VOLUME:	0.005 Liter	DATE SAMPLED: 12/31/98
INITIAL PRESSURE:	1.00 psia	DATE RECEIVED: 1/7/99
FINAL PRESSURE:	1.00 psia	DATE ANALYZED: 1/8/99
PRES. DILUTION :	1.00	
DILUTION FACTOR:	1	ANALYTICAL METHOD: EPA TO14 (GC/MS)

CAS NUMBER	COMPOUND	CONCENTRATION			
		mg/m3	PQL	ppm(v)	PQL
74-87-3	Chloromethane	ND<	1.0	ND<	0.5
74-83-9	Bromomethane	ND<	1.0	ND<	0.3
75-01-04	Vinyl Chloride	ND<	1.0	ND<	0.4
75-00-3	Chloroethane	ND<	1.0	ND<	0.4
75-69-4	Freon 11	ND<	1.0	ND<	0.2
75-35-4	1,1-Dichloroethene	ND<	1.0	ND<	0.3
76-13-1	Freon 113	ND<	1.0	ND<	0.1
75-09-2	Methylene Chloride	ND<	1.0	ND<	0.3
75-35-3	1,1-Dichloroethane	ND<	1.0	ND<	0.2
156-60-5	trans-1,2-Dichloroethene	ND<	1.0	ND<	0.3
156-59-2	cis-1,2-Dichloroethene	ND<	1.0	ND<	0.3
67-66-3	Chloroform	ND<	1.0	ND<	0.2
71-55-6	1,1,1-Trichloroethane	ND<	1.0	ND<	0.2
56-23-5	Carbon Tetrachloride	ND<	1.0	ND<	0.2
71-43-2	Benzene	ND<	1.0	ND<	0.3
107-06-2	1,2-Dichloroethane	ND<	1.0	ND<	0.2
79-01-6	Trichloroethene	ND<	1.0	ND<	0.2
78-87-5	1,2-Dichloropropane	ND<	1.0	ND<	0.2
10061-02-6	trans-1,3-Dichloropropene	ND<	1.0	ND<	0.2
108-88-3	Toluene	ND<	1.0	ND<	0.3
10061-01-5	cis-1,3-Dichloropropene	ND<	1.0	ND<	0.2
79-00-5	1,1,2-Trichloroethane	ND<	1.0	ND<	0.2
127-18-4	Tetrachloroethene	ND<	1.0	ND<	0.1
106-93-4	Ethylene Dibromide	ND<	1.0	ND<	0.1
108-90-7	Chlorobenzene	ND<	1.0	ND<	0.2
100-41-4	Ethylbenzene	ND<	1.0	ND<	0.2
1330-20-7	m,p-Xylene	ND<	1.0	ND<	0.2
95-47-6	o-Xylene	ND<	1.0	ND<	0.2
100-42-5	Styrene	ND<	1.0	ND<	0.2
79-34-5	1,1,2,2-Tetrachlorethane	ND<	1.0	ND<	0.1
108-67-8	1,3,5-Trimethyl Benzene	ND<	1.0	ND<	0.2
95-63-6	1,2,4-Trimethyl Benzene	ND<	1.0	ND<	0.2
541-73-1	1,3-Dichlorobenzene	ND<	1.0	ND<	0.2
106-46-7	1,4-Dichlorobenzene	ND<	1.0	ND<	0.2
100-44-7	Chlorotoluene	ND<	1.0	ND<	0.2
95-50-1	1,2-Dichlorobenzene	ND<	1.0	ND<	0.2
67-64-1	Acetone	ND<	1.0	ND<	0.4
78-93-3	2-Butanone	ND<	1.0	ND<	0.3
108-10-1	4-methyl-2-pentanone	ND<	1.0	ND<	0.2
591-78-6	2-Hexanone	ND<	1.0	ND<	0.2
Surrogate Recovery		% Recovery			
1,2-Dichloroethane-D4 (SS1)		108	70-130		
Toluene-d8 (SS2)		114	70-130		
4- Bromofluorobenzene (SS3)		113	70-130		

ND- Not detected
TR - Trace

*Value outside QC limits due to matrix interference.

VOLATILE ORGANIC ANALYSIS

CLIENT NAME: Foster Wheeler Environmental
PROJECT #: ---
PROJECT NAME: NWS-Earle
MATRIX: Air/Canister
SAMPLE VOLUME: 0.005 Liter
INITIAL PRESSURE: 1.00 psia
FINAL PRESSURE: 1.00 psia
PRES. DILUTION : 1.00
DILUTION FACTOR: 1

CLIENT SAMPLE ID: 16 (B) VD 15
AAI RFS# 9900701
AAI ID#: 9900701-002

DATE SAMPLED: 12/31/98
DATE RECEIVED: 1/7/99
DATE ANALYZED: 1/8/99

ANALYTICAL METHOD: EPA TO14 (GC/MS)

CAS NUMBER	COMPOUND	CONCENTRATION			
		mg/m3	PQL	ppm(v)	PQL
74-87-3	Chloromethane	ND<	1.0	ND<	0.5
74-83-9	Bromomethane	ND<	1.0	ND<	0.3
75-01-04	Vinyl Chloride	ND<	1.0	ND<	0.4
75-00-3	Chloroethane	ND<	1.0	ND<	0.4
75-69-4	Freon 11	ND<	1.0	ND<	0.2
75-35-4	1,1-Dichloroethene	ND<	1.0	ND<	0.3
76-13-1	Freon 113	ND<	1.0	ND<	0.1
75-09-2	Methylene Chloride	ND<	1.0	ND<	0.3
75-35-3	1,1-Dichloroethane	ND<	1.0	ND<	0.2
156-60-5	trans-1,2-Dichloroethene	ND<	1.0	ND<	0.3
156-59-2	cis-1,2-Dichloroethene	ND<	1.0	ND<	0.3
67-66-3	Chloroform	ND<	1.0	ND<	0.2
71-55-6	1,1,1-Trichloroethane	ND<	1.0	ND<	0.2
56-23-5	Carbon Tetrachloride	ND<	1.0	ND<	0.2
71-43-2	Benzene	ND<	1.0	ND<	0.3
107-06-2	1,2-Dichloroethane	ND<	1.0	ND<	0.2
79-01-6	Trichloroethene	ND<	1.0	ND<	0.2
78-87-5	1,2-Dichloropropane	ND<	1.0	ND<	0.2
10061-02-6	trans-1,3-Dichloropropene	ND<	1.0	ND<	0.2
108-88-3	Toluene	ND<	1.0	ND<	0.3
10061-01-5	cis-1,3-Dichloropropene	ND<	1.0	ND<	0.2
79-00-5	1,1-2-Trichloroethane	ND<	1.0	ND<	0.2
127-18-4	Tetrachloroethene	ND<	1.0	ND<	0.1
106-93-4	Ethylene Dibromide	ND<	1.0	ND<	0.1
108-90-7	Chlorobenzene	ND<	1.0	ND<	0.2
100-41-4	Ethylbenzene	ND<	1.0	ND<	0.2
1330-20-7	m,p-Xylene	ND<	1.0	ND<	0.2
95-47-6	o-Xylene	ND<	1.0	ND<	0.2
100-42-5	Styrene	ND<	1.0	ND<	0.2
79-34-5	1,1,2,2-Tetrachlorethane	ND<	1.0	ND<	0.1
108-67-8	1,3,5-Trimethyl Benzene	ND<	1.0	ND<	0.2
95-63-6	1,2,4-Trimethyl Benzene	ND<	1.0	ND<	0.2
541-73-1	1,3-Dichlorobenzene	ND<	1.0	ND<	0.2
106-46-7	1,4-Dichlorobenzene	ND<	1.0	ND<	0.2
100-44-7	Chlorotoluene	ND<	1.0	ND<	0.2
95-50-1	1,2-Dichlorobenzene	ND<	1.0	ND<	0.2
67-64-1	Acetone	ND<	1.0	ND<	0.4
78-93-3	2-Butanone	ND<	1.0	ND<	0.3
108-10-1	4-methyl-2-pentanone	ND<	1.0	ND<	0.2
591-78-6	2-Hexanone	ND<	1.0	ND<	0.2
Surrogate Recovery		% Recovery			
1,2-Dichloroethane-D4 (SS1)		114		70-130	
Toluene-d8 (SS2)		109		70-130	
4- Bromofluorobenzene (SS3)		106		70-130	

ND- Not detected
 TR - Trace

*Value outside QC limits due to matrix interference.

VOLATILE ORGANIC ANALYSIS

CLIENT NAME:	Foster Wheeler Environmental	CLIENT SAMPLE ID: Method Blank
PROJECT #:	—	AAI RFS# 9900701
PROJECT NAME:	NWS-Earle	AAI ID#: Method Blank
MATRIX:	Air/Canister	
SAMPLE VOLUME:	0.005 Liter	DATE SAMPLED: 12/31/98
INITIAL PRESSURE:	1.00 psia	DATE RECEIVED: 1/7/99
FINAL PRESSURE:	1.00 psia	DATE ANALYZED: 1/8/99
PRES. DILUTION :	1.00	
DILUTION FACTOR:	1	ANALYTICAL METHOD: EPA TO14 (GC/MS)

CAS NUMBER	COMPOUND	CONCENTRATION			
		mg/m3	PQL	ppm(v)	PQL
74-87-3	Chloromethane	ND<	1.0	ND<	0.5
74-83-9	Bromomethane	ND<	1.0	ND<	0.3
75-01-04	Vinyl Chloride	ND<	1.0	ND<	0.4
75-00-3	Chloroethane	ND<	1.0	ND<	0.4
75-69-4	Freon 11	ND<	1.0	ND<	0.2
75-35-4	1,1-Dichloroethene	ND<	1.0	ND<	0.3
76-13-1	Freon 113	ND<	1.0	ND<	0.1
75-09-2	Methylene Chloride	ND<	1.0	ND<	0.3
75-35-3	1,1-Dichloroethane	ND<	1.0	ND<	0.2
156-60-5	trans-1,2-Dichloroethene	ND<	1.0	ND<	0.3
156-59-2	cis-1,2-Dichloroethene	ND<	1.0	ND<	0.3
67-66-3	Chloroform	ND<	1.0	ND<	0.2
71-55-6	1,1,1-Trichloroethane	ND<	1.0	ND<	0.2
56-23-5	Carbon Tetrachloride	ND<	1.0	ND<	0.2
71-43-2	Benzene	ND<	1.0	ND<	0.3
107-06-2	1,2-Dichloroethane	ND<	1.0	ND<	0.2
79-01-6	Trichloroethene	ND<	1.0	ND<	0.2
78-87-5	1,2-Dichloropropane	ND<	1.0	ND<	0.2
10061-02-6	trans-1,3-Dichloropropene	ND<	1.0	ND<	0.2
108-88-3	Toluene	ND<	1.0	ND<	0.3
10061-01-5	cis-1,3-Dichloropropene	ND<	1.0	ND<	0.2
79-00-5	1,1-2-Trichloroethane	ND<	1.0	ND<	0.2
127-18-4	Tetrachloroethene	ND<	1.0	ND<	0.1
106-93-4	Ethylene Dibromide	ND<	1.0	ND<	0.1
108-90-7	Chlorobenzene	ND<	1.0	ND<	0.2
100-41-4	Ethylbenzene	ND<	1.0	ND<	0.2
1330-20-7	m,p-Xylene	ND<	1.0	ND<	0.2
95-47-6	o-Xylene	ND<	1.0	ND<	0.2
100-42-5	Styrene	ND<	1.0	ND<	0.2
79-34-5	1,1,2,2-Tetrachlorethane	ND<	1.0	ND<	0.1
108-67-8	1,3,5-Trimethyl Benzene	ND<	1.0	ND<	0.2
95-63-6	1,2,4-Trimethyl Benzene	ND<	1.0	ND<	0.2
541-73-1	1,3-Dichlorobenzene	ND<	1.0	ND<	0.2
106-46-7	1,4-Dichlorobenzene	ND<	1.0	ND<	0.2
100-44-7	Chlorotoluene	ND<	1.0	ND<	0.2
95-50-1	1,2-Dichlorobenzene	ND<	1.0	ND<	0.2
67-64-1	Acetone	ND<	1.0	ND<	0.4
78-93-3	2-Butanone	ND<	1.0	ND<	0.3
108-10-1	4-methyl-2-pentanone	ND<	1.0	ND<	0.2
591-78-6	2-Hexanone	ND<	1.0	ND<	0.2
Surrogate Recovery		% Recovery			
1,2-Dichloroethane-D4 (SS1)		92	70-130		
Toluene-d8 (SS2)		128	70-130		
4- Bromofluorobenzene (SS3)		73	70-130		

ND- Not detected
TR - Trace

*Value outside QC limits due to matrix interference.

