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NSB NEW LONDON

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**MONTHLY OPERATIONS SUMMARY
FOR THE NAVAL EXCHANGE (NEX) AND DOLPHIN MART
AIR SPARGING/SOIL VAPOR EXTRACTION SYSTEMS
AND OT-8 PASSIVE FREE PRODUCT RECOVERY SYSTEM**

**NEW LONDON SUBMARINE BASE
GROTON, CONNECTICUT**

Month: June 1997

Prepared By:

Fluor Daniel GTI, Inc.

Prepared by:



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Reviewed by:



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Environmental Site Technical Manager**

OPERATIONAL SUMMARY

DOLPHIN MART AIR SPARGE/SVE SYSTEM

System Status - The remediation system at the site has been operating since June 29, 1996. As of June 30, 1997, thirteen (13) horizontal vapor extraction trenches (VET-1, VET-2, VET-3, VET-4, VET-5, VET-6, VET-7, VET-8, VET-9, VET-10, VET-11, VET-12, and VET-17) and seven (7) air sparge points (ASP-A, ASP-B, ASP-C, ASP-D, ASP-E, ASP-F, and ASP-G) were operating. VET-13 through VET-16 are not operating due to flooding of the lower section of the main trunk line. Air sparge points ASP-H through ASP-Q cannot be operated without VET-13 through VET-16 operating. The SVE system is currently extracting subsurface air at a flow rate of approximately 329 scfm. The air sparge system is currently injecting air at a flow rate of approximately 15 scfm. These flow rates are based on readings collected in May 1997. The Hersey flow meters for the SVE and air sparge systems are currently inoperable pending repair/replacement. A site map has been included as **Figure 1**. The site visit forms for O&M conducted during the month of June, 1997 are included in **Attachment 1**. A weekly break-down of the monthly field activities has been included as **Attachment 2**.

Mass Removal - The total hydrocarbon mass removal rate, based on the SVE system influent sample collected June 10, 1997, was 0.067 lbs/hour. During the period from May 21, 1997 to June 10, 1997 approximately 12.14 lbs of hydrocarbons were extracted by the remediation system. The total hydrocarbon mass extracted by the remediation system, as of June 10, 1997, was approximately 1,267 lbs. The system database has been included in **Attachment 3**. Mass removal graphs have been included as **Figures 3A, 3B and 4**. Based on the hydrocarbon mass removal rate, no exceedance of CTDEP air quality guidelines was observed.

Carbon Usage - A summary of the historical vapor phase carbon usage at the site has been included as **Attachment 4**. The last carbon change at the site occurred August 27, 1996.

Discharge Monitoring Sampling - No discharge took place at the Dolphin Mart site during the month of June, 1997. A no flow Discharge Monitoring Report (DMR) will be generated for the month.

Monitoring Well Gauging - The site monitoring wells were last gauged May 21, 1997 during the quarterly groundwater sampling event. Depth to groundwater at the site ranged from 2.04 feet in DM-1 to 8.20 feet in WE-3. The next well gauging event is currently scheduled during the August 1997 quarterly groundwater sampling event. Historical well gauging data has been included in **Attachment 5**.

Monitoring Well Sampling - Monitoring well sampling was last completed on May 21, 1997. The Quarterly Groundwater Sampling Report for the May sampling event is currently being prepared. The next quarterly sampling event is scheduled for August, 1997. The historical groundwater sampling results have been summarized in **Attachment 6**.

Additional Activities - None

NEX AIR SPARGE/SVE SYSTEM

System Status - The remediation system at the site has been operating since July 31, 1996. As of May 22, 1997, eight (8) vapor extraction wells (VEA-8 through VEA-15) were operating. The remainder of the vapor extraction points are not operating due to high groundwater table elevations limiting well effectiveness. The air sparge system was activated April 17, 1997. As of May 22, 1997, eleven (11) air sparge points (SPB-15 through SPB-25) were operating. The SVE system is currently extracting subsurface air at a flow rate of approximately 300 scfm (from the east system only). The air sparge system is currently injecting air at a flow rate of approximately 2 scfm. A site map has been included as **Figure 2**. The site visit forms for O&M conducted during the month of June, 1997 are included in **Attachment 1**. A weekly break-down of the monthly field activities has been included in **Attachment 2**.

Mass Removal - The total hydrocarbon mass removal rate, based on the SVE system influent sample collected June 10, 1997, was 0.00 lbs/hour. During the period from May 21, 1997 to June 10, 1997 an estimated 0.0 lbs of hydrocarbons were extracted by the remediation system. The system influent concentrations are expected to increase following the completion of planned system modification. The total hydrocarbon mass extracted by the remediation system, as of May 21, 1997, is approximately 1,285 lbs. The system database has been included in **Attachment 3**. Mass removal graphs have been included as **Figures 5A, 5B and 6**. Based on the hydrocarbon mass removal rate, no exceedance of CTDEP air quality guidelines was observed.

Carbon Usage - A summary of the historical vapor phase carbon usage at the site has been included as **Attachment 4**. The carbon units at the site were taken off-line September 4, 1996.

Discharge Monitoring Sampling - Discharge monitoring sampling was completed June 10, 1997. The Discharge Monitoring Report (DMR) will be generated following receipt of the laboratory analytical data.

Monitoring Well Gauging - The site monitoring wells were last gauged on May 21, 1997. Depth to groundwater at the site ranged from 4.46 feet in ERM-19 to 8.16 feet in ERM-16. During the well gauging, light non-aqueous phase liquid (LNAPL) was detected in monitoring well ERM-12 at a thickness of 0.01 feet, in monitoring well ERM-14 at a thickness of 0.05 feet and in monitoring well OBG-9 at a thickness of 0.53 feet. The LNAPL from OBG-9 was bailed and placed in a labeled drum within the OT-8 drum storage enclosure. Historical well gauging data has been included in **Attachment 5**. The next complete round of well gauging is scheduled during the August 1997 quarterly groundwater sampling event. Following completion of the well gauging in August 1997, all wells historically containing measurable LNAPL thickness will be gauged on a monthly basis, and bailed if sufficient LNAPL is present.

Monitoring Well Sampling - Monitoring well sampling was completed on May 22, 1997. The Quarterly Groundwater Sampling Report for the May sampling event is currently being prepared. The next quarterly sampling event is scheduled for August, 1997. The historical groundwater sampling results have been summarized in **Attachment 6**.

Additional Activities - None

OT-8 PASSIVE FREE PRODUCT RECOVERY SYSTEM

System Status - The OT-8 passive free product recovery system was activated on September 28, 1996. On June 10, 1997, the system was temporarily deactivated (due to a high groundwater table which prohibited system operation).

Product Recovery - As of June 30, 1997 a total of approximately 4.25 gallons of LNAPL have been recovered by the system. The fluctuating groundwater table around MW-7 may lead to smearing of the LNAPL. It is anticipated that during periods of extended lower water table elevations LNAPL recovery will resume. A copy of the well construction log for MW-7 has been included as Attachment 7. *Please note: The screen interval of MW-7 begins at five feet below grade.*

Monitoring Well Gauging - MW-7 was gauged on June 10, 1997. At that time the depth to groundwater was 4.64 feet below grade with an LNAPL sheen detected on the surface of the groundwater. Historical gauging data for MW-7 is included in Attachment 5.

Additional Activities - None

FIGURES

REVISIONS				
NO.	DESCRIPTION	PREP'D BY	DATE	APPROVED

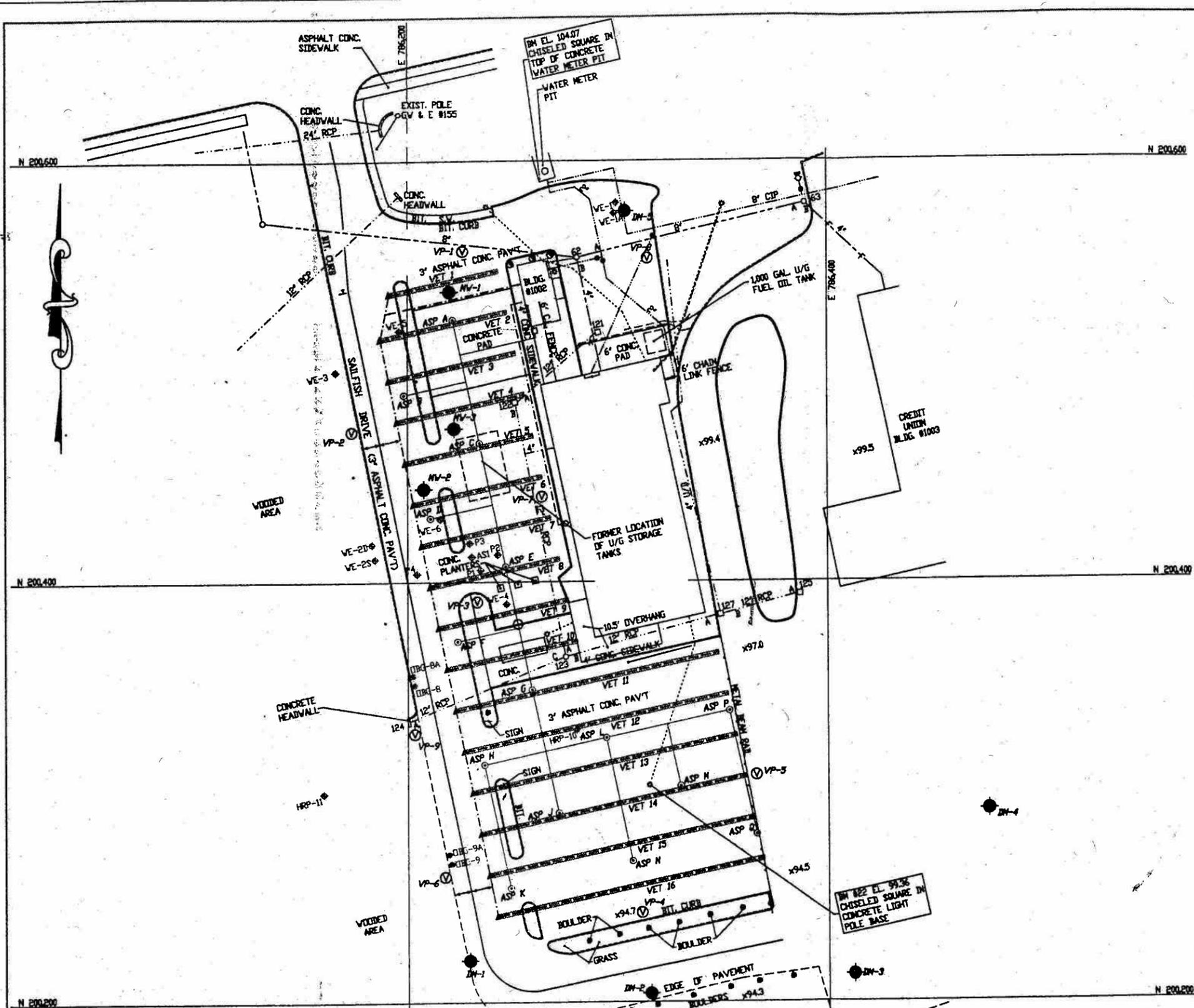
HIGHEST RECORDED GROUND WATER ELEVATIONS

WELL NO.	GROUNDWATER ELEVATION
VE-1A	96.84
VE-2S	94.25
VE-2D	94.31
VE-3	93.93
VE-4	94.11
VE-5	95.40
VE-6	95.41
DBG-8A	93.70
DBG-9A	94.80
HRP-10	93.5 (ESTIMATED)
HRP-11	92.5 (ESTIMATED)

NOTE: GROUND WATER DATA SHOWN ON PLANS ARE APPROXIMATELY AS SHOWN FOR BIDDING PURPOSES. ACTUAL WELL ELEVATIONS TO BE DETERMINED IN THE FIELD BY THE CONTRACTOR.