ANALYTICAL RESULTS

AAI RFS #: 9900701

Client Name: Foster Wheeler Environmental
 Project Name: NWS-Earle
 Project #: —
 Matrix: Air/Canister

Date(s) Sampled: 12/31/98
 Date(s) Analyzed: 1/8/99
 Analytical Method: CARB/EPA
 Chemist: HA

	Units	16 (A) VD 15 9900701 -001	16 (B) VD 15 9900701 -002	Method Blank
EPA 8015mod				
TPH as gasoline	(ppm(v))	430	83	ND<10

	Units	16 (A) VD 15 9900701 -001	16 (B) VD 15 9900701 -002	Method Blank
EPA 8015mod				
TPH as gasoline	(mg/m3)	1,550	290	ND<1.0

QUALITY CONTROL

AAI RFS #: 9900701

Client Name: Foster Wheeler Environmental
 Project Name: NWS-Earle
 Project #: —
 Matrix: Air/Canister

Date(s) Sampled: 12/31/98
 Date(s) Analyzed: 1/8/99
 Analytical Method: CARB/EPA
 Chemist: HA

	Sample Result	Duplicate Result	RPD	Quality Control Limits
	9900701-001	9900701-001		
	(ppm(v))	(ppm(v))	(%)	(%)
EPA 8015mod				
TPH as gasoline	430	410	5	30

	Sample Result	Duplicate Result	RPD	Quality Control Limits
	9900701-001	9900701-001		
	(mg/m3)	(mg/m3)	(%)	(%)
EPA 8015mod				
TPH as gasoline	1,550	1,500	3	30

Company Name: <i>Foster Wheeler Energy</i>		Project Manager or Contact: Phone: <i>Mike Heffron</i>		Parameters/Method Numbers for Analysis										Chain of Custody Record			
Project No.		Project Name: <i>NWS-Eagle</i>		No. of Containers <i>TPH</i> <i>Volatiles Organic</i>										 EA Laboratories Environmental Analysis Polymers (ATIS) T-4920			
Dept.: Task:		ATO Number:															
Sample Storage Location:		Report #: <i>AAI RFS# 9900701</i>												Report Deliverables: 1 2 3 4 D E			
Page of														EDD: Yes/No			
														DUE TO CLIENT: _____			
ID #	Date	Time	Water	Air	Sample Identification 19 Characters										EA Labs Accession Number	Remarks	
-001	<i>12/3/98</i>	<i>10:00</i>		<i>X</i>													LPM:
-002	<i>12/30/98</i>	<i>10:30</i>		<i>X</i>													<i>48 HOUR RUSH</i> <i>PER MIKE HEFFRON</i> <i>1/8/99 (43)</i>
Sampled by: (Signature)		Date/Time		Relinquished by: (Signature)			Date/Time		Received by: (Signature)			Date/Time					
Relinquished by: (Signature)		Date/Time		Received by Laboratory: (Signature)			Date/Time		Airbill Number:		Sample Shipped by: (Circle)						
											<input checked="" type="radio"/> Fed Ex <input type="radio"/> Puro <input type="radio"/> UPS						
Cooler Temp. C pH: <input type="checkbox"/> Yes <input type="checkbox"/> No		Comments:			Custody Seals Intact <input type="checkbox"/> Yes <input type="checkbox"/> No			Hand Carried		Other:							
NOTE: Please indicate method number for analyses requested. This will help clarify any questions with laboratory techniques.																	

VOLATILE ORGANIC ANALYSIS

CLIENT NAME: Foster Wheeler Environmental
 PROJECT #: —
 PROJECT NAME: NWS-Earte
 MATRIX: Air/Canister
 SAMPLE VOLUME: 0.01 Liter
 INITIAL PRESSURE: 14.60 psia
 FINAL PRESSURE: 15.90 psia
 PRES. DILUTION : 1.09
 DILUTION FACTOR: 1

CLIENT SAMPLE ID: 16 (B) 99VD03
 AAI RFS# 9909204
 AAI ID#: 9909204-002

DATE SAMPLED: 3/31/99
 DATE RECEIVED: 4/2/99
 DATE ANALYZED: 4/6/99

ANALYTICAL METHOD: EPA TO14 (GC/MS)

CAS NUMBER	COMPOUND	CONCENTRATION			
		mg/m3	PQL	ppm(v)	PQL
74-87-3	Chloromethane	ND<	0.545	ND<	0.264
74-83-9	Bromomethane	ND<	0.545	ND<	0.140
75-01-04	Vinyl Chloride	ND<	0.545	ND<	0.213
75-00-3	Chloroethane	ND<	0.545	ND<	0.206
75-69-4	Freon 11	ND<	0.545	ND<	0.097
75-35-4	1,1-Dichloroethene	ND<	0.545	ND<	0.137
76-13-1	Freon 113	ND<	0.545	ND<	0.071
75-09-2	Methylene Chloride	ND<	0.545	ND<	0.157
75-35-3	1,1-Dichloroethane	ND<	0.545	ND<	0.135
155-60-5	trans-1,2-Dichloroethene	ND<	0.545	ND<	0.137
156-59-2	cis-1,2-Dichloroethene	ND<	0.545	ND<	0.137
67-66-3	Chloroform	ND<	0.545	ND<	0.112
71-55-6	1,1,1-Trichloroethane	ND<	0.545	ND<	0.100
56-23-5	Carbon Tetrachloride	ND<	0.545	ND<	0.087
71-43-2	Benzene	0.75	0.545	0.24	0.171
107-06-2	1,2-Dichloroethane	ND<	0.545	ND<	0.135
79-01-6	Trichloroethene	ND<	0.545	ND<	0.101
78-87-5	1,2-Dichloropropane	ND<	0.545	ND<	0.118
10061-02-6	trans-1,3-Dichloropropene	ND<	0.545	ND<	0.120
108-88-3	Toluene	ND<	0.545	ND<	0.145
10061-01-5	cis-1,3-Dichloropropene	ND<	0.545	ND<	0.120
79-00-5	1,1-2-Trichloroethane	ND<	0.545	ND<	0.100
127-18-4	Tetrachloroethene	ND<	0.545	ND<	0.080
106-93-4	Ethylene Dibromide	ND<	0.545	ND<	0.071
108-90-7	Chlorobenzene	ND<	0.545	ND<	0.118
100-41-4	Ethylbenzene	1.7	0.545	0.40	0.125
1330-20-7	m,p-Xylene	2.4	0.545	0.55	0.125
95-47-6	o-Xylene	1.5	0.545	0.34	0.125
100-42-5	Styrene	ND<	0.545	ND<	0.128
79-34-5	1,1,2,2-Tetrachloroethane	ND<	0.545	ND<	0.079
108-67-8	1,3,5-Trimethyl Benzene	ND<	0.545	ND<	0.111
95-63-6	1,2,4-Trimethyl Benzene	ND<	0.545	ND<	0.111
541-73-1	1,3-Dichlorobenzene	ND<	0.545	ND<	0.091
106-46-7	1,4-Dichlorobenzene	ND<	0.545	ND<	0.091
100-44-7	Chlorotoluene	ND<	0.545	ND<	0.105
95-50-1	1,2-Dichlorobenzene	ND<	0.545	ND<	0.091
67-64-1	Acetone	ND<	0.545	ND<	0.230
78-93-3	2-Butanone	ND<	0.545	ND<	0.165
108-10-1	4-methyl-2-pentanone	ND<	0.545	ND<	0.133
591-78-6	2-Hexanone	ND<	0.545	ND<	0.133
Surrogate Recovery		% Recovery			
1,2-Dichloroethane-D4 (SS1)		101		70-130	
Toluene-d8 (SS2)		93		70-130	
4-Bromofluorobenzene (SS3)		111		70-130	

ND- Not detected

*Value outside QC limits due to matrix interference.

TR - Trace

ANALYTICAL RESULTS

AAI RFS #: 9909204

Client Name: Foster Wheeler Environmental
 Project Name: NWS-Earle
 Project #: —
 Matrix: Air/Canister

Date(s) Sampled: 3/31/99
 Date(s) Analyzed: 4/6/99
 Analytical Method: CARB/EPA
 Chemist: HA

	16 (A) 99VD03	16 (B) 99VD03	Method
Units	9909204 -001	9909204 -002	Blank
EPA 8015mod			
TPH as gasoline (ppm(v))	ND<10	200	ND<10

	16 (A) 99VD03	16 (B) 99VD03	Method
Units	9909204 -001	9909204 -002	Blank
EPA 8015mod			
TPH as gasoline (mg/m3)	ND<1.0	700	ND<1.0

QUALITY CONTROL

AAI RFS #: 9909204

Client Name: Foster Wheeler Environmental
 Project Name: NWS-Earle
 Project #: —
 Matrix: Air/Canister

Date(s) Sampled: 3/31/99
 Date(s) Analyzed: 4/6/99
 Analytical Method: CARB/EPA
 Chemist: HA

	Sample Result 9909204-002 (ppm(v))	Duplicate Result 9909204-002 (ppm(v))	RPD (%)	Quality Control Limits (%)
EPA 8015mod				
TPH as gasoline	200	200	0	30

	Sample Result 9909204-002 (mg/m3)	Duplicate Result 9909204-002 (mg/m3)	RPD (%)	Quality Control Limits (%)
EPA 8015mod				
TPH as gasoline	700	700	0	30

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Received: 01/18/99

TOXIKON CORP. REPORT
01/25/99 16:09:37

Work Order # 99-01-261

REPORT FOSTER & WHEELER
TO 1 OXFORD VALLEY, SUITE 200
LANGHORNE, PA. 19047
215-702-4007 FAX: 4045
ATTEN MICHAEL HEFFRON

PREPARED TOXIKON CORPORATION
BY 15 WIGGINS AVE
BEDFORD, MA 01730
ATTEN PAUL LEZBERG
PHONE (781)275-3330

D. L. Shelley
CERTIFIED BY
CONTACT JAYSON

CLIENT FOSTER SAMPLES 10
COMPANY FOSTER & WHEELER
FACILITY 1 OXFORD VALLEY, SUITE 200
LANGHORNE, PA. 19047

MA CERT # N-MA064: TRACE METALS, SULFATE, CYANIDE, RES. FREE
CHLORINE, Ca, TOTAL ALK., TDS, pH, THMs, VOC, PEST., NUTRIENTS,
DEMAND, O&G, PHENOLICS, PCBs . CT DHS #PH-0563, NY #10778
FL MRS E87143, NJ DEP 59538, NC DNR286, SC 88002, NH 204091-C.

WORK ID MWS EARLE
TAKEN 1/13/99
TRANS _____
TYPE WATER
P.O. # MWS EARLE
INVOICE under separate cover

VERIFIED BY: *Paul Lezberg*

SAMPLE IDENTIFICATION

TEST CODES and NAMES used on this workorder

- 01 16(B)EW99W06
- 02 16(B)EW99W07
- 03 16(B)EW99W08
- 04 16(B)EW99W09
- 05 16(B)EW99W10
- 06 16(B)EW99W10
- 07 16(B)EW99W10
- 08 16(B)EW99W10
- 09 16(B)EW99W10
- 10 16EW99T801

- 8260 PURGEABLE ORGANICS VOA
- 8270 A/BN EXTRACTABLES
- MEK HG METALS, EXT. FOR MERCURY
- MEK TV METALS, TOTAL EXT., WATER
- PH W PH - AQUEOUS
- PFCBW PESTICIDES/PCB (WATER)
- TALW TAL METALS
- TPH IR TPH BY IR
- TSS TOTAL SUSPENDED SOLIDS

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Received: 01/18/99

TOXIKOM CORP. REPORT
Results by Sample

Work Order # 99-01-261

SAMPLE ID <u>16(B)EV99J06</u>	SAMPLE # <u>01</u> FRACTIONS: <u>A</u>
	Date & Time Collected <u>01/15/99 10:00:00</u> Category <u>WATER</u>
TPH_IR <u>120</u>	
mg/L DL=1.0	
SAMPLE ID <u>16(B)EV99J07</u>	SAMPLE # <u>02</u> FRACTIONS: <u>A</u>
	Date & Time Collected <u>01/15/99 10:02:00</u> Category <u>WATER</u>
TPH_IR <u>ND</u>	
mg/L DL=1.0	
SAMPLE ID <u>16(B)EV99J08</u>	SAMPLE # <u>03</u> FRACTIONS: <u>A</u>
	Date & Time Collected <u>01/15/99 10:04:00</u> Category <u>WATER</u>
TPH_IR <u>ND</u>	
mg/L DL=1.0	
SAMPLE ID <u>16(B)EV99J09</u>	SAMPLE # <u>04</u> FRACTIONS: <u>A</u>
	Date & Time Collected <u>01/15/99 10:06:00</u> Category <u>WATER</u>
TPH_IR <u>ND</u>	
mg/L DL=1.0	
SAMPLE ID <u>16(B)EV99J10</u>	SAMPLE # <u>05</u> FRACTIONS: <u>A</u>
	Date & Time Collected <u>01/15/99 10:10:00</u> Category <u>WATER</u>
TPH_IR <u>ND</u>	
mg/L DL=1.0	

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TOXIKON CORP.

REPORT

Work Order # 99-01-261

Received: 01/18/99

Results by Sample

SAMPLE ID 16(B)EU99U10FRACTION 06A TEST CODE 8270 NAME A/PK EXTRACTABLESDate & Time Collected 01/15/99 10:10:00Category WATER

	RESULT	LIMIT		RESULT	LIMIT
BASE NEUTRAL EXTRACTABLES					
bis-(2-Chloroethyl) ether	ND	11	Chrysene	ND	11
1,3-Dichlorobenzene	ND	11	Di-n-octyl phthalate	ND	11
1,4-Dichlorobenzene	ND	11	Benzo(b)fluoranthene	ND	11
1,2-Dichlorobenzene	ND	11	Benzo(k)fluoranthene	ND	11
bis(2-Chloroisopropyl) ether	ND	11	Benzo(a)pyrene	ND	11
N-Nitroso-Di-N-Propylamine	ND	11	Indeno(1,2,3-cd)pyrene	ND	11
Hexachloroethane	ND	11	Dibenz(a,h)anthracene	ND	11
Nitrobenzene	ND	11	Benzo(g,h,i)perylene	ND	11
Isophorone	ND	11	2-Methylnaphthalene	ND	11
bis(2-Chloroethoxy) methane	ND	11	Benzdine	ND	11
1,2,4-Trichlorobenzene	ND	11	Dibenzofuran	ND	11
Naphthalene	ND	11			
Hexachlorobutadiene	ND	11	ACID EXTRACTABLES		
Hexachlorocyclopentadiene	ND	11	Phenol	ND	11
2-Chloronaphthalene	ND	11	2-Chlorophenol	ND	11
Dimethyl phthalate	ND	11	Benzyl Alcohol	ND	22
Acenaphthylene	ND	11	2-Methylphenol	ND	11
Acenaphthene	ND	11	4+3-Methylphenol	ND	11
2,4-Dinitrotoluene	ND	11	2-Nitrophenol	ND	11
2,6-Dinitrotoluene	ND	11	2,4-Dimethylphenol	ND	11
Diethylphthalate	ND	11	Benzoic Acid	ND	56
4-Chlorophenyl phenyl ether	ND	11	2,4-Dichlorophenol	ND	11
Fluorene	ND	11	4-Chloroaniline	ND	11
N-Nitrosodiphenylamine	ND	11	4-Chloro-3-methylphenol	ND	11
4-Bromophenyl phenyl ether	ND	11	2,4,6-Trichlorophenol	ND	11
Hexachlorobenzene	ND	11	2,4,5-Trichlorophenol	ND	11
Phenanthrene	ND	11	2-Nitroaniline	ND	28
Anthracene	ND	11	3-Nitroaniline	ND	28
Di-n-butylphthalate	ND	11	2,4-Dinitrophenol	ND	28
Fluoranthene	ND	11	4-Nitrophenol	ND	28
Pyrene	ND	11	4-Nitroaniline	ND	28
Butyl benzyl phthalate	ND	11	4,6-Dinitro-2-methylphenol	ND	28
3,3'-Dichlorobenzidine	ND	22	Pentachlorophenol	ND	28
Benzo (a) anthracene	ND	11	2,6- Dichlorophenol	ND	28
bis (2-ethylhexyl)phthalate	ND	11			

Notes and Definitions for this Report:

UNITS: ug/L
 EXTRACTED: 01/19/99
 DATE RUN: 01/20/99
 ANALYST: PAC
 INSTRUMENT: F
 DIL. FACTOR: 1.12
 ND = not detected at detection limit

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TOXIKOM CORP.

REPORT

Work Order # 99-01-261

Received: 01/18/99

Results by Sample

SAMPLE ID 16(B)EUP9U10FRACTION 07A TEST CODE PPOM NAME PESTICIDES/PCB (WATER)Date & Time Collected 01/15/99 10:10:00 Category WATERPESTICIDESPCB

	RESULT	LIMIT		RESULT	LIMIT
Alpha-BHC	ND	0.010	Aroclor 1016	ND	0.10
Gamma-BHC (Lindane)	ND	0.010	Aroclor 1221	ND	0.10
Beta-BHC	ND	0.010	Aroclor 1232	ND	0.10
Heptachlor	ND	0.010	Aroclor 1242	ND	0.10
Delta-BHC	ND	0.010	Aroclor 1248	ND	0.10
Aldrin	ND	0.010	Aroclor 1254	ND	0.10
Heptachlor Epoxide	ND	0.010	Aroclor 1260	ND	0.10
Endosulfan I	ND	0.010			
4,4'-DDE	ND	0.010			
Dieldrin	ND	0.010			
Endrin	ND	0.010			
4,4'-DDD	ND	0.010			
Endosulfan II	ND	0.010			
4,4'-DDT	ND	0.010			
Endrin Aldehyde	ND	0.010			
Endosulfan Sulfate	ND	0.010			
Chlordane	ND	0.010			
Toxaphene	ND	0.010			
Methoxychlor	ND	0.010			

Notes and Definitions for this Report:

EXTRACTED: 01/19/99
 UNITS: ug/L
 DATE RUN: 01/21/99
 ANALYST: CK
 INSTRUMENT: HP3
 DIL. FACTOR: 1

ND = not detected at detection limit

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TOXIKON CORP.

REPORT

Work Order # 99-01-261

Received: 01/18/99

Results by Sample

SAMPLE ID <u>16(B)EV99U10</u>		SAMPLE # <u>08</u> FRACTIONS: <u>A</u>	
		Date & Time Collected <u>01/15/99 10:10:00</u> Category <u>WATER</u>	
PH <u>M</u>	<u>6.4</u>	TSS	<u>ND</u>
	PH UNITS	mg/L	DL=4.0

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Received: 01/18/99

TOXIKON CORP. REPORT
Results by Sample

Work Order # 99-01-261

SAMPLE ID 16(B)EM99W10 FRACTION OSA TEST CODE T&M NAME TAL METALS
Date & Time Collected 01/15/99 10:10:00 Category WATER

TAL METALS

	RESULT	LIMIT
Silver	ND	0.007
Cadmium	ND	0.005
Chromium	ND	0.010
Copper	ND	0.010
Nickel	ND	0.020
Lead	ND	0.050
Zinc	0.062	0.020
Arsenic	ND	0.100
Selenium	ND	0.250
Beryllium	ND	0.004
Antimony	ND	0.150
Thallium	ND	0.300
Barium	0.087	0.010
Iron	ND	0.020
Manganese	0.491	0.010
Cobalt	ND	0.010
Vanadium	ND	0.010
Aluminum	ND	0.200
Calcium	18.5	0.100
Potassium	3.19	0.500
Sodium	31.5	0.500
Magnesium	5.19	0.050
Mercury	ND	0.0005

Notes and Definitions for this Report:

EXTRACTED..... 01/20/99
DATE RUN..... 01/21/99
ANALYST..... AS
INSTRUMENT..... ICP
CONC FACTOR... 1
UNITS..... MG/L

ND = not detected at detection limit

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Received: 01/18/99

TOXIKON CORP. REPORT
Results by Sample

Work Order # 99-01-261

SAMPLE ID 16E999TB01 FRACTION 10A TEST CODE 8260 NAME PURGEABLE ORGANICS WQA
Date & Time Collected 01/15/99 Category WATER

EPA 8260 PURGEABLE ORGANICS

	RESULT	LIMIT		RESULT	LIMIT
Chloromethane	ND	10	o-Xylene	ND	5.0
Bromomethane	ND	5.0	m-p-Xylene	ND	5.0
Vinyl Chloride	ND	2.0	1,2-Dichlorobenzene	ND	5.0
Chloroethane	ND	10	1,3-Dichlorobenzene	ND	5.0
Methylene Chloride	ND	10	1,4-Dichlorobenzene	ND	5.0
1,1-Dichloroethene	ND	5.0	Naphthalene	ND	10
Trichlorofluoromethane	ND	10	n-Propylbenzene	ND	10
1,1-Dichloroethane	ND	5.0	Bromobenzene	ND	5.0
Trans-1,2-Dichloroethene	ND	5.0	Bromochloromethane	ND	5.0
Chloroform	ND	5.0	n-Butylbenzene	ND	10
1,2-Dichloroethane	ND	5.0	sec-Butylbenzene	ND	10
1,1,1-Trichloroethane	ND	5.0	tert-Butylbenzene	ND	10
Carbon Tetrachloride	ND	5.0	2-Chlorotoluene	ND	5.0
Bromodichloromethane	ND	5.0	4-Chlorotoluene	ND	5.0
1,2-Dichloropropane	ND	5.0	1,2-Dibromo-3-chloropropane	ND	5.0
Trichloroethene	ND	5.0	1,2-Dibromoethane	ND	5.0
Dibromochloromethane	ND	5.0	Dibromomethane	ND	5.0
1,1,2-Trichloroethane	ND	5.0	Dichlorodifluoromethane	ND	10
Benzene	ND	5.0	cis-1,2-Dichloroethene	ND	5.0
1,1-Dichloropropene	ND	5.0	1,3-Dichloropropene	ND	5.0
2,2-Dichloropropane	ND	5.0	1,1,1,2-Tetrachloroethane	ND	5.0
Bromoform	ND	5.0	1,2,3-Trichlorobenzene	ND	5.0
Hexachlorobutadiene	ND	10	1,1,2,2-Tetrachloroethane	ND	5.0
Isopropylbenzene	ND	10	1,2,4-Trichlorobenzene	ND	5.0
Tetrachloroethene	ND	5.0	1,2,3-Trichloropropane	ND	5.0
Methyl tertiary butyl ether	ND	5.0	1,2,4-Trimethylbenzene	ND	10
Toluene	ND	5.0	1,3,5-Trimethylbenzene	ND	10
Chlorobenzene	ND	5.0	cis-1,3-Dichloropropene	ND	5.0
Ethyl Benzene	ND	5.0	trans-1,3-Dichloropropene	ND	5.0
p-Isopropyltoluene	ND	10	Styrene	ND	5.0

Notes and definitions for this report:

DATE RUN 01/23/99

ANALYST JPM

INSTRUMENT _____ B

DIL. FACTOR 1

UNITS ug/L

COMMENTS _____

ND = Not detected at detection limit

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TOXIKON CORP.