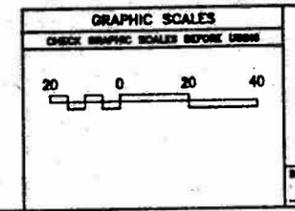
SOIL VAPOR EXTRACTION TRENCH PIPE ELEVATIONS - DOLPHIN MART

TRENCH NO.	INV. ELEV. 6" VAPOR COLLECTION PIPE	INV. ELEV. 2" PIPE @ WEST END OF TRENCH	INV. ELEV. 2" PIPE @ EAST END OF TRENCH
VET 1	94.64	99.41	99.46
VET 2	94.64	98.80	98.85
VET 3	94.48	98.19	98.24
VET 4	94.32	97.50	97.62
VET 5	94.16	96.78	97.30
VET 6	94.00	96.20	97.20
VET 7	93.84	95.65	97.00
VET 8	93.68	95.13	96.80
VET 9	93.52	94.62	96.60
VET 10	93.36	93.52	96.40
VET 11	93.20	93.37	95.80
VET 12	93.04	93.23	95.22
VET 13	92.88	93.09	94.64
VET 14	92.72	92.95	94.04
VET 15	92.56	92.80	93.56
VET 16	92.40	92.66	93.08

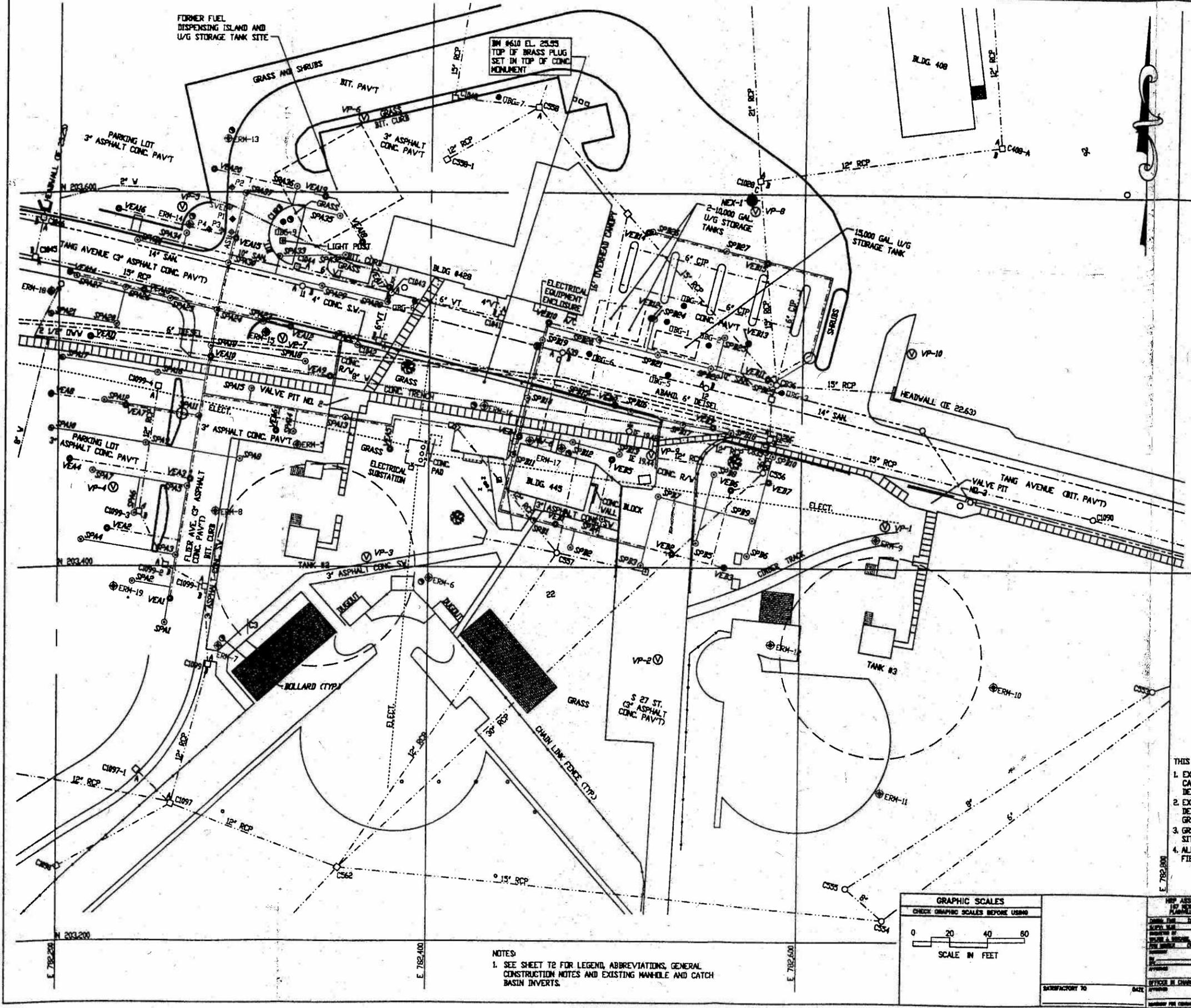


NOTES
1. SEE SHEET T2 FOR LEGEND, ABBREVIATIONS GENERAL CONSTRUCTION NOTES AND EXISTING MANHOLE AND CATCH BASIN INVERTS.

THIS MAP WAS PREPARED FROM MAPS LISTED BELOW:
 1. NAUTILUS PARK, GROTON, CONN. EXISTING UTILITIES MAPS PREPARED BY CULLINAN ENGINEERING CO., INC. SCALE 1"=40' DATE 3/25/83 NAVFAC DRAWING NOS. 2,064,332, 2,064,333 AND 2,064,374.
 2. MONITOR WELL LOCATION AND GROUND WATER CONTOUR MAP OF JANUARY 21, 1992 DOLPHIN MART SITE US SUBBASE, GROTON, CT. PREPARED BY ERN-NORTHEAST SCALE 1"=20' APRIL, 1992.
 3. UTILITY DATA FROM AS-BUILT DRAWINGS AND UTILITY MAPS; EXACT LOCATIONS MUST BE VERIFIED IN FIELD.
 4. ALL TOPOGRAPHIC FEATURES AND INVERTS SHOWN HEREON SHALL BE FIELD VERIFIED.



NEW ASSOCIATES, INC. 127 WEST ST. 2ND FL. GROTON, CT 06340	DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING DIVISION NORTHERN DIVISION NEW LONDON, CONNECTICUT
PROJECT NO. 80091 DRAWING NO. 2166440 SHEET NO. C2-1	REMEDIATION OF CONTAMINATED SOIL/GROUND WATER DOLPHIN MART FIGURE 1 - SITE PLAN



REV.	DESCRIPTION	DATE	APPROVED

HIGHEST RECORDED GROUND WATER ELEVATION

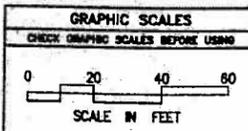
MELL. NO.	GROUND WATER EL.	MELL. NO.	GROUND WATER EL.
ORG-1	16.73	ERM-18	16.97
ORG-2	17.09	ERM-19	16.06
ORG-4	16.63	ERM-1	17.09
ORG-5	16.85	ERM-2	16.31
ORG-6	16.76	ERM-3	14.76
ORG-7	18.40	ERM-4	16.86
ORG-8	17.96	ERM-5	17.78
ORG-9	17.63	ERM-6	16.79
ERM-10	18.68	ERM-7	15.81
ERM-11	17.84	ERM-8	17.14
ERM-12	16.69	ERM-9	17.00
ERM-13	17.58		
ERM-14	17.46		
ERM-15	17.59		
ERM-16	17.71		
ERM-17	16.91		

NOTE:
GROUND WATER DATA SHOWN ON PLANS ARE APPROXIMATELY AS SHOWN FOR BIDDING PURPOSES. ACTUAL WELL ELEVATIONS TO BE DETERMINED IN FIELD BY CONTRACTOR.

THIS MAP WAS PREPARED FROM MAPS LISTED BELOW:

- EXISTING TOPOGRAPHY FROM MAP BY JAMES S. KINGES & ASSOCIATES, CARLSON & SWEATT FARMINGTON, CT & NEW YORK, N.Y., DATED 31 DEC. 1974.
- EXISTING UTILITIES FROM 40 SCALE UTILITY MAPS SUPPLIED BY THE DEPARTMENT OF PUBLIC WORKS, NAVAL SUBMARINE BASE, NEW LONDON, GROTON, CT.
- GROUND WATER ANALYTICAL RESULTS, JANUARY, 1992 NEX STATION SITE US SUBBASE, GROTON, CT PREPARED FOR ERM-PHC.
- ALL TOPOGRAPHIC FEATURES AND INVERTS SHOWN HEREIN SHALL BE FIELD VERIFIED.

NOTES:
1. SEE SHEET T2 FOR LEGEND, ABBREVIATIONS, GENERAL CONSTRUCTION NOTES AND EXISTING MANHOLE AND CATCH BASIN INVERTS.



PREPARED BY HRP ASSOCIATES, INC. 157 NEW BRIDGE AVENUE PLAINVILLE, CT 06061	DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND NORTHERN DIVISION NAVAL SUBMARINE BASE NEW LONDON, CONNECTICUT
DATE: 1992 DRAWN BY: [blank] CHECKED BY: [blank]	PROJECT NO.: 2166439 SHEET NO.: C1-1
OFFICE IN CHARGE: [blank]	CONSTRUCTION NO.: [blank]

Figure 3A- Mass Removal Rate
Dolphin Mart Site, New London Naval Submarine Base, Groton, CT