REPORT

Work Order # 99-01-261

Received: 01/18/99

Test Methodology

TEST CODE 8260 NAME PURGEABLE ORGANICS VOL

EPA METHOD: 8260B: Gas Chromatography/Mass Spectrometry for Volatile Organics.

Reference: Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods.
EPA SW-846 Final Update III, 1996. Office of Solid Waste, USEPA.

SOIL RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

TEST CODE 8270 NAME A/BM EXTRACTABLESEPA METHOD: 8270C: Gas Chromatography / Mass Spectrometry for Semivolatile
Organics; Capillary Column Technique.Reference: Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods.
EPA SW-846 FINAL UPDATE III, 1996. Office of Solid Waste, USEPA.TEST CODE MEX HG NAME METALS, EXT. FOR MERCURY

REFERENCE:

EPA METHOD 245.1 Mercury. Methods for Chemical Analysis of Water and
Wastes. EPA 600/4-79-020.

EPA METHOD 7470. Mercury in Liquid Waste.

or

EPA METHOD 7471. Mercury in Solid or Semisolid Waste,
Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.
EPA SW-846 (Third Edition) 1986. Office of Solid Waste, USEPATEST CODE MEX TW NAME METALS, TOTAL EXT., WATER

REFERENCE:

EPA METHOD 3005. Acid Digestion of Waters for Total Recoverable or
Dissolved Metals for Analysis by Flame Atomic Absorption Spectroscopy or
Inductively Coupled Plasma Spectroscopy. Test Methods for Evaluating
Physical/Chemical Methods. SW 846, 3rd Edition.

Wastewater digestion

40CFR Part 136 Appendix C-Preparation for Inductively Coupled Plasma-
Atomic Emission Spectrometric Method for Trace Element Analysis of
Water and Wastes Method 200.7. Protection of Environment, 1991.TEST CODE PH W NAME PH - AQUEOUS

EPA METHOD: 150.1

Reference: Methods for Chemical Analysis of Water and Wastes.
EPA 600/4-79-020 (Revised, March 1983). EPA/ENSL.TEST CODE PPCBW NAME PESTICIDES/PCB (WATER)

Page 1
Received: 12/07/98

TOXIKON CORP. REPORT
12/08/98 15:35:32

Work Order # 98-12-131

REPORT FOSTER & WHEELER
TO 1 OXFORD VALLEY, SUITE 200
LANGHORNE, PA. 19047
215-702-4007 FAX: 4045
ATTEN MICHAEL HEFFRON

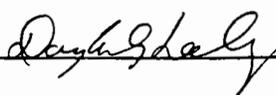
PREPARED TOXIKON CORPORATION
BY 15 WIGGINS AVE
BEDFORD, MA 01730
ATTEN PAUL LEZBERG
PHONE (781)275-3330


CERTIFIED BY
CONTACT JAYSON

CLIENT FOSTER SAMPLES 11
COMPANY FOSTER & WHEELER
FACILITY 1 OXFORD VALLEY, SUITE 200
LANGHORNE, PA. 19047

MA CERT # M-MA064: TRACE METALS, SULFATE, CYANIDE, RES. FREE
CHLORINE, Ca, TOTAL ALK., TDS, pH, THMs, VOC, PEST., NUTRIENTS,
DEMAND. O&G, PHENOLICS, PCBs . CT DHS #PH-0563, NY #10778
FL HRS E87143, NJ DEP 59538, NC DNR286, SC 88002, NH 204091-C.

WORK ID NWS-EARLE
TAKEN 12/4/98
TRANS _____
TYPE WATER
P.O. # _____
INVOICE under separate cover

VERIFIED BY: 

SAMPLE IDENTIFICATION

TEST CODES and NAMES used on this workorder

- 01 16(A)EW98W109
- 02 16(A)EW98W110
- 03 16(A)EW98W111
- 04 16(A)EW98W112
- 05 16(A)EW98W113
- 06 16(A)EW98W114
- 07 16(B)EW98W92
- 08 16(B)EW98W93
- 09 16(B)EW98W94
- 10 16(B)EW98W95
- 11 16(B)EW98W96

TPH IR TPH BY IR _____

SAMPLE ID 16(A)EW98W109 SAMPLE # 01 FRACTIONS: A
Date & Time Collected 12/04/98 14:00:00 Category WATER

TPH_IR 690
mg/L DL=1.0

SAMPLE ID 16(A)EW98W110 SAMPLE # 02 FRACTIONS: A
Date & Time Collected 12/04/98 14:02:00 Category WATER

TPH_IR 243
mg/L DL=1.0

SAMPLE ID 16(A)EW98W111 SAMPLE # 03 FRACTIONS: A
Date & Time Collected 12/04/98 14:04:00 Category WATER

TPH_IR 79.4
mg/L DL=1.0

SAMPLE ID 16(A)EW98W112 SAMPLE # 04 FRACTIONS: A
Date & Time Collected 12/04/98 14:06:00 Category WATER

TPH_IR 1.13
mg/L DL=1.0

SAMPLE ID 16(A)EW98W113 SAMPLE # 05 FRACTIONS: A
Date & Time Collected 12/04/98 14:08:00 Category WATER

TPH_IR ND
mg/L DL=1.0

SAMPLE ID 16(A)EW98W114 SAMPLE # 06 FRACTIONS: A
Date & Time Collected 12/04/98 14:10:00 Category WATER

TPH_IR ND
mg/L DL=1.0

SAMPLE ID 16(B)EW98W92 SAMPLE # 07 FRACTIONS: A
Date & Time Collected 12/04/98 14:40:00 Category WATER

TPH_IR 65.9
mg/L DL=1.0

SAMPLE ID 16(B)EW98W93 SAMPLE # 08 FRACTIONS: A
Date & Time Collected 12/04/98 14:42:00 Category WATER

TPH_IR 1.09
mg/L DL=1.0

SAMPLE ID <u>16(B)EW98U94</u>	SAMPLE # <u>09</u> FRACTIONS: <u>A</u>
Date & Time Collected <u>12/04/98 14:44:00</u> Category <u>WATER</u>	
TPH_IR <u>ND</u>	
mg/L DL=1.0	

SAMPLE ID <u>16(B)EW98U95</u>	SAMPLE # <u>10</u> FRACTIONS: <u>A</u>
Date & Time Collected <u>12/04/98 14:46:00</u> Category <u>WATER</u>	
TPH_IR <u>ND</u>	
mg/L DL=1.0	

SAMPLE ID <u>16(B)EW98U96</u>	SAMPLE # <u>11</u> FRACTIONS: <u>A</u>
Date & Time Collected <u>12/04/98 14:48:00</u> Category <u>WATER</u>	
TPH_IR <u>ND</u>	
mg/L DL=1.0	

Received: 12/07/98

Test Methodology

TEST CODE TPH IR NAME TPH BY IR

EPA METHOD: 418.1 for water sample.

Reference: Methods for Chemical Analysis of Water and Wastes.

EPA 600/4-79-020 (Revised, March 1983). EPA/EMSL, Cincinnati, OH.

EPA METHOD: 9071/9073

Reference: Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.

EPA SW-846 (Third Edition) 1986. Office of Solid Waste, USEPA.

CASE NARRATIVE

Work Order: 9812131

All samples were analyzed within the method holding times.

No target compounds were detected in the method blanks.

Received: 12/15/98

12/18/98 09:45:47

REPORT FOSTER & WHEELER
TO 1 OXFORD VALLEY, SUITE 200
LANGHORNE, PA. 19047
215-702-4007 FAX: 4045

PREPARED TOXIKON CORPORATION
BY 15 WIGGINS AVE
BEDFORD, MA 01730


CERTIFIED BY

ATTEN MICHAEL HEFFRON

ATTEN PAUL LEZBERG
PHONE (781)275-3330

CONTACT JAYSON

CLIENT FOSTER SAMPLES 6
COMPANY FOSTER & WHEELER
FACILITY 1 OXFORD VALLEY, SUITE 200
LANGHORNE, PA. 19047

MA CERT # M-MA064: TRACE METALS, SULFATE, CYANIDE, RES. FREE
CHLORINE, Ca, TOTAL ALK., TDS, pH, THMs, VOC, PEST, NUTRIENTS,
DEMAND, O&G, PHENOLICS, PCBs . CT DHS #PH-0563, NY #10778
FL HRS EB7143, NJ DEP 59538, NC DNR286, SC 88002, NH 204091-C.

WORK ID NWS EARLE
TAKEN 12/11/98
TRANS _____
TYPE WATER
P.O. # NWS EARLE
INVOICE under separate cover

VERIFIED BY: Susan Ethericourt

SAMPLE IDENTIFICATION

TEST CODES and NAMES used on this workorder

- 01 16(A)EW98W115
- 02 16(A)EW98W116
- 03 16(A)EW98W117
- 04 16(A)EW98W118
- 05 16(A)EW98W119
- 06 16(A)EW98W120

TPH IR TPH BY IR _____

SAMPLE ID 16(A)EW98W115 SAMPLE # 01 FRACTIONS: A
Date & Time Collected 12/11/98 10:00:00 Category WATER
TPH_IR 447
mg/L DL=1.0

SAMPLE ID 16(A)EW98W116 SAMPLE # 02 FRACTIONS: A
Date & Time Collected 12/11/98 10:02:00 Category WATER
TPH_IR 156
mg/L DL=1.0

SAMPLE ID 16(A)EW98W117 SAMPLE # 03 FRACTIONS: A
Date & Time Collected 12/11/98 10:04:00 Category WATER
TPH_IR 88.5
mg/L DL=1.0

SAMPLE ID 16(A)EW98W118 SAMPLE # 04 FRACTIONS: A
Date & Time Collected 12/11/98 10:06:00 Category WATER
TPH_IR 1.51
mg/L DL=1.0

SAMPLE ID 16(A)EW98W119 SAMPLE # 05 FRACTIONS: A
Date & Time Collected 12/11/98 10:08:00 Category WATER
TPH_IR ND
mg/L DL=1.0

SAMPLE ID 16(A)EW98W120 SAMPLE # 06 FRACTIONS: A
Date & Time Collected 12/11/98 10:10:00 Category WATER
TPH_IR ND
mg/L DL=1.0

Received: 12/15/98

Test Methodology

TEST CODE TPH IR NAME TPH BY IR

EPA METHOD: 418.1 for water sample.

Reference: Methods for Chemical Analysis of Water and Wastes.

EPA 600/4-79-020 (Revised, March 1983). EPA/EMSL, Cincinnati, OH.

EPA METHOD: 9071/9073

Reference: Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.

EPA SW-846 (Third Edition) 1986. Office of Solid Waste, USEPA.

CASE NARRATIVE

Work Order: 9812323

All samples were analyzed within the method holding times.

No target compounds were detected in the method blanks.

Page 1
Received: 12/15/98

TOXIKON CORP. REPORT
12/17/98 14:19:33

Work Order # 98-12-324

REPORT FOSTER & WHEELER
TO 1 OXFORD VALLEY, SUITE 200
LANGHORNE, PA, 19047
215-702-4007 FAX: 4045
ATTEN MICHAEL HEFFROW

PREPARED TOXIKON CORPORATION
BY 15 WIGGINS AVE
BEDFORD, MA 01730
ATTEN PAUL LEZBERG
PHONE (781)275-3330


CERTIFIED BY
CONTACT JAYSON

CLIENT FOSTER SAMPLES 5
COMPANY FOSTER & WHEELER
FACILITY 1 OXFORD VALLEY, SUITE 200
LANGHORNE, PA. 19047

MA CERT # M-MA064: TRACE METALS, SULFATE, CYANIDE, RES. FREE
CHLORINE, CO, TOTAL ALK., TDS, PH, THMS, VOC, PEST, NUTRIENTS,
DEMAND, O&G, PHENOLICS, PCBs, CT DHS #PH-0563, NY #10778
FL HRS E87143, NJ DEP 59538, NC DNR286, SC B8002, NH 204001-C.

WORK ID MWS EARLE
TAKEN 12/11/98
TRANS _____
TYPE WATER
P.O. # _____
INVOICE under separate cover

VERIFIED BY: Kendra Hanna

SAMPLE IDENTIFICATION
01 16(B)EW98W97
02 16(B)EW98W98
03 16(B)EW98W99
04 16(B)EW98W100
05 16(B)EW98W101

TEST CODES and NAMES used on this workorder
TPH IR TPH BY IR _____

Page 2

TOXIKON CORP.

REPORT

Work Order # 98-12-324

Received: 12/15/98

Results by Sample

SAMPLE ID <u>16(B)EW98W97</u>	SAMPLE # <u>01</u> FRACTIONS: <u>A</u>
	Date & Time Collected <u>12/11/98 11:00:00</u> Category <u>WATER</u>
TPH_IR <u>235</u>	
mg/L DL=1.0	
SAMPLE ID <u>16(B)EW98W98</u>	SAMPLE # <u>02</u> FRACTIONS: <u>A</u>
	Date & Time Collected <u>12/11/98 11:02:00</u> Category <u>WATER</u>
TPH_IR <u>ND</u>	
mg/L DL=1.0	
SAMPLE ID <u>16(B)EW98W99</u>	SAMPLE # <u>03</u> FRACTIONS: <u>A</u>
	Date & Time Collected <u>12/11/98 11:04:00</u> Category <u>WATER</u>
TPH_IR <u>ND</u>	
mg/L DL=1.0	
SAMPLE ID <u>16(B)EW98W100</u>	SAMPLE # <u>04</u> FRACTIONS: <u>A</u>
	Date & Time Collected <u>12/11/98 11:06:00</u> Category <u>WATER</u>
TPH_IR <u>ND</u>	
mg/L DL=1.0	
SAMPLE ID <u>16(B)EW98W101</u>	SAMPLE # <u>05</u> FRACTIONS: <u>A</u>
	Date & Time Collected <u>12/11/98 11:08:00</u> Category <u>WATER</u>
TPH_IR <u>ND</u>	
mg/L DL=1.0	

CASE NARRATIVE

Work Order: 9812324

All samples were analyzed within the method holding times.

No target compounds were detected in the method blanks.

Page 3

TOXIKON CORP.

REPORT

Work Order # 98-12-324

Received: 12/15/98

Test Methodology

TEST CODE TPH IR NAME TPH BY IR

EPA METHOD: 418.1 for water sample.

Reference: Methods for Chemical Analysis of Water and Wastes.

EPA 600/4-79-020 (Revised, March 1983). EPA/EMSL, Cincinnati, OH.

EPA METHOD: 9071/9073

Reference: Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.

EPA SW-846 (Third Edition) 1986. Office of Solid Waste, USEPA.

Received: 01/07/99

01/11/99 09:20:50

REPORT FOSTER & WHEELER
TO 1 OXFORD VALLEY, SUITE 200
LANGHORNE, PA. 19047
215-702-4007 FAX: 4045
ATTN MICHAEL HEFFRON

PREPARED TOXIKON CORPORATION
BY 15 WIGGINS AVE
BEDFORD, MA 01730
ATTN PAUL LEZBERG

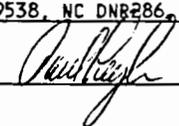

CERTIFIED BY

PHONE (781)275-3330 CONTACT JAYSON

CLIENT FOSTER SAMPLES 11
COMPANY FOSTER & WHEELER
FACILITY 1 OXFORD VALLEY, SUITE 200
LANGHORNE, PA. 19047

MA CERT # M-MA064: TRACE METALS, SULFATE, CYANIDE, RES. FREE
CHLORINE, Ca, TOTAL ALK., TDS, pH, THMS, VOC, PEST., NUTRIENTS.
DEMAND. O&G, PHENOLICS, PCBs . CT DHS #PH-0563, NY #10778
FL HRS E87143, NJ DEP 59538, NC DNR286, SC 88002, NH 204091-C.

WORK ID NWS EARLE
TAKEN 1/6/99
TRANS _____
TYPE WATER
P.O. # _____
INVOICE under separate cover

VERIFIED BY: 

SAMPLE IDENTIFICATION

TEST CODES and NAMES used on this workorder

- 01 16(A)EW99W01 ole sep
- 02 16(A)EW99W02 1st ole
- 03 16(A)EW99W03 2nd ole
- 04 16(A)EW99W04 3rd ole
- 05 16(A)EW99W05 1st carb
- 06 16(A)EW99W06 2nd carb
- 07 16(B)EW99W01 ole sep
- 08 16(B)EW99W02 1st ole
- 09 16(B)EW99W03 2nd ole
- 10 16(B)EW99W04 3rd ole
- 11 16(B)EW99W05 1st carb

TPH IR TPH BY IR

SAMPLE ID 16(A)EW99W01 SAMPLE # 01 FRACTIONS: A
Date & Time Collected 01/06/99 14:00:00 Category WATER
TPH_IR 425
mg/L DL=1.0

SAMPLE ID 16(A)EW99W02 SAMPLE # 02 FRACTIONS: A
Date & Time Collected 01/06/99 14:02:00 Category WATER
TPH_IR 1980
mg/L DL=1.0

SAMPLE ID 16(A)EW99W03 SAMPLE # 03 FRACTIONS: A
Date & Time Collected 01/06/99 14:04:00 Category WATER
TPH_IR 1580
mg/L DL=1.0

SAMPLE ID 16(A)EW99W04 SAMPLE # 04 FRACTIONS: A
Date & Time Collected 01/06/99 14:06:00 Category WATER
TPH_IR 1040
mg/L DL=1.0

SAMPLE ID 16(A)EW99W05 SAMPLE # 05 FRACTIONS: A
Date & Time Collected 01/06/99 14:08:00 Category WATER
TPH_IR 25.6
mg/L DL=1.0

SAMPLE ID 16(A)EW99W06 SAMPLE # 06 FRACTIONS: A
Date & Time Collected 01/06/99 14:10:00 Category WATER
TPH_IR ND
mg/L DL=1.0

SAMPLE ID 16(B)EW99W01 SAMPLE # 07 FRACTIONS: A
Date & Time Collected 01/06/99 14:45:00 Category WATER
TPH_IR 4.84
mg/L DL=1.0

SAMPLE ID 16(B)EW99W02 SAMPLE # 08 FRACTIONS: A
Date & Time Collected 01/06/99 14:46:00 Category WATER
TPH_IR ND
mg/L DL=1.0

Results by Sample

SAMPLE ID <u>16(B)EW99W03</u>	SAMPLE # <u>09</u> FRACTIONS: <u>A</u>
	Date & Time Collected <u>01/06/99 14:48:00</u> Category <u>WATER</u>
TPH_IR <u>ND</u>	
mg/L DL=1.0	

SAMPLE ID <u>16(B)EW99W04</u>	SAMPLE # <u>10</u> FRACTIONS: <u>A</u>
	Date & Time Collected <u>01/06/99 14:50:00</u> Category <u>WATER</u>
TPH_IR <u>ND</u>	
mg/L DL=1.0	

SAMPLE ID <u>16(B)EW99W05</u>	SAMPLE # <u>11</u> FRACTIONS: <u>A</u>
	Date & Time Collected <u>01/06/99 14:02:00</u> Category <u>WATER</u>
TPH_IR <u>ND</u>	
mg/L DL=1.0	

Received: 01/07/99

Test Methodology

TEST CODE TPH IR NAME TPH BY IR _____

EPA METHOD: 418.1 for water sample.

Reference: Methods for Chemical Analysis of Water and Wastes.

EPA 600/4-79-020 (Revised, March 1983). EPA/EMSL, Cincinnati, OH.

EPA METHOD: 9071/9073

Reference: Test Methods for Evaluating Solid Waste: Physical/Chemical Methods.

EPA SW-846 (Third Edition) 1986. Office of Solid Waste, USEPA.



15 Wiggins Ave., Bedford, MA 01730
 Telephone: (781) 275-3330
 Fax: (781) 275-7478

CHAIN OF CUSTODY RECORD

WORK ORDER #: 99-01-041

DUE DATE: 01-11-99

COMPANY: Foster Wheeler Eng'g
 ADDRESS: One Oxford Valley Suite 200
Laguarda Rd 19047
 PHONE #: (215) 701-4015 FAX #: ()
 P.O. #: _____
 PROJECT MANAGER: Mike Hoffman
 PROJECT ID/LOCATION: NWS-Ewfk

SAMPLE TYPE CONTAINER TYPE
 1. WASTEWATER P - PLASTIC
 2. SOIL G - GLASS
 3. SLUDGE V - VOA
 4. OIL
 5. DRINKING WATER
 6. WATER (GW/MW/SW)
 7. OTHER (SPECIFY)

ANALYSES

TOXIKON #	SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER			SAMPLING		PRESERVATIVE	ANALYSES										SPECIAL INSTRUCTION/ COMMENT			
			SIZE	TYPE	#	DATE	TIME															
①	16(A)EW99W01	6LW	12	G	1	1/6/99	14:00	H ₂ SO ₄														PH=2
②	16(A)EW99W02						14:02															PH=2
③	16(A)EW99W03						14:04															PH=2
④	16(A)EW99W04						14:06															PH=2
⑤	16(A)EW99W05						14:08															PH=2
⑥	16(A)EW99W06						14:10															PH=2
⑦	16(B)EW99W01						14:45															PH=2
⑧	16(B)EW99W02						14:46															PH=2
⑨	16(B)EW99W03						14:58															PH=2
⑩	16(B)EW99W04						14:50															PH=2
⑪	16(B)EW99W05						14:52															PH=2

SAMPLED BY: [Signature]
 RELINQUISHED BY: [Signature]
 RELINQUISHED BY: USPS
 METHOD OF SHIPMENT: EXPRESS MAIL

DATE: 1-6-99
 TIME: - -
 DATE: 1-6-99
 TIME: - -
 DATE: 1-6-99
 TIME: - -

QUOTATION #:
 RECEIVED BY: [Signature]
 RECEIVED FOR LAB BY: [Signature]
 COOLER TEMPERATURE: 10.9C