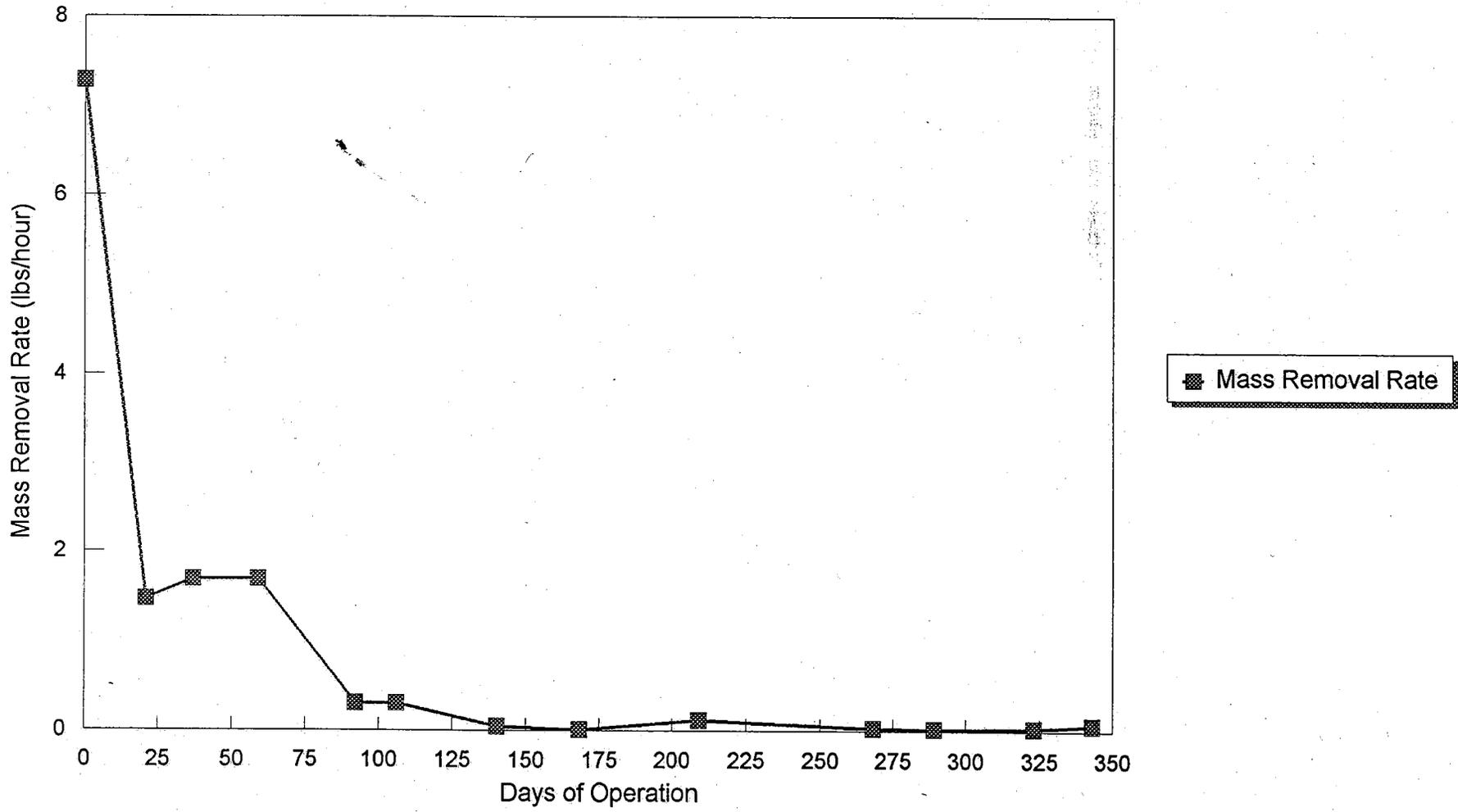


Figure 3B- Mass Removal Rate

Dolphin Mart Site, New London Naval Submarine Base, Groton, CT

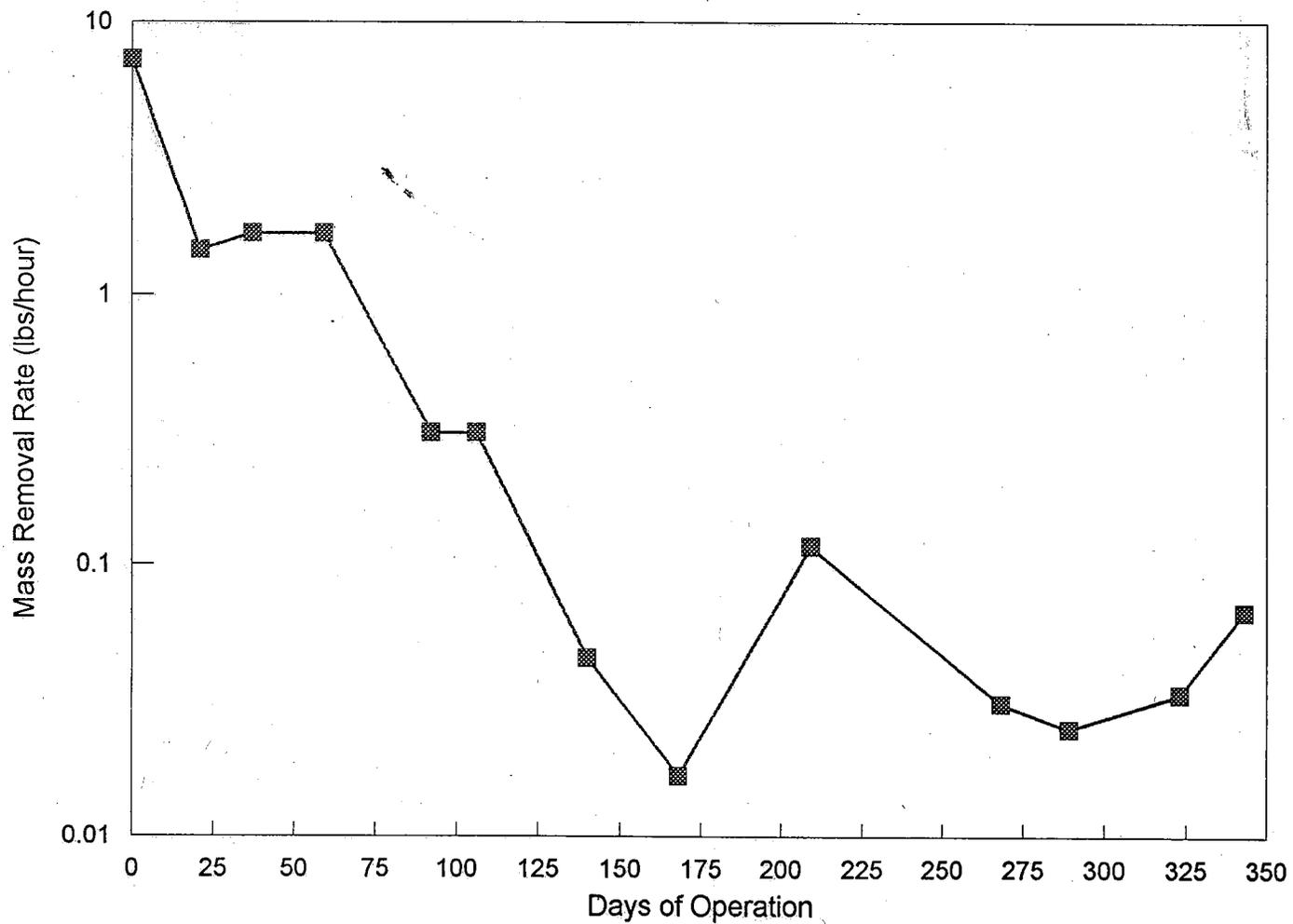


Figure 4 - Cumulative Mass Removed versus Time

Dolphin Mart Site, New London Naval Submarine Base, Groton, CT

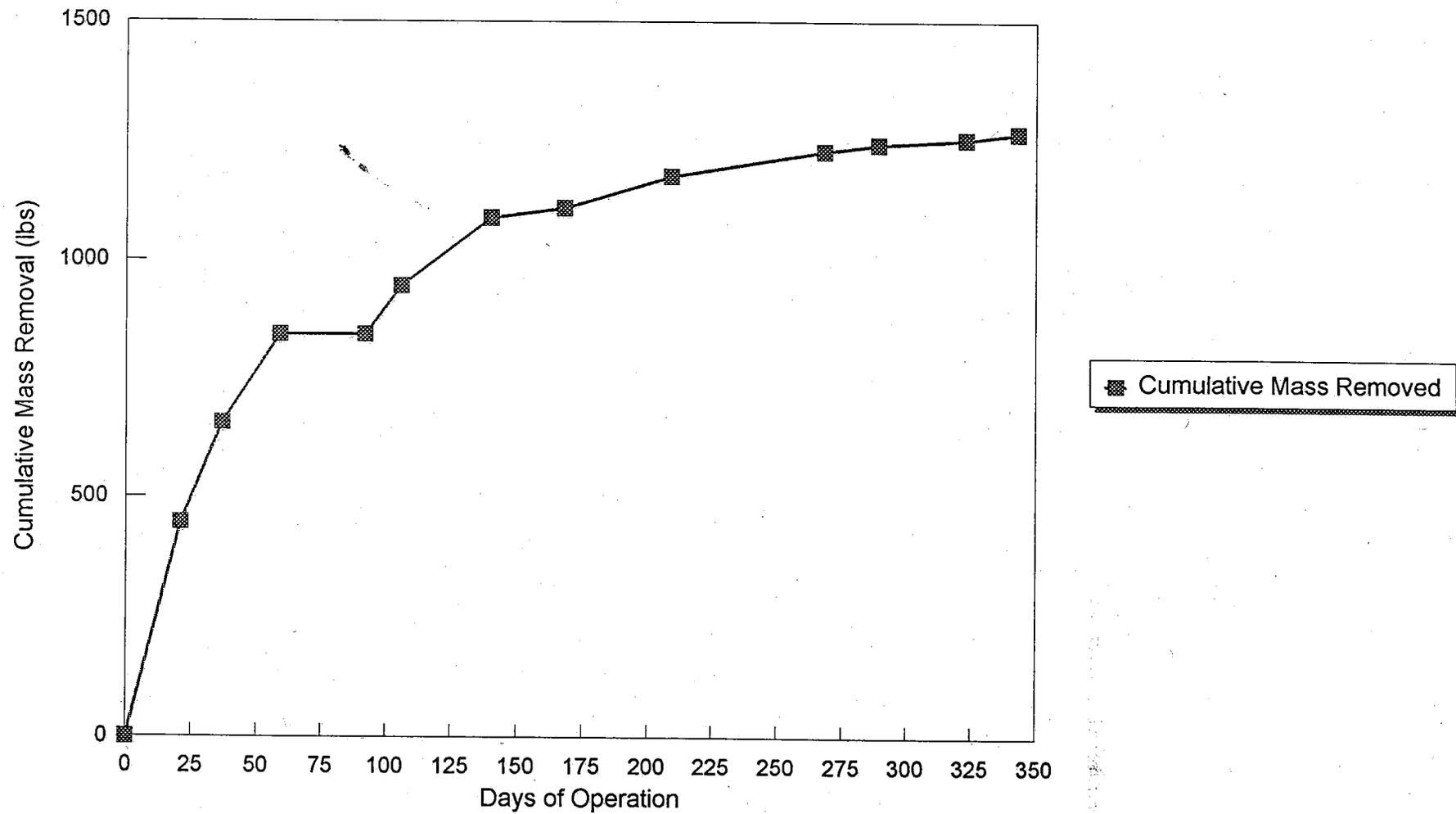


Figure 5A - Mass Removal Rate
NEX Site, New London Naval Submarine Base, Groton, CT

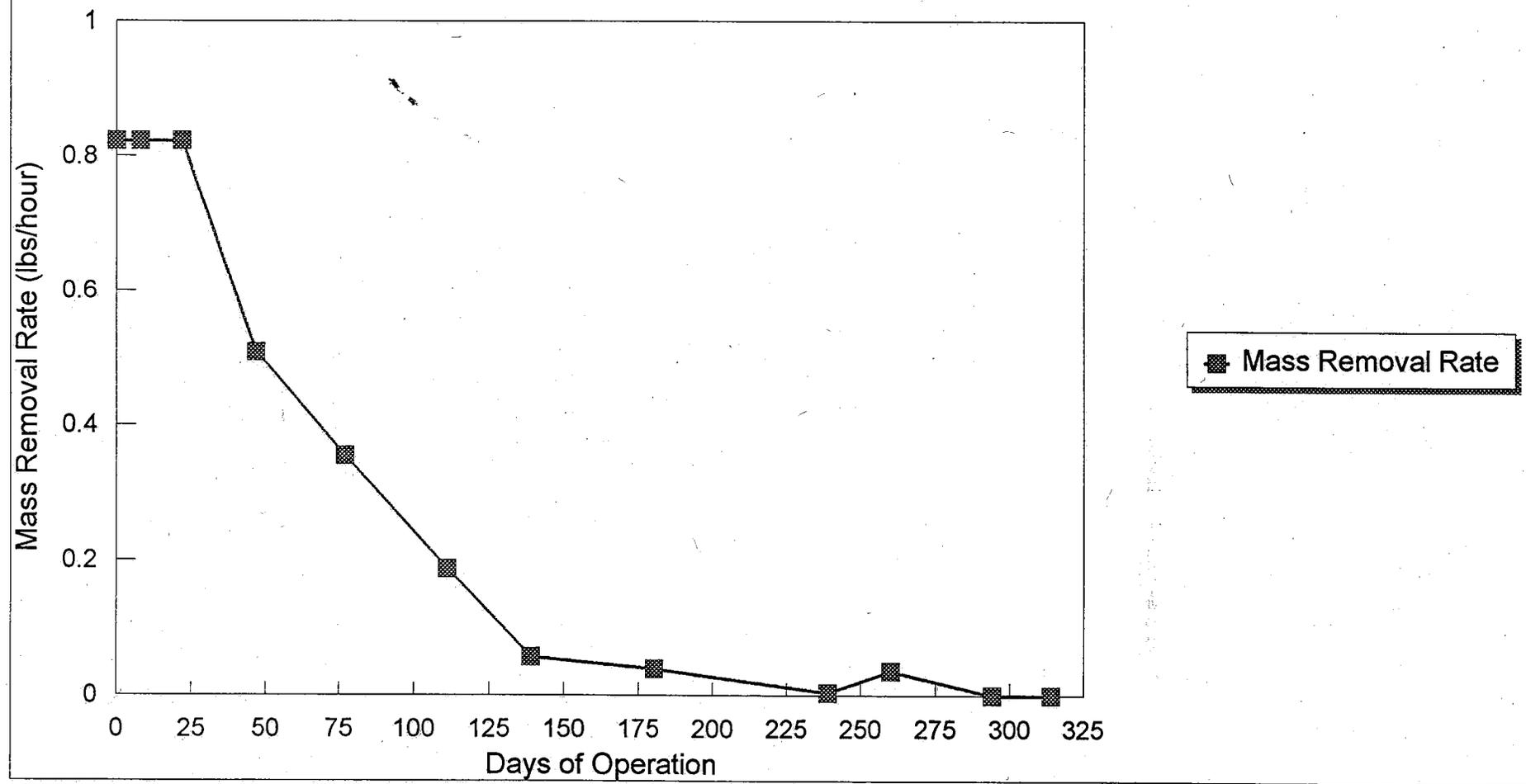


Figure 5B - Mass Removal Rate
NEX Site, New London Naval Submarine Base, Groton, CT

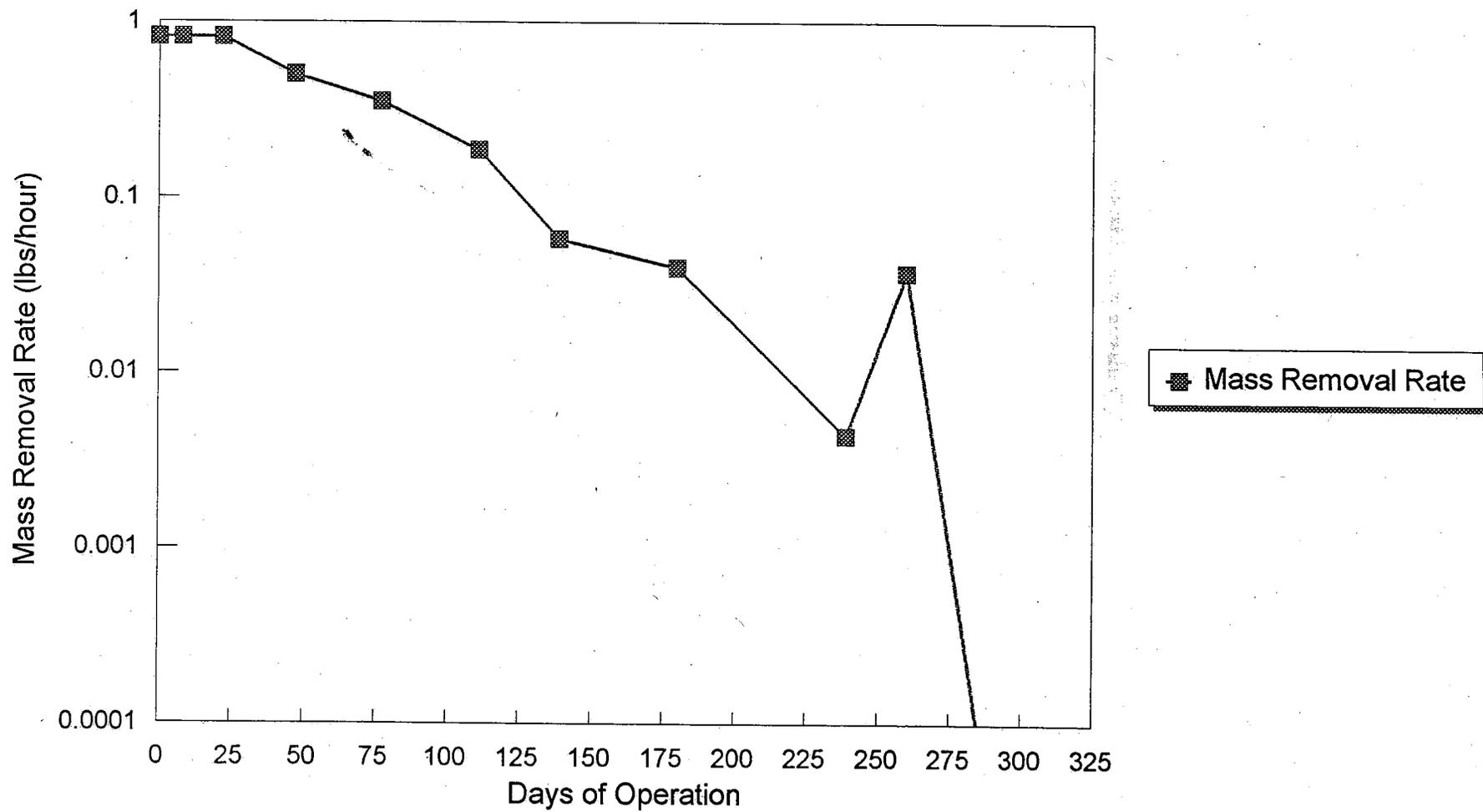
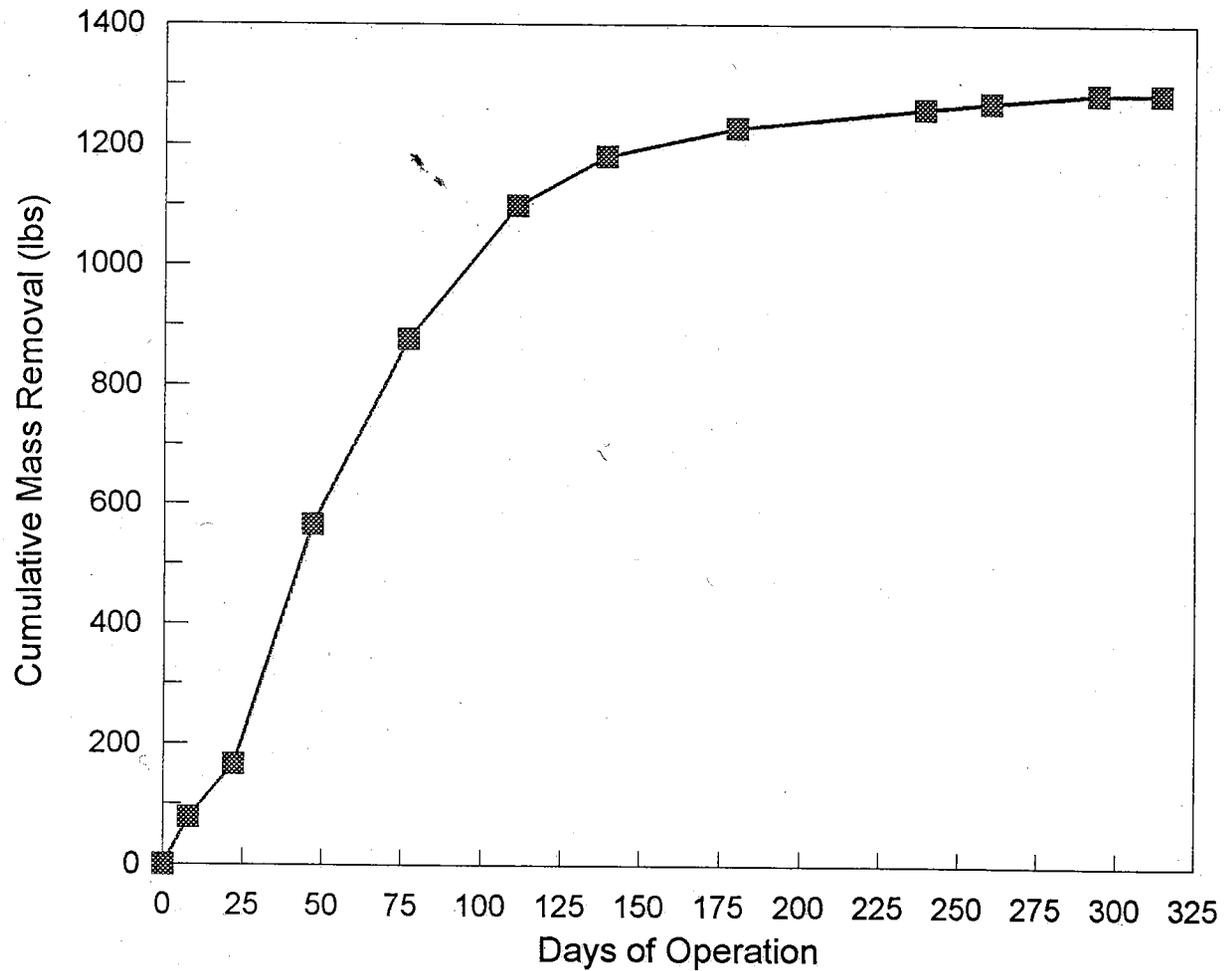


Figure 6 - Cumulative Mass Removed versus Time

NEX Site, New London Naval Submarine Base, Groton, CT



■ Cumulative Mass Removed

ATTACHMENT 1
SITE VISIT FORMS

OPERATIONAL DATA FORM
 Air Sparging/Soil Vapor Extraction System
 Dolphin Mart
 Naval Submarine Base -Groton, CT
 Project #83001-9999

Date: 6-10-97
 Time: _____
 Technician: CSG - WGD.