DATE: - -
 TIME: - -
 DATE: 01-07-99
 TIME: 14-15

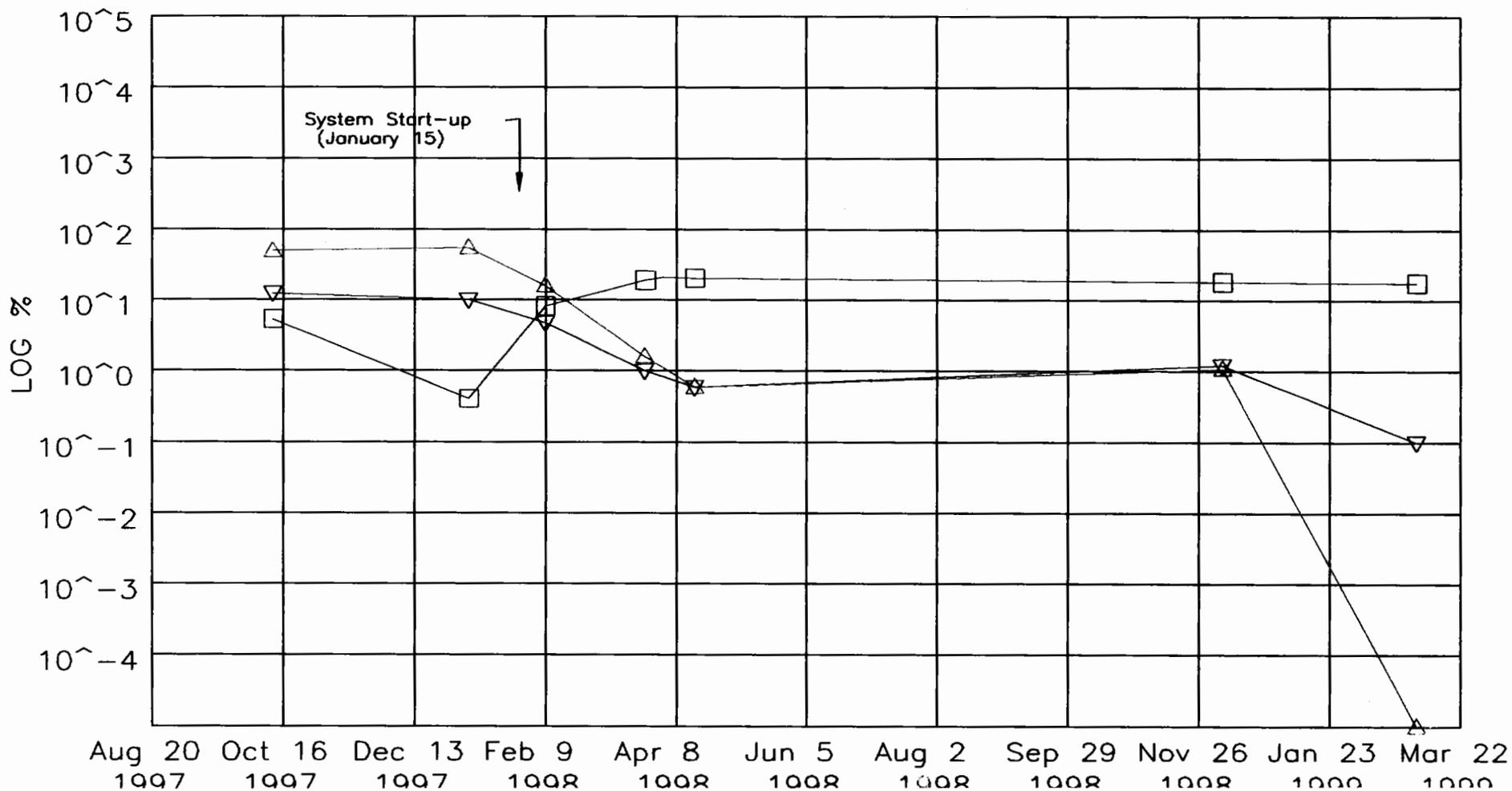
72 hr.
 RUSH BUSINESS DAY TURN AROUND
 ROUTINE
 Sample disposal information
 Are there any other known or suspected contaminants in these samples other than those listed above?
 Yes No