AIR COMPRESSOR SYSTEM

Flow Rate	SCFM	Total Flow	SCFM
Air Compressor C-1		Air Compressor C-1 <u>C-1</u>	
Pressure	_____ psi	Pressure	<u>9.5</u> psi
Temperature	_____ °F	Temperature	<u>224</u> °F
Flow Control Valve Setting	_____	Flow Control Valve Setting	<u>100%</u>
Bleed Valve	_____	Bleed Valve	<u>50%</u>
Radiator	ON / OFF	Radiator	<u>ON</u> OFF

SOIL VAPOR EXTRACTION SYSTEM

Flow Rate	SCFM	Total Flow	SCFM
Vacuum Pump V-1		Vacuum Pump V-2	
Vacuum	<u>5"</u> Hg	Vacuum	<u>5"</u> Hg
Temperature	<u>150</u> °F	Temperature	<u>148</u> °F
Particulate Filter	<u>OK</u>	Particulate Filter	<u>OK</u>
Flow Control Valve Setting	<u>100%</u>	Flow Control Valve Setting	<u>100%</u>
Bleed Air Valve Setting	<u>50%</u>	Bleed Air Valve Setting	<u>50%</u>
Liquid Level	<u>DRAINED</u>	Liquid Level	<u>DRAINED</u>
Vacuum Pump V-3		Vacuum Pump V-4	
Vacuum	_____ Hg	Vacuum	_____ Hg
Temperature	_____ °F	Temperature	_____ °F
Particulate Filter	_____	Particulate Filter	_____
Flow Control Valve Setting	_____	Flow Control Valve Setting	_____
Bleed Air Valve Setting	_____	Bleed Air Valve Setting	_____
Liquid Level	_____	Liquid Level	_____

ACTIVATED CARBON ADSORPTION SYSTEM

Carbon Adsorber A/B		Carbon Adsorber C/D	
Inf. VOC Level	_____ ppm	Inf. VOC Level	<u>3.2</u> ppm
Inf Pressure	_____ psi	Inf Pressure	<u>_____</u> psi
Mid. VOC Level	_____ ppm	Mid. VOC Level	<u>4.1</u> ppm
Mid Pressure	_____ psi	Mid Pressure	<u>_____</u> psi
Eff. VOC Level	_____ ppm	Eff. VOC Level	<u>2.6</u> ppm
Change out Date	_____	Change out Date	<u>_____</u>

WATER TREATMENT

Flowmeter Reading 2979.3 Gallons / No MONTHLY DISCHARGE.

COMMENTS

* RENTAL MICROFID USED.

OPERATIONAL DATA FORM
Air Sparging/Soil Vapor Extraction System
Naval Exchange
Naval Submarine Base - Groton, CT
Project #83001-9999

Date: 6.10.97
 Time: _____
 Technician: CSG - WCD

AIR COMPRESSOR SYSTEM

Flow Rate	<u>0-2.</u>	SCFM	Total Flow	<u>20206.</u>	SCFM
Air Compressor C-1			Air Compressor C-2		
Pressure	<u>11.</u>	psi	Pressure	_____	psi
Temperature	<u>220.</u>	°F	Temperature	_____	°F
Flow Control Valve Setting	<u>100%</u>		Flow Control Valve Setting	_____	
Bleed Valve	<u>50%</u>		Bleed Valve	_____	
Radiator	<u>ON</u> OFF		Radiator	<u>ON</u> OFF	

SOIL VAPOR EXTRACTION SYSTEM

Eastern Flow Rate	<u>280-320.</u>	SCFM	Total Flow	<u>38828850.</u>	SCFM
Western Flow Rate	<u>CLOSED.</u>	SCFM	Total Flow	<u>12812843.</u>	SCFM
Vacuum Pump V-1			Vacuum Pump V-2		
Vacuum	_____	Hg	Vacuum	<u>9."</u>	°Hg
Temperature	_____	°F	Temperature	<u>150.</u>	°F
Particulate Filter	_____		Particulate Filter	<u>OK.</u>	
Flow Control Valve Setting	_____		Flow Control Valve Setting	<u>100%</u>	
Bleed Air Valve Setting	_____		Bleed Air Valve Setting	<u>50%</u>	
Liquid Level	_____		Liquid Level	<u>DRAINED.</u>	
Vacuum Pump V-3			Vacuum Pump V-4		
Vacuum	<u>8."</u>	°Hg	Vacuum	_____	°Hg
Temperature	<u>176.</u>	°F	Temperature	_____	°F
Particulate Filter	<u>OK.</u>		Particulate Filter	_____	
Flow Control Valve Setting	<u>100%</u>		Flow Control Valve Setting	_____	
Bleed Air Valve Setting	<u>50%</u>		Bleed Air Valve Setting	_____	
Liquid Level	<u>DRAINED.</u>		Liquid Level	_____	

ACTIVATED CARBON ADSORPTION SYSTEM

Carbon Adsorber A/B			Carbon Adsorber C/D		
Inf. VOC Level	<u>20.1</u>	ppm	Inf. VOC Level	<u>19.3</u>	ppm
Inf Pressure	<u>_____</u>	psi	Inf Pressure	<u>_____</u>	psi
Mid. VOC Level	<u>20.2</u>	ppm	Mid. VOC Level	<u>_____</u>	ppm
Mid Pressure	<u>_____</u>	psi	Mid Pressure	<u>_____</u>	psi
Eff. VOC Level	<u>19.8</u>	ppm	Eff. VOC Level	<u>_____</u>	ppm
Change out Date	<u>_____</u>		Change out Date	<u>_____</u>	

WATER TREATMENT

Flowmeter Reading 4257.9 Gallons

COMMENTS

* MICROFID USED.

ATTACHMENT 2

MONTHLY FIELD ACTIVITY SUMMARY

Field Activity Summary

June 1997

**New London Naval Submarine Base
Groton, Connecticut**

Week Ending	Site	Period	Field Activities¹	Comments
6/13/97	Dolphin Mart	Monthly Monitoring	Conducted monthly system monitoring and effluent off-gas sampling.	High water level in moisture separator caused SVE system and air sparge system to shut down.
	NEX		Conducted monthly system monitoring, DMR sampling and effluent off-gas sampling.	High water level in moisture separator caused one SVE blower and air sparge system to shut down.
	OT-8		Conducted routine maintenance and monitoring.	Product recovery system deactivated due to high water table.
7/14/97	Dolphin Mart	Monthly Monitoring	Conducted routine maintenance and monitoring.	Low air flow due to high water level in moisture separator caused SVE system and air sparge system to shut down.
	NEX		Conducted routine maintenance and monitoring.	High water level in moisture separator caused one SVE blower and air sparge system to shut down.
	OT-8		None	Product recovery system inactive due to high water table.

Note: ¹ Monthly operation and maintenance tasks include well gauging and system monitoring.

ATTACHMENT 3

AIR SPARGE/SVE SYSTEM DATABASES

**SYSTEM MONITORING DATA
SOIL VAPOR EXTRACTION/AIR SPARGE SYSTEM**

New London Naval Submarine Base
NEX Site
Groton, CT

Date	Day of Operation	Air Sparge Flowrate (scfm)	Extraction Flowrate (east side) (scfm)	Extraction Flowrate (west side) (scfm)	Extraction Flowrate (total) (scfm)	Extraction Flowrate (cfm)	Influent Concentration BTEX (ppmv)	Removal Rate BTEX (lb/hr)	Influent Concentration MTBE (ppmv)	Removal Rate MTBE (lb/hr)	Influent Concentration Aliphatics (ppmv)	Removal Rate Aliphatics (lb/hr)	Influent Concentration Aromatics (ppmv)	Removal Rate Aromatics (lb/hr)	Influent Concentration TVPH (ppmv)	Removal Rate TVPH (lb/hr)	Total Mass Removal Rate (lbs/hr)	Period Mass Removed (lbs)	Cumulative Mass Removed (lbs)	Comments
07/31/96	0	NA*	54	199	253	288.00	1.80	0.013	—	0.000	130.00	0.810	0.00	0.000	—	0.000	0.823	0.00	0.00	
08/08/96	8	NA*	85	185	270	307.35	1.80	0.013	—	0.000	130.00	0.810	0.00	0.000	—	0.000	0.823	78.21	78.21	
08/22/96	22	NA*	85	185	270	307.35	1.80	0.013	—	0.000	130.00	0.810	0.00	0.000	—	0.000	0.823	88.09	166.30	
09/16/96	47	NA*	186	134	320	364.27	2.70	0.021	0.00	0.000	—	0.000	—	0.000	61.00	0.487	0.508	399.38	565.68	system operated approx. 92 hrs between 7/31 and 8/8
10/16/96	77	NA*	186	134	320	364.27	2.50	0.020	0.00	0.000	—	0.000	—	0.000	—	0.000	0.823	88.09	166.30	24-hour per day system operation began 8/8
11/19/96	111	NA*	192	132	324	368.83	0.95	0.008	0.00	0.000	—	0.000	—	0.000	42.00	0.335	0.355	310.76	876.44	
12/17/96	139	NA*	223	87	310	352.89	0.18	0.001	0.07	0.000	—	0.000	—	0.000	22.61	0.180	0.188	221.67	1096.10	
01/27/97	160	NA*	252	69	321	365.41	0.14	0.001	0.00	0.000	—	0.000	—	0.000	6.98	0.056	0.058	82.54	1180.65	
03/27/97	239	NA*	267	117	384	437.13	0.00	0.000	0.00	0.000	—	0.000	—	0.000	4.81	0.038	0.040	47.78	1228.42	
04/17/97	260	NA*	460	261	721	820.75	0.00	0.000	0.00	0.000	—	0.000	—	0.000	0.55	0.004	0.004	31.10	1259.52	
05/21/97	294	6**	360	0	360	409.81	0.00	0.000	0.00	0.000	—	0.000	—	0.000	2.89	0.037	0.037	10.40	1269.92	
06/10/97	314	2**	300	0	300	341.51	0.00	0.000	0.00	0.000	—	0.000	—	0.000	0.00	0.000	0.000	15.06	1284.98	

- Notes:
- * Air sparge compressor not activated due to elevated SVE influent concentrations.
 - ** Air sparge compressor not activated due to improperly sized pressure switch.
 - *** Air sparge compressor activated, but high water levels in the moisture separators cause frequent compressor shut-down.
 - 1) Aliphatics are weighted using a response factor of hexane. (MW = 86.2)
 - 2) Aromatics are weighted using a response factor of o-xylene. (MW=106.16)
 - 3) Analytical data for 7/31/96 is assumed based on results of sampling conducted 6/8/96.
 - 4) Analytical data for 8/22/96 is assumed based on results of sampling conducted 8/8/96.
 - 5) Air flow rate from 10/16/96 assumed for 9/16/96, due to a broken flow meter
 - 6) Beginning 9/16/96 lab analysis was performed by Mitkem Laboratory. Prior to 9/16/96 air analysis performed by NEI/STEL
 - 7) Mitkem results report total volatile petroleum hydrocarbons, not misc. aromatics and aliphatics. Total Volatile Petroleum Hydrocarbons are weighted to molecular weight of 100.
 - 8) Laboratory results for 11/19/96 to present are reported in mg/m3.

**SYSTEM MONITORING DATA
SOIL VAPOR EXTRACTION/AIR SPARGE SYSTEM**

New London Naval Submarine Base
Dolphin Mart Site
Groton, CT

Date	Day of Operation	Air Sparge Flowrate (scfm)	Extraction Flowrate (scfm)	Extraction Flowrate (cfm)	Influent Concentration BTEX (ppmv)	Removal Rate BTEX (lb/hr)	Influent Concentration MTBE (ppmv)	Removal Rate MTBE (lb/hr)	Influent Concentration Aliphatics (ppmv)	Removal Rate Aliphatics (lb/hr)	Influent Concentration Aromatics (ppmv)	Removal Rate Aromatics (lb/hr)	Influent Concentration TVPH (mg/m3)	Influent Concentration TVPH (ppmv)	Removal Rate TVPH (lb/hr)	Total Mass Removal Rate (lbs/hr)	Period Mass Removed (lbs)	Cumulative Mass Removed (lbs)	Comments
07/02/96	0	25	450	512.26	24.00	0.187	33.00	0.232	1000.00	6.876	0.00	0.000	—	—	0.000	7.295	0.00	0.00	
07/23/96	21	20	449	511.12	11.40	0.091	0.00	0.000	200.00	1.375	0.00	0.000	—	—	0.000	1.487	448.88	448.88	system operated approx. 102 hrs between 7/2 and 7/23
08/08/96	37	32	454	516.81	18.00	0.142	—	0.000	210.00	1.444	12.00	0.102	—	—	0.000	1.887	209.75	656.61	system operated approx. 133 hrs between 7/23 and 8/8
08/30/96	59	0	450	512.26	18.00	0.142	—	0.000	210.00	1.444	12.00	0.102	—	—	0.000	1.887	187.31	843.92	system operated approx. 111 hrs between 8/8 and 8/30
10/02/96	92	30	448	509.98	2.30	0.019	0.00	0.000	—	0.000	—	0.000	—	—	0.000	0.000	0.00	843.92	system not in operation from 8/30 to 10/2 due to flow meter problem
10/16/96	106	30	450	512.26	2.30	0.019	0.00	0.000	—	0.000	—	0.000	NA	36.00	0.287	0.306	187.31	843.92	system reactivated 10/2/96
11/19/96	140	30	450	512.26	0.38	0.003	0.00	0.000	—	0.000	—	0.000	NA	36.00	0.287	0.306	102.81	843.92	system not in operation from 8/30 to 10/2 due to flow meter problem
12/17/96	168	30	450	512.26	0.12	0.001	0.00	0.000	—	0.000	—	0.000	22.00	5.29	0.042	0.045	143.33	946.74	system reactivated 10/2/96
01/27/97	209	30	450	512.26	1.35	0.011	0.00	0.000	—	0.000	—	0.000	8.20	1.97	0.016	0.017	20.84	1090.06	
03/27/97	268	30	450	512.26	0.00	0.000	0.00	0.000	—	0.000	—	0.000	55.00	13.23	0.106	0.117	65.56	1110.90	
04/17/97	289	30	450	512.26	0.00	0.000	0.00	0.000	—	0.000	—	0.000	0.00	3.90	0.031	0.031	104.53	1176.46	
05/21/97	323	15	329	374.52	0.00	0.000	0.00	0.000	—	0.000	—	0.000	13.00	3.13	0.025	0.025	14.13	1228.73	assume 50% up-time, blowers shutting down due to influent water
06/10/97	343	15	329	374.52	0.25	0.002	0.00	0.000	—	0.000	—	0.000	24.00	5.77	0.034	0.034	11.96	1242.86	assume 50% up-time, blowers shutting down due to influent water
																0.067	12.14	1266.96	assume 50% up-time, blowers shutting down due to influent water

- Notes:
- 1) Aliphatics are weighted using a response factor of hexane. (MW = 86.2)
 - 2) Aromatics are weighted using a response factor of o-xylene. (MW=106.16)
 - 3) Analytical data for 8/30/96 is assumed based on results of sampling conducted 8/8/96. System was deactivated 8/30/96 due to flow meter failure.
 - 4) Flow rate of 10/16/96 through 4/17/97 and 6/10/97 is assumed. Air flow meter not in operation.
 - 5) Analytical data for 10/2 is assumed based on data from 10/16/96.
 - 6) Beginning 10/16/96 lab analysis was performed by Milkem Laboratory. Prior to 10/16/96 air analysis performed by NEI/GTEL
 - 7) Milkem results report total volatile petroleum hydrocarbons, not misc. aromatics and aliphatics. Total Volatile Petroleum Hydrocarbons are weighted to molecular weight of 100.
 - 8) Laboratory results from 11/19/96 to present are reported in mg/m3.

ATTACHMENT 4

HISTORICAL CARBON USAGE SUMMARY

**Carbon Breakthrough Matrix
Dolphin Mart and NEX Site**

**Groton Naval Submarine Base
Groton, CT**

Carbon Breakthrough (#)	Sample Date	Sample Time	Influent Conc. (ppmv, PID/FID)	Effluent Conc. (ppmv, PID/FID)	SVE System Flow Rate (scfm)	Air Sparge System Flow Rate (scfm)	Estimated Breakthrough Time (hours)	Comments
2	7-2-96	17:05	66	8.1	452	25	15.75	Dolphin Mart Site
	7-3-96	8:50	375	289	448	33		
3	7-11-96	15:10	204.8	0	449	25	16.33	Dolphin Mart Site
	7-12-96	7:30	534	268	450	37		
4	7-12-96	9:55	588	15	450	30	21.33	Dolphin Mart Site. System deactivated 7/12/96 15:55 for weekend.
	7-15-96	18:10	366	0.0	449	16		
	7-16-96	9:30	149	77	442	24		
5	7-19-96	11:30	105	0	440	16	25.83	Approx. 1 hour test-only on 7/19/96.
	7-22-96	10:30	142	0	445	15		
	7-23-96	11:20	215	75	449	20		
6	7/24/96	9:45	96	0	450	16	40	Dolphin Mart Site. System down up to 8 hrs on 7/19/96 for electrical work.
	7/25/96	17:45	84.6	0	446	17		
	7/26/96	11:45	275	192	442	21		

**Carbon Breakthrough Matrix
Dolphin Mart and NEX Site**

**Groton Naval Submarine Base
Groton, CT**

Carbon Breakthrough (#)	Sample Date	Sample Time	Influent Conc. (ppmv, PID/FID)	Effluent Conc. (ppmv, PID/FID)	SVE System Flow Rate (scfm)	Air Sparge System Flow Rate (scfm)	Estimated Breakthrough Time (hours)	Comments
7	8/1/96	6:20	83.9	0	447.7	20		Dolphin Mart Site. Carbon loading test shut down for weekend 8/2/96.
	8/2/96	15:30	68	0	451	33		
	8/5/96	16:00	102	0	456	29		
	8/6/96	17:45	77.8	5.2	450	33		
	8/7/96	20:00	100.3	12.0	452	22		
	8/8/96	9:15	122.6	74.2	453.5	32		
8	8/1/96	6:50	6.6	4.5	116	0		NEX Site. A/B Carbon Units.
	8/2/96	15:00	33	7.2	68.5	0		
	8/5/96	15:45	0	0	166	0		
	8/6/96	17:10	3.1	4.0	137	0		
	8/7/96	17:00	2.0	3.3	158	0		
	8/8/96	9:45	2.3	3.5	135	0		
	8/12/96	14:00	65.4	47.6	262	0		

**Carbon Breakthrough Matrix
Dolphin Mart and NEX Site**

**Groton Naval Submarine Base
Groton, CT**

Carbon Breakthrough (#)	Sample Date	Sample Time	Influent Conc. (ppmv, PID/FID)	Effluent Conc. (ppmv, PID/FID)	SVE System Flow Rate (scfm)	Air Sparge System Flow Rate (scfm)	Estimated Breakthrough Time (hours)	Comments
9	8/1/96	6:50	44	8	116	0		NEX Site. C/D Carbon Units.
	8/2/96	15:00	46.5	9.1	68.5	0		
	8/5/96	15:45	100	15.8	166	0		
	8/6/96	17:10	60	24.0	137	0		
	8/7/96	17:00	50.6	34	158	0		
	8/8/96	9:45	54.4	44	135	0		
10	8/22/96	12:00	120	0.0	448	30		Dolphin Mart Site. C/D Carbon Units
	8/24/96	12:30	141	55	445	35		

**Carbon Breakthrough Matrix
Dolphin Mart and NEX Site**

**Groton Naval Submarine Base
Groton, CT**

Carbon Breakthrough (#)	Sample Date	Sample Time	Influent Conc. (ppmv, PID/FID)	Effluent Conc. (ppmv, PID/FID)	SVE System Flow Rate (scfm)	Air Sparge System Flow Rate (scfm)	Estimated Breakthrough Time (hours)	Comments
11	8/22/96	16:00	29	0.0	232	0		NEX Site. C/D Carbon Units. Carbon units taken off-line 9/4/96.
	8/27/96	9:20	36	12	228	0		
	8/30/96	14:40	26	24	108	0		
	9/4/96	16:00	49	NA	330	0		
	9/10/96	10:30	52.6	52.6	243	0		
	9/16/96	14:00	35	35	320	0		
	9/27/96	13:00	42.7	42.7	60	0		
	10/2/96	10:00	17	17	84	0		
	10/8/96	12:00	33.7	33.7	413	0		
	10/10/96	12:50	22.3	22.3	282	0		
	10/16/96	13:30	23.8	23.8	259	0		
	10/21/96	14:40	14.6	14.6	281	0		
	10/25/96	15:05	49.9	49.9	173	0		
	10/28/96	12:30	65.0	65.0	350	0		
	11/8/96	17:15	26.3	26.3	342	0		
	11/19/96	14:40	8.7	8.7	324	0		
	12/2/96	10:30	160	160	299	0		
	12/17/96	NA	5.0	5.0	310	0		
	1/13/97	14:20	8.2	8.2	322	0		
	1/27/97	17:10	15.0	15.0	322	0		
2/17/97	16:30	2.2	2.2	288	0			

**Carbon Breakthrough Matrix
Dolphin Mart and NEX Site**

**Groton Naval Submarine Base
Groton, CT**

Carbon Breakthrough (#)	Sample Date	Sample Time	Influent Conc. (ppmv, PID/FID)	Effluent Conc. (ppmv, PID/FID)	SVE System Flow Rate (scfm)	Air Sparge System Flow Rate (scfm)	Estimated Breakthrough Time (hours)	Comments
11 con'd	2/19/97	17:30	0.0	0.0	NS	NS		
	3/27/97	15:15	4.0	4.0	NS	NS		
	4/17/97	14:00	9.8/6.5	9.8/6.5	721	NS		
	5/1/97	15:35	0.0	0.0	318	11.5		
	5/21/95	NA	4.9/7.9	4.9/7.9	360	6		
	6/10/97	NA	20.1	20.1	300	2		

**Carbon Breakthrough Matrix
Dolphin Mart and NEX Site**

**Groton Naval Submarine Base
Groton, CT**

Carbon Breakthrough (#)	Sample Date	Sample Time	Influent Conc. (ppmv, PID/FID)	Effluent Conc. (ppmv, PID/FID)	SVE System Flow Rate (scfm)	Air Sparge System Flow Rate (scfm)	Estimated Breakthrough Time (hours)	Comments
12	8/27/96	12:45	68	1.0	450	32		Dolphin Mart Site. C/D Carbon Units. Units still in service.
	10/2/96	12:50	47.5	13.7	458	30		
	10/8/96	13:10	27	6.5	467	28		
	10/16/96	13:00	18	5.4	NS	NS		
	10/25/96	16:00	23.1	27.5	NS	NS		
	10/28/96	11:30	27.3	13.3	NS	NS		
	11/8/96	11:10	10.3	5.6	NS	NS		
	11/19/96	14:10	2.5	0.0	NS	NS		
	12/2/96	14:15	4.0	9.0	NS	NS		
	12/17/96	NA	13.0	2.0	NS	NS		
	12/30/96	NA	12.0	12.0	NS	NS		
	1/13/97	13:50	5.0	5.0	NS	NS		
	1/27/97	15:00	12.0	8.0	NS	NS		
	2/13/97	NA	2.4	0.0	NS	15		
	2/19/97	13:45	2.6	1.1	NS	NS		
	3/27/97	10:40	20	1.8	NS	NS		
	4/17/97	NA	8.7	7.3	NS	NS		
	5/1/97	12:30	3.6	1.9	298	16		
	5/21/97	NA	287.2	60.8	329	15		
	6/10/97	NA	3.2	2.6	329	15		
							NA	