**Naval Weapons Station - Earle
Air Data from Bioslurper Extraction Wells**

Well: 16MW-13

- △ = % CH4
- ▽ = % CO2
- = % O2

Constituent vs. Time

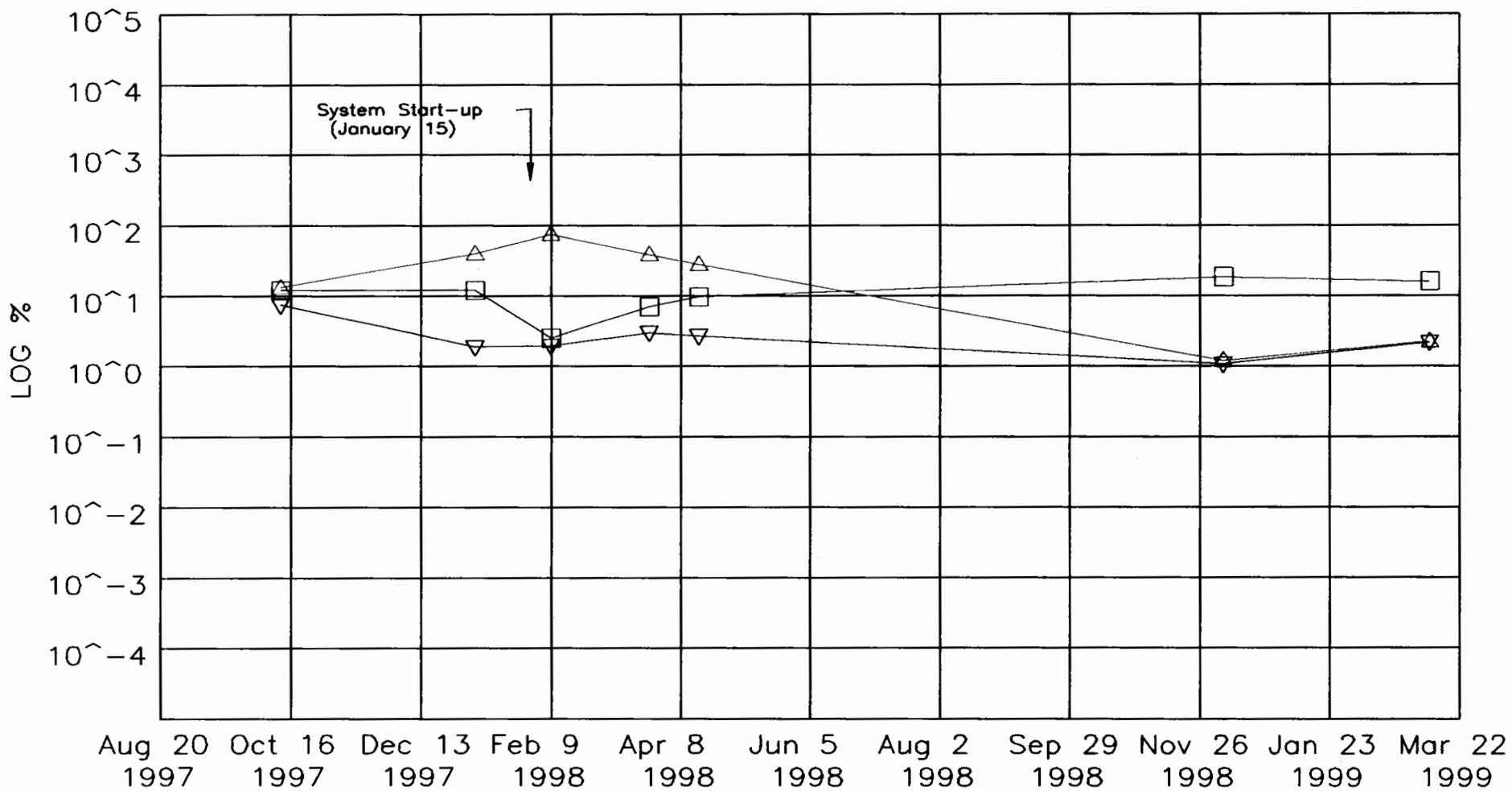


Naval Weapons Station - Earle Air Data from Bioslurper Extraction Wells

Well: 16MW-14

- △ = % CH₄
- ▽ = % CO₂
- = % O₂

Constituent vs. Time

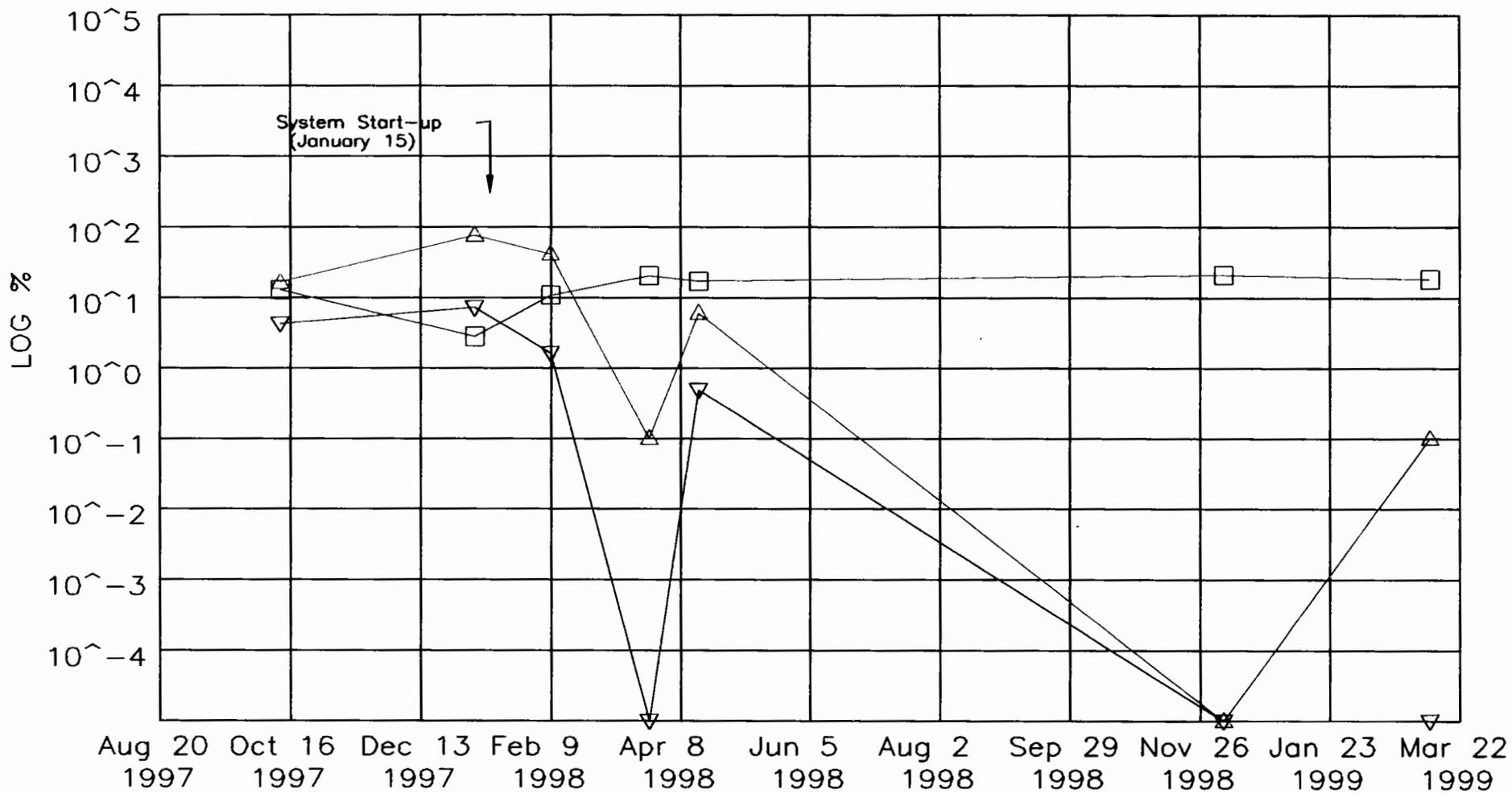


**Naval Weapons Station - Earle
Air Data from Bioslurper Extraction Wells**

Well: 16MW-15

- △ = % CH₄
- ▽ = % CO₂
- = % O₂

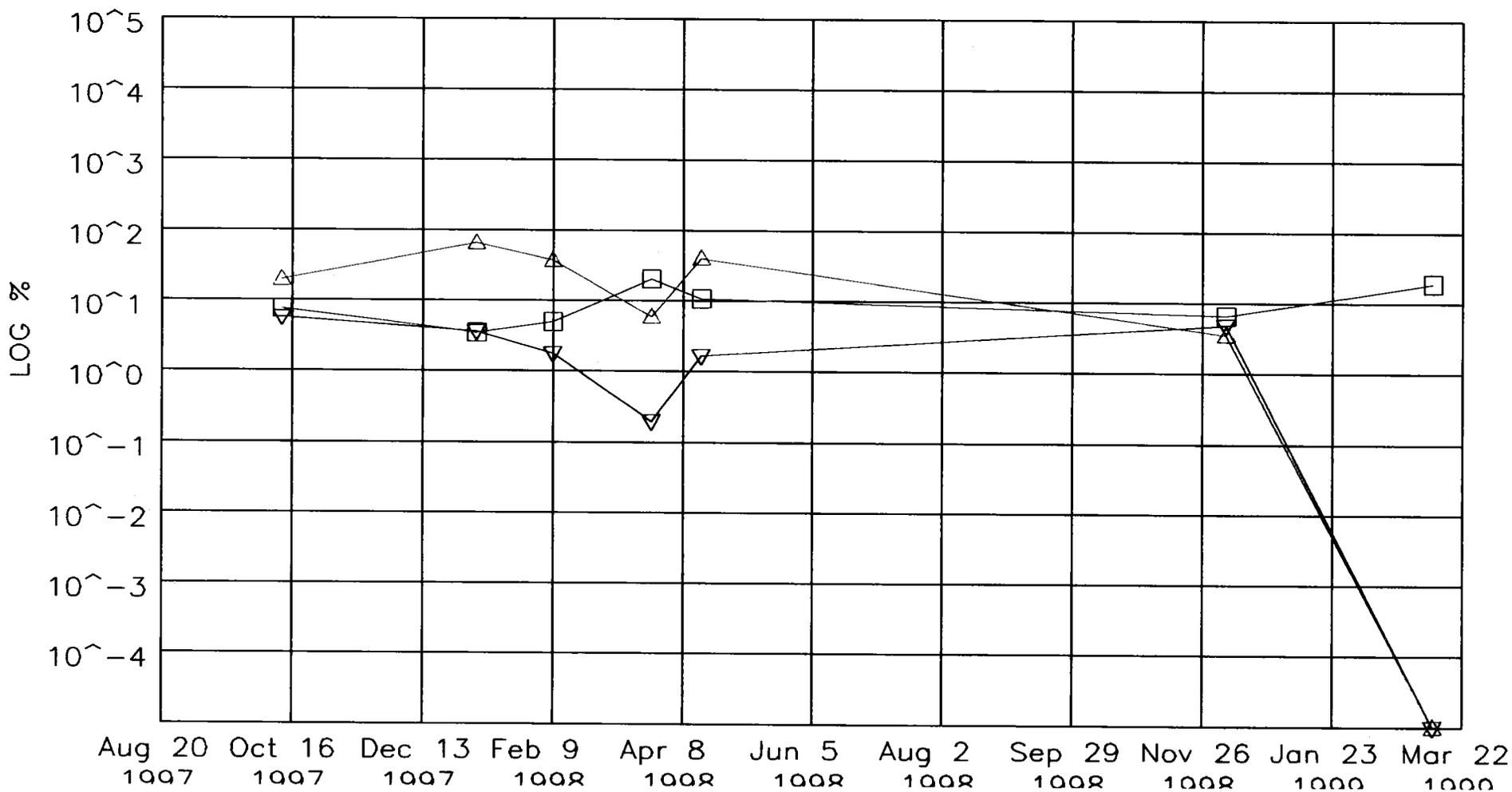
Constituent vs. Time



Well: 16MW-16

△ = % CH4
▽ = % CO2
□ = % O2

Constituent vs. Time

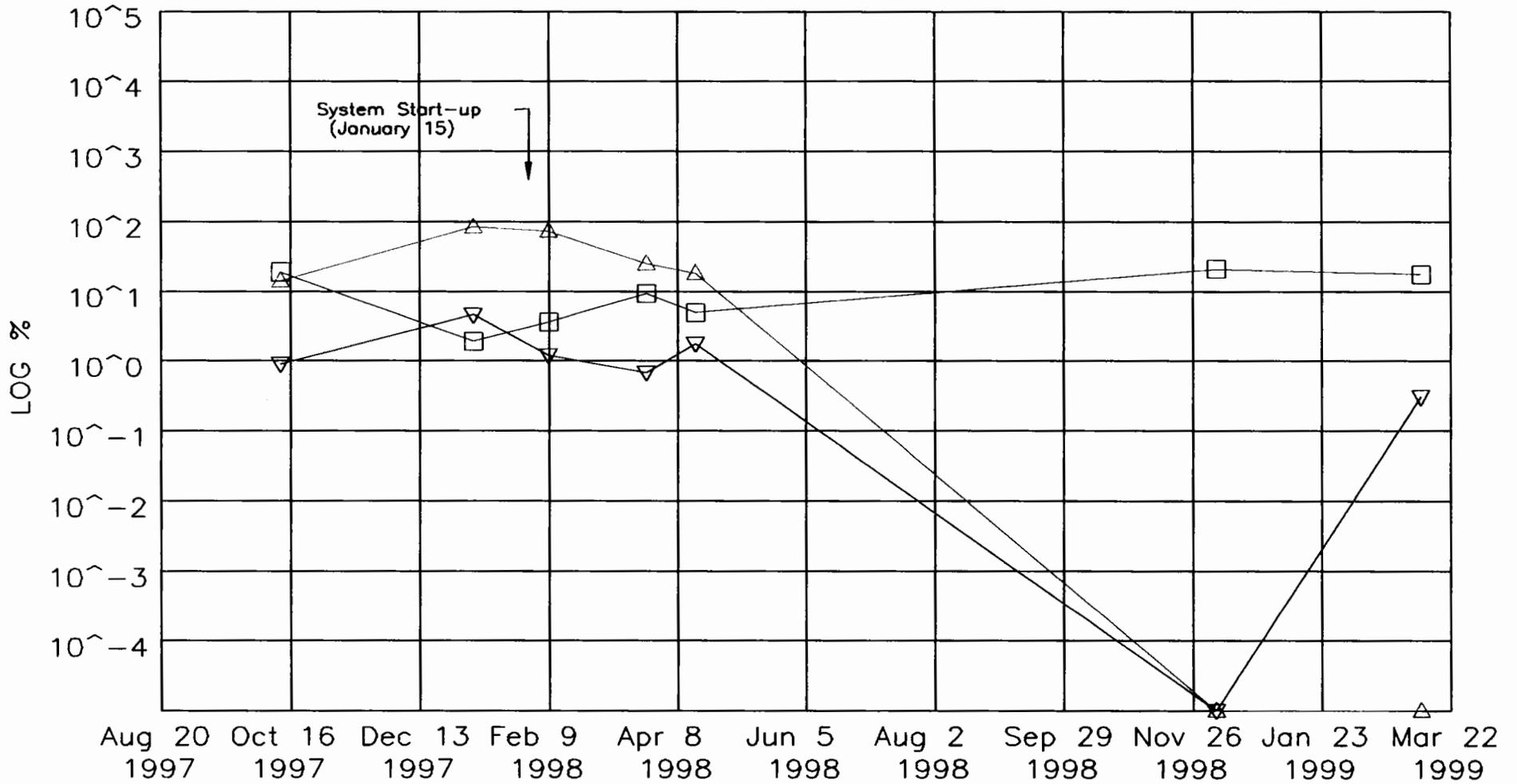


**Naval Weapons Station - Earle
Air Data from Bioslurper Extraction Wells**

Well: 16MW-17

- △ = % CH₄
- ▽ = % CO₂
- = % O₂

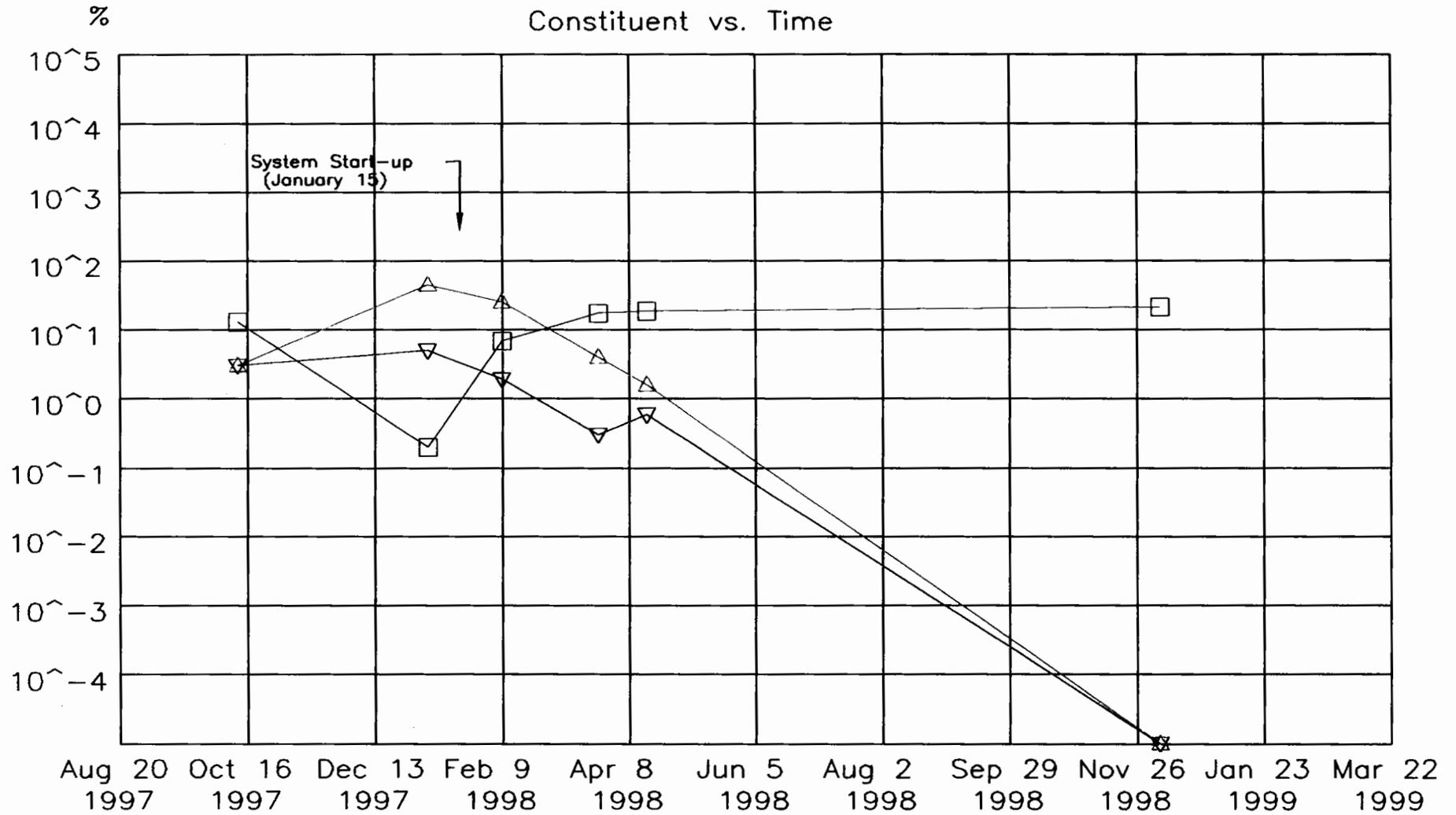
Constituent vs. Time



**Naval Weapons Station - Earle
Air Data from Bioslurper Extraction Wells**

Site: 16MW-18

- △ = % CH₄
- ▽ = % CO₂
- = % O₂

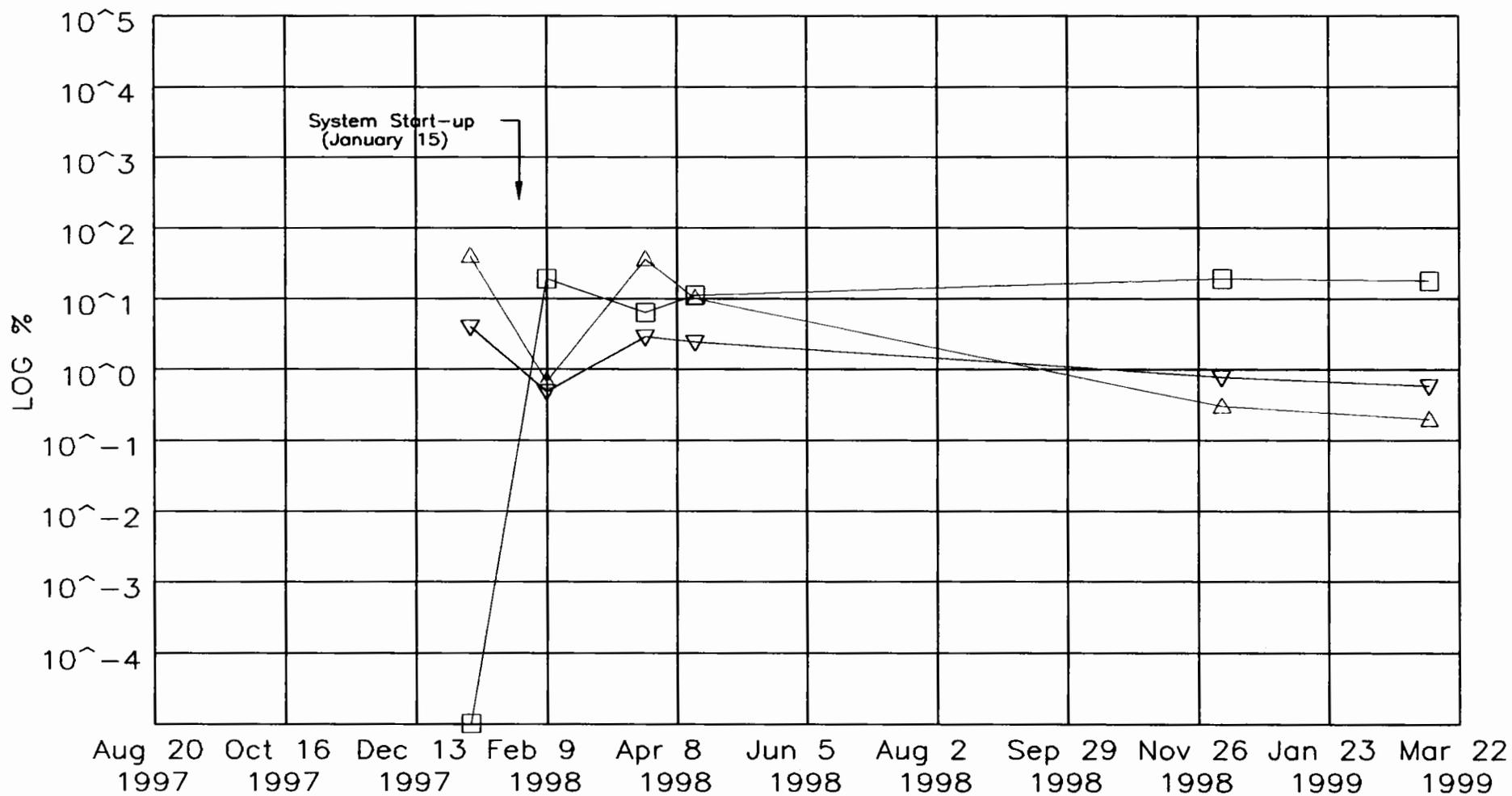


Naval Weapons Station - Earle Air Data from Bioslurper Extraction Wells

Well: 16MW-19

- △ = % CH₄
- ▽ = % CO₂
- = % O₂

Constituent vs. Time

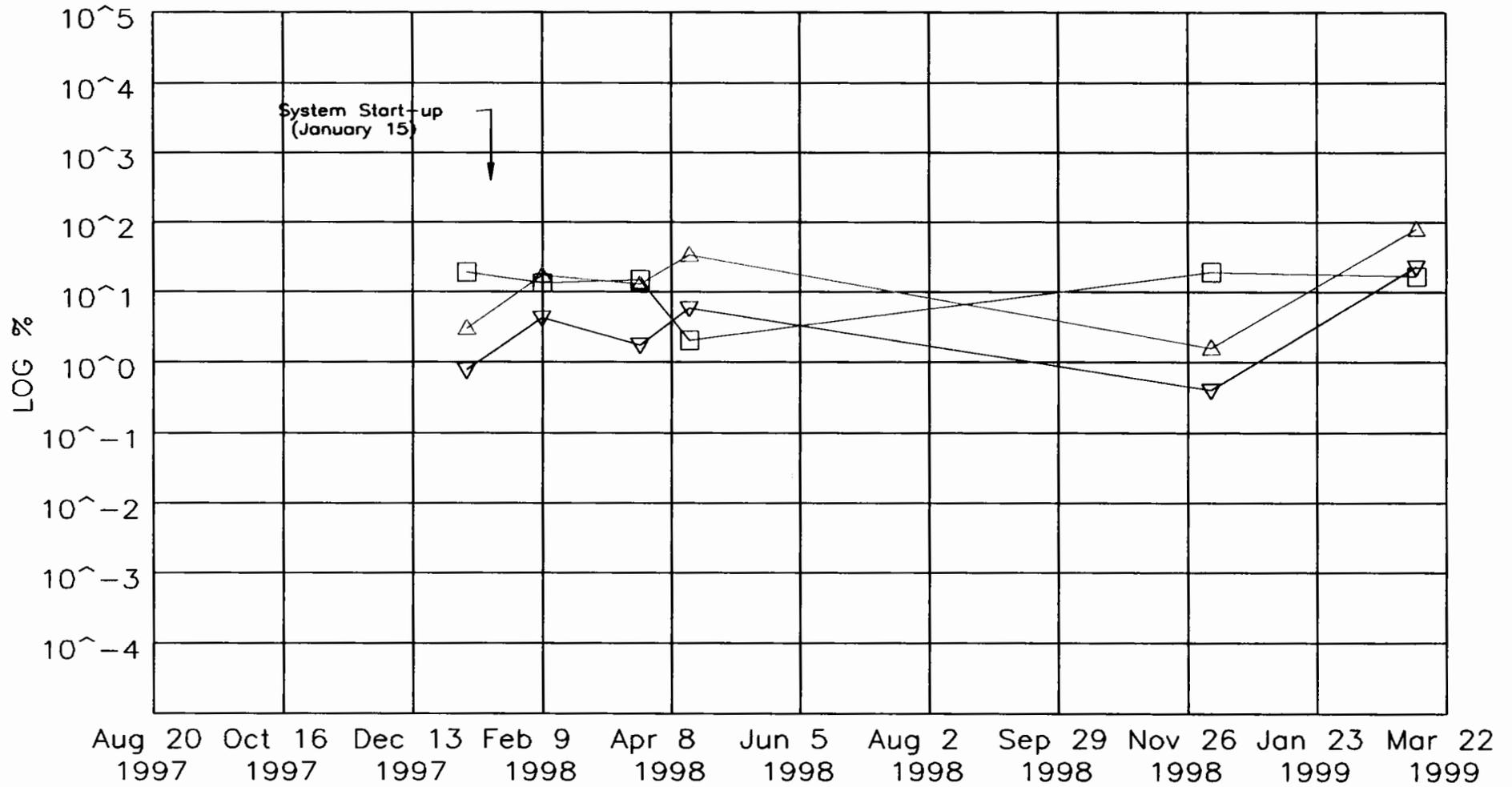


Naval Weapons Station - Earle Air Data from Bioslurper Extraction Wells

Well: 16MW-20

- △ = % CH₄
- ▽ = % CO₂
- = % O₂

Constituent vs. Time

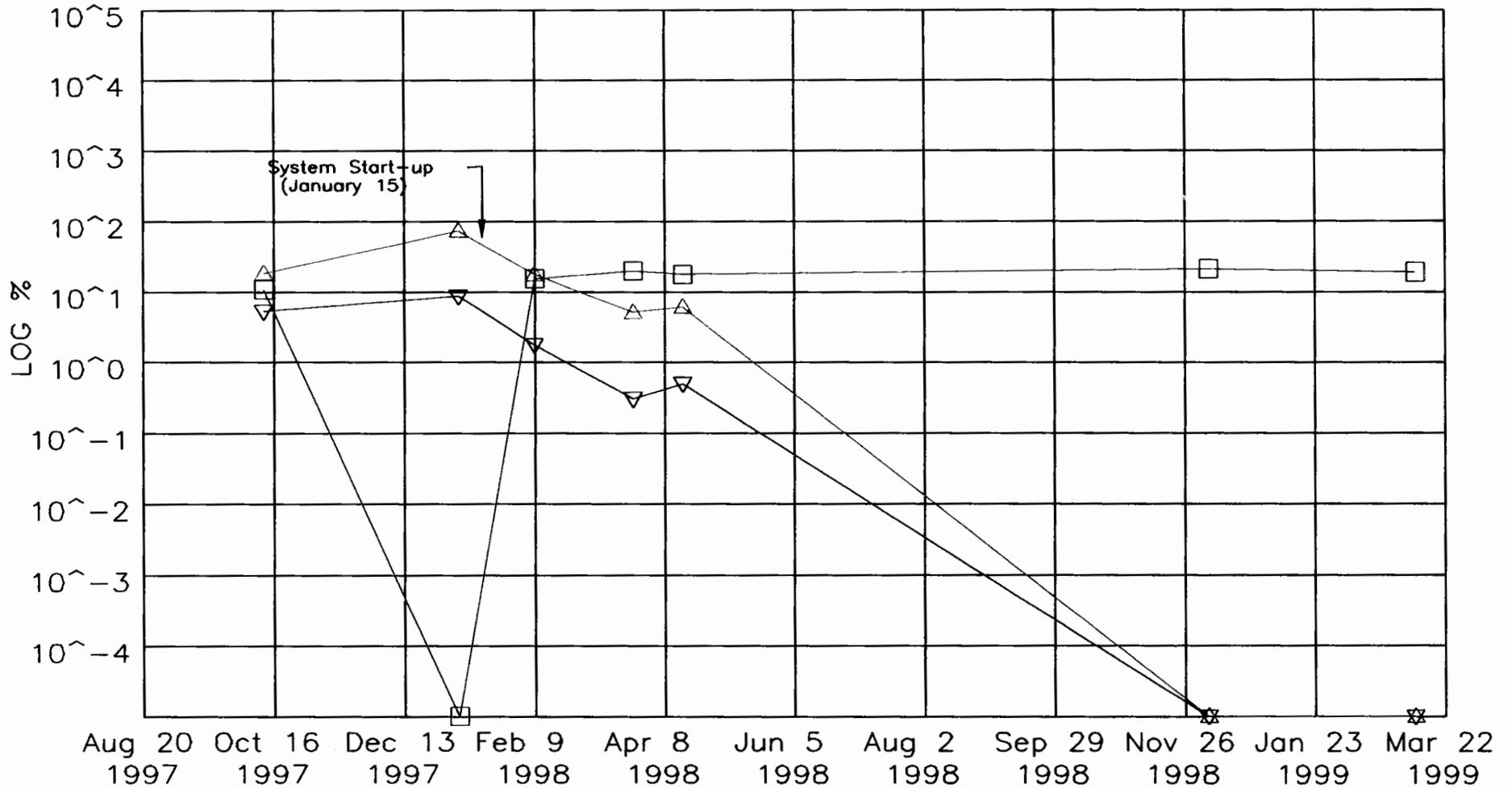


Naval Weapons Station - Earle
Air Data from Bioslurper Extraction Wells

Well: C17MW-07

- △ = % CH₄
- ▽ = % CO₂
- = % O₂

Constituent vs. Time



Naval Weapons Station - Earle
Air Data from Bioslurper Extraction Wells

△ = % CH₄

▽ = % CO₂

□ = % O₂

Well: 16MW-21

Constituent vs. Time