**Carbon Breakthrough Matrix
Dolphin Mart and NEX Site**

**Groton Naval Submarine Base
Groton, CT**

Carbon Breakthrough (#) ¹	Sample Date	Sample Time	Influent Conc. (ppmv, PID/FID)	Effluent Conc. (ppmv, PID/FID)	SVE System Flow Rate (scfm)	Air Sparge System Flow Rate (scfm)	Estimated Breakthrough Time (hours)	Comments
<p>Notes: 1 The initial carbon breakthrough (not included in this table) occurred during OHM's start-up activities.</p> <p> 2 AB/CD carbon units.</p> <p> ppmv = parts per million by volume</p> <p> PID = photoionization detector</p> <p> FID = flame ionization detector</p> <p> PGC = portable gas chromatograph</p> <p> NS = not sampled</p>								

ATTACHMENT 5

HISTORICAL WELL GAUGING DATA

Well Gauging Data
Dolphin Mart Site
New London Naval Submarine Base
Groton, Connecticut

Date	Depth to Water (ft)																	
	Well ID																	
	DM-1	DM-2	DM-3	DM-4	DM-5	HRP-10	HRP-11	MW-1	MW-2	MW-3	WE-1	WE-1A	WE-25	WE-2B	WE-3	WE-4	WE-5	WE-6
07/02/96	6.37	NG	NG	NG	NG	4.65	NG	4.65	3.55	3.12	NG	NG	6.78	6.56	8.67	4.24	4.80	3.40
07/03/96	NG	NG	NG	NG	NG	5.19	NG	4.63	2.86	0.00	NG	NG	6.58	6.35	8.69	6.38	4.33	2.30
07/12/96	NG	NG	NG	NG	NG	5.81	NG	5.01	3.82	1.95	NG	NG	6.96	6.83	8.93	6.38	4.98	3.60
07/16/96	NG	NG	NG	NG	NG	4.33	NG	4.55	2.89	0.74	NG	NG	6.47	6.24	8.5	6.27	4.08	2.76
07/17/96	NG	NG	NG	NG	NG	2.73	NG	4.94	1.63	2.79	NG	NG	6.3	5.88	8.62	6.47	3.62	1.72
07/19/96	NG	NG	NG	NG	NG	4.38	NG	5.21	0.61	0.00	NG	NG	6.18	5.53	8.45	NG	3.19	1.08
07/22/96	NG	NG	NG	NG	NG	4.54	NG	4.82	1.95	1.17	NG	NG	6.45	6.42	8.64	3.68	3.73	1.96
07/23/96	NG	NG	NG	NG	NG	4.55	NG	4.75	3.33	0.00	NG	NG	6.7	6.33	8.72	8.72	4.49	2.40
07/24/96	NG	NG	NG	NG	NG	4.33	NG	5.22	1.18	0.00	NG	NG	6.31	5.67	8.45	3.38	3.33	1.49
07/25/96	NG	NG	NG	NG	NG	4.46	NG	5.31	NG	NG	NG	NG	NG	NG	NG	NG	NG	2.12
07/26/96	NG	NG	NG	NG	NG	4.43	NG	4.79	NG	NG	NG	NG	NG	NG	NG	NG	NG	2.95
08/01/96	NG	NG	NG	NG	NG	3.93	NG	4.96	2.2	1.28	NG	NG	6.39	6.09	8.55	3.22	4.06	1.15
08/02/96	NG	NG	NG	NG	NG	4.08	NG	5.24	1.82	1.31	NG	NG	6.3	5.73	8.56	2.96	3.76	0.86
08/05/96	NG	NG	NG	NG	NG	4.35	NG	5.08	NG	1.08	NG	NG	NG	NG	NG	NG	NG	1.28
09/04/96	NG	NG	NG	NG	NG	5.43	NG	6.07	4.59	DRY	NG	NG	7.39	7.51	9.73	5.11	6.23	4.59
10/02/96	NG	NG	NG	NG	NG	3.53	NG	5.43	NG	3.86	NG	NG	6.41	5.82	8.41	3.11	3.96	1.60
10/21/96	NG	NG	NG	NG	NG	3.98	NG	NG	NG	NG	NG	NG	6.41	5.82	8.41	3.11	3.96	1.60
11/19/96	1.90	NG	2.06	2.68	5.37	4.15	NG	3.85	3.00	DRY	NG	NG	6.46	5.89	8.32	3.53	3.87	2.90
12/17/96	2.53	NG	1.60	NG	3.67	NG	NG	2.53	2.17	NG	NG	NG	6.10	NG	7.92	2.17	2.96	2.10
01/27/97	1.91	NG	1.89	NG	4.26	3.29	NG	2.98	2.13	NG	NG	NG	6.24	5.73	7.94	3.08	3.26	1.53
02/18/97	1.93	NG	1.90	2.04	NG	4.04	NG	2.91	2.56	2.28	NG	NG	6.32	5.84	7.95	3.49	3.21	2.55
03/27/97	1.89	2.27	1.86	2.41	4.6	4.04	3.21	3.48	1.86	1.27	5.03	DRY	6.21	5.45	8.08	1.66	3.51	1.15
04/17/97	NG	NG	NG	NG	NG	5.25	NG	3.14	1.94	1.39	NG	NG	NG	NG	NG	3.00	3.18	1.30
05/21/97	2.04	2.39	2.08	3.08	5.19	4.11	3.43	3.60	2.93	2.44	DRY	DRY	NG	6.11	8.20	3.73	4.07	2.84

Notes:
NG = Not Gauged
(1) Depth to Product/Depth to Water

Well Gauging Data
 NEX Site
 New London Naval Submarine Base
 Groton, Connecticut

Date	Depth to Water/Depth to Product (ft)																								
	Well ID																								
	ERM-5	ERM-6	ERM-7	ERM-8	ERM-9	ERM-10	ERM-11	ERM-12	ERM-13	ERM-14	ERM-15	ERM-16	ERM-17	ERM-18	ERM-19	HEX-1	OBC-1	OBC-2	OBC-3	OBC-4	OBC-5	OBC-6	MW-1	MW-2	
09/16/96	3.82	5.14	5.27	NG	NG	NG	NG	8.38	7.01	6.89	4.30	8.51	5.62	3.65	6.28	NG	NG	NG							
10/16/96	NG	4.82	4.75	NG	NG	NG	6.4	8.13	7.15	6.92	3.94	8.49	5.56	3.96	5.17	NG	NG	NG							
11/18/96	3.72	4.64	4.93	NG	NG	NG	6.36	8.09	7.13	7.10/6.91	4.03	8.43	5.53	NG	5.19	NG	NG	NG							
12/16/96	3.10	4.08	4.21	NG	NG	NG	5.02	7.83	6.55	6.35	NG	7.8	3.73	NG	4.23	NG	NG	NG							
02/17/97	3.00	4.34	4.29	NG	NG	NG	4.89	7.65	6.03	5.89	NG	7.85	4.53	NG	4.18	NG	NG	NG							
03/27/97	2.89	4.28	4.19	NG	NG	NG	5.19	7.63	5.98	5.82	NG	7.79	4.87	NG	4.06	5.81	8.12	7.95	7.75	7.95	5.61	NG	5.54	4.91	4.49
04/15/97	NG	NG	NG	NG	NG	NG	NG	NG	5.86	5.7	3.39	7.84	4.84	NG	NG	5.74	NG	7.92	7.75	NG	NG	NG	5.54	NG	NG
04/17/97	2.73	NG	NG	NG	NG	NG	NG	NG	NG	5.66	3.31	NG	4.67	NG	3.91	NG	NG	7.91	7.78	NG	NG	NG	5.58	NG	NG
04/24/97	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	NG	7.74	7.74	NG	NG	NG	NG	NG
05/21/97	NG	4.72	4.61	NG	NG	NG	6.27	7.81/7.80	6.15	6.04/5.99	NG	8.16	5.26	NG	4.46	5.80	7.98	7.81	7.64	NG	5.79	5.60	5.84/5.31	NG	4.85

Notes:
 NG = Not Gauged

**MW-7 Well Gauging Data
OT-8 Site
New London Naval Submarine Base
Groton, Connecticut**

Date	Depth to Product (feet)	Depth to Water (feet)	LNAPL Thickness (feet)	LNAPL Recovered (gallons)	Cumulative LNAPL Recovered (gallons)
09/26/96	4.26	6.02	1.76	0.00	0.00
10/02/96	NS	NS	0.00	4.00	4.00
10/08/96	NS	NS	0.00	0.00	4.00
10/16/96	NS	NS	0.00	0.00	4.00
10/21/96	1.65	1.66	0.01	0.00	4.00
10/25/96	3.06	3.18	0.12	0.00	4.00
10/28/96	3.46	3.55	0.09	0.00	4.00
12/17/96	NA	0.00	0.00	0.00	4.00
01/13/97	7.76	7.86	0.10	0.00	4.00
01/27/97	NA	0.00	0.00	0.00	4.00
02/19/97	2.96	2.97	0.01	0.00	4.00
03/27/97	3.30	3.99	0.69	UNK*	4.00
04/17/97	3.12	3.34	0.22	0.00	4.00
05/21/97	5.07	4.09	0.98	0.25	4.25
06/10/97	sheen	4.64	sheen	0.00	4.25

Notes: Gauging on 10/02/96 and 10/16/96 was with a clear bailer, to visually confirm product thickness.

The well and vault were flooded on 12/17/96

NA = Not Applicable

NG = Not Gauged

* Product was recovered, but the volume was insufficient to fill the product piping and discharge into the recovery drum.

ATTACHMENT 6

HISTORICAL GROUNDWATER SAMPLING RESULTS

**Table 1
Historical Groundwater Sampling Results
Dolphin Mart - March 1995 - May 1997
Naval Submarine Base, Groton, CT**

(analytical results in µg/l)
page 1 of 8

Compound		BTEX				MTBE	TPH (By EPA Method 418.1)	Total Volatiles (by EPA Method 8010/8020)	DRO (by EPA Method 8100M)	GRO (by EPA Method 8015M)
		Benzene	Toluene	Ethylbenzene	Xylenes					
Remediation Standard		1.0	1,000	700	530	100	500	NA	NA	NA
Well	Date									
DM-1	3/95	<1.0	<1.0	<1.0	<1.0	<2.0	<473	NS	NS	NS
	5/96	<1.0	<1.0	<1.0	<1.0	4.0	<473	NS	NS	NS
	11/96	<1.0	<1.0	<1.0	<1.0	<1.0	<1,000	5	1,000	<500
	2/97	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	<1.0	<500	<500
DM-2	3/95	<1.0	<1.0	<1.0	<1.0	<2.0	<473	NS	NS	NS
	5/96	<1.0	<1.0	<1.0	<1.0	4.0	<473	NS	NS	NS
	11/96	NS	NS	NS	NS	NS	NS	NS	NS	NS
	2/97	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	<1.0	<500	<500

Notes: NS = Not sampled (NS results have been shaded)
Bold numbers indicate an exceedance of State of CT Clean-up Standards
B = Analyte detected in method blank, D = Analyte concentration was obtained from a diluted analysis, E = Analyte concentration exceeded the calibration range
DRO=Diesel Range Organics, GRO=Gasoline Range Organics

Table 1
Historical Groundwater Sampling Results
Dolphin Mart - March 1995 - May 1997
Naval Submarine Base, Groton, CT

(analytical results in µg/l)
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Compound		BTEX				MTBE	TPH (By EPA Method 418.1)	Total Volatiles (by EPA Method 8010/8020)	DRO (by EPA Method 8100M)	GRO (by EPA Method 8015M)
		Benzene	Toluene	Ethylbenzene	Xylenes					
Remediation Standard		1.0	1.000	700	530	100	500	NA	NA	NA
Well	Date									
DM-3	3/95	<1.0	<1.0	<1.0	<1.0	7.90	<473	NS	NS	NS
	5/96	<1.0	<1.0	<1.0	<1.0	<2.0	<473	NS	NS	NS
	11/96	<1.0	<1.0	<1.0	<1.0	<1.0	<1,000	5	<500	<500
	2/97	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	<1.0	<500	<500
DM-4	3/95	<1.0	<1.0	<1.0	<1.0	<2.0	<473	NS	NS	NS
	5/96	<1.0	<1.0	<1.0	<1.0	<2.0	<473	NS	NS	NS
	11/96	<1.0	<1.0	<1.0	<1.0	<1.0	<1,000	5	600	<500
	2/97	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	<1.0	<500	<500

Notes: NS = Not sampled (NS results have been shaded)
B = Analyte detected in method blank, **D** = Analyte concentration was obtained from a diluted analysis, **E** = Analyte concentration exceeded the calibration range
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Table 1
Historical Groundwater Sampling Results
Dolphin Mart - March 1995 - May 1997
Naval Submarine Base, Groton, CT

(analytical results in µg/l)
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Compound		BTEX				MTBE	TPH (By EPA Method 418.1)	Total Volatiles (by EPA Method 8010/8020)	DRO (by EPA Method 8100M)	GRO (by EPA Method 8015M)
		Benzene	Toluene	Ethylbenzene	Xylenes					
Remediation Standard		1.0	1,000	700	530	100	500	NA	NA	NA
Well	Date									
DM-5	3/95	<1.0	<1.0	<1.0	<1.0	<2.0	<473	NS	NS	NS
	5/96	<1.0	<1.0	<1.0	<1.0	<2.0	<473	NS	NS	NS
	11/96	<1.0	<1.0	<1.0	<1.0	<1.0	<1,000	6	<500	<500
	2/97	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	<1.0	<500	<500
HRP-10	3/95	304	35.2	257	1140	<50	6,080	NS	NS	NS
	5/96	125	21	54	329	<20	1,740	NS	NS	NS
	11/96	9	<1.0	65	<1.0	7	<1,000	81	600	<500
	2/97	<1.0	<1.0	<1.0	<1.0	3	<500	3	<500	<500
	5/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	<1.0	<500	<500

Notes: NS = Not sampled (NS results have been shaded)
Bold numbers indicate an exceedance of State of CT Clean-up Standards
B = Analyte detected in method blank, D = Analyte concentration was obtained from a diluted analysis, E = Analyte concentration exceeded the calibration range
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Table 1
Historical Groundwater Sampling Results
Dolphin Mart - March 1995 - May 1997
Naval Submarine Base, Groton, CT

(analytical results in µg/l)
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Compound		BTEX				MTBE	TPH (By EPA Method 418.1)	Total Volatiles (by EPA Method 8010/8020)	DRO (by EPA Method 8100M)	GRO (by EPA Method 8015M)
		Benzene	Toluene	Ethylbenzene	Xylenes					
Remediation Standard		1.0	1,000	700	530	100	500	NA	NA	NA
Well	Date									
HRP-11	3/95	<1.0	<1.0	<1.0	<1.0	<2.0	<473	NS	NS	NS
	5/96	1.0	<1.0	<1.0	3.0	<2.0	<473	NS	NS	NS
	11/96	NS	NS	NS	NS	NS	NS	NS	NS	NS
	2/97	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	<1.0	<500	<500
MW-1	11/96	3	<1.0	5	<1.0	<1.0	<1,000	11	1,000	<500
	2/97	<1.0	<1.0	4	<1.0	<1.0	<500	4	<500	600
	5/97	<1.0	<1.0	4	<1.0	<1.0	<500	6	700	760
MW-2	11/96	4	<1.0	14	<1.0	4	<1,000	28	1,200	<500
	2/97	<1.0	<1.0	<1.0	<1.0	<1.0	1,000	1 B	1,200	1,200
	5/97	<1.0	<1.0	3	<1.0	<1.0	<500	3	500	580

Notes: NS = Not sampled (NS results have been shaded)
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Table 1
Historical Groundwater Sampling Results
Dolphin Mart - March 1995 - May 1997
Naval Submarine Base, Groton, CT

(analytical results in µg/l)
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Compound		BTEX				MTBE	TPH (By EPA Method 418.1)	Total Volatiles (by EPA Method 8010/8020)	DRO (by EPA Method 8100M)	GRO (by EPA Method 8015M)
		Benzene	Toluene	Ethylbenzene	Xylenes					
Remediation Standard		1.0	1,000	700	530	100	500	NA	NA	NA
Well	Date									
MW-3	2/97	36	23	72	500	5	2,000	645 B	3,300	1,600
	5/97	60	38	69	730D	<1.0	5,000	897D	7,900	<500
OBG-8A	3/95	72	24.6	25.9	62.4	9.29	<473	NS	NS	NS
	5/96	12.0	<1.0	9.0	4.0	<2.0	<473	NS	NS	NS
	11/96	NS	NS	NS	NS	NS	NS	NS	NS	NS
	2/97	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/97	NS	NS	NS	NS	NS	NS	NS	NS	NS
OBG-9A	3/95	<1.0	<1.0	<1.0	<1.0	<2.0	<473	NS	NS	NS
	5/96	<1.0	<1.0	<1.0	<1.0	<2.0	<473	NS	NS	NS
	11/96	NS	NS	NS	NS	NS	NS	NS	NS	NS
	2/97	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/97	<1.0	<1.0	<1.0	<1.0	<1.0	3,000	<1.0	<500	<500

Notes: NS = Not sampled (NS results have been shaded)
Bold numbers indicate an exceedance of State of CT Clean-up Standards
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Table 1
Historical Groundwater Sampling Results
Dolphin Mart - March 1995 - May 1997
Naval Submarine Base, Groton, CT

(analytical results in µg/l)
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Compound		BTEX				MTBE	TPH (By EPA Method 418.1)	Total Volatiles (by EPA Method 8010/8020)	DRO (by EPA Method 8100M)	GRO (by EPA Method 8015M)
		Benzene	Toluene	Ethylbenzene	Xylenes					
Remediation Standard		1.0	1.000	700	530	100	500	NA	NA	NA
Well	Date									
WE-2D(B)	11/96	1	<1.0	<1.0	<1.0	<1.0	<1,000	3	<500	<500
	2/97	2	<1.0	<1.0	<1.0	3	<500	3	<500	<500
	5/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	<1.0	<500	<500
WE-2S	3/95	37.9	24.2	60.3	126.4	21.3	725	NS	NS	NS
	5/96	50	22	101	144	<10	1,570	NS	NS	NS
	11/96	7	<1.0	9	4	14	<1,000	34	<500	<500
	2/97	5	<1.0	14	3	10	<500	32	500	600
	5/97	NS	NS	NS	NS	NS	NS	NS	NS	NS

Notes: NS = Not sampled (NS results have been shaded)
B = Analyte detected in method blank, **D** = Analyte concentration was obtained from a diluted analysis, **E** = Analyte concentration exceeded the calibration range
DRO=Diesel Range Organics, GRO=Gasoline Range Organics

Table 1
Historical Groundwater Sampling Results
Dolphin Mart - March 1995 - May 1997
Naval Submarine Base, Groton, CT

(analytical results in µg/l)
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Compound		BTEX				MTBE	TPH (By EPA Method 418.1)	Total Volatiles (by EPA Method 8010/8020)	DRO (by EPA Method 8100M)	GRO (by EPA Method 8015M)
		Benzene	Toluene	Ethylbenzene	Xylenes					
Remediation Standard		1.0	1,000	700	530	100	500	NA	NA	NA
Well	Date									
WE-3	3/95	<1.0	<1.0	<1.0	<1.0	8.70	<473	NS	NS	NS
	5/96	2.0	<1.0	<1.0	<1.0	14.0	<473	NS	NS	NS
	11/96	NS	NS	NS	NS	NS	NS	NS	NS	NS
	2/97	<1.0	<1.0	<1.0	<1.0	6	<500	6	<500	<500
	5/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	<1.0	<500	<500
WE-4	3/95	267	29.8	392	712	<40	5,180	NS	NS	NS
	5/96	160	16	301	617	<40	3,680	NS	NS	NS
	11/96	41	1.0	100	2	19	<1,000	166	1,100	500
	2/97	21	<1	27	1	17	<500	66	500	700
	5/97	13	<1.0	13	<1.0	19	<500	45	700	540

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DRO=Diesel Range Organics, GRO=Gasoline Range Organics

Table 1
Historical Groundwater Sampling Results
Dolphin Mart - March 1995 - May 1997
Naval Submarine Base, Groton, CT

(analytical results in µg/l)
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Compound		BTEX				MTBE	TPH (By EPA Method 418.1)	Total Volatiles (by EPA Method 8010/8020)	DRO (by EPA Method 8100M)	GRO (by EPA Method 8015M)
		Benzene	Toluene	Ethylbenzene	Xylenes					
Remediation Standard		1.0	1,000	700	530	100	500	NA	NA	NA
Well	Date									
WE-5	11/96	240D	410D	720D	4,300E	27	9,000	5,697	12,000	8,900
	2/97	42D	10	89D	490D	6	2,000	637	2,000	1,200
	5/97	370	190	840	3,900D	<1.0	4,000	5,300	11,000	16,000
WE-6	11/96	5	210D	71D	630D	<1.0	<1,000	916	2,000	1,400
	2/97	3	4	8	12	2	<500	29	800	700
	5/97	3	1.0	12	<1.0	<1.0	<500	15	1,200	1,200

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DRO=Diesel Range Organics, GRO=Gasoline Range Organics

Table 2
Historical Groundwater Sampling Results
NEX - March 1995 - May 1997
Naval Submarine Base, Groton, CT

(analytical results in µg/l)
page 1 of 8

Compound		BTEX				MTBE	TPH (By EPA Method 418.1)	Total Volatiles (by EPA Method 8010/8020)	DRO	GRO
		Benzene	Toluene	Ethylbenzene	Xylenes					
Remediation Standard		1.0	1,000	700	530	100	500	NA	NA	NA
Well	Date									
ERM-5	3/95	967	431	390	1,340	<100	NS	3,295.1	430	8,250
	5/96	112	6	34	28	<10	NS	196	159	554
	11/96	370D	14	33	61D	<1.0	3,000	480	1,100	1,600
	2/97	1,100	1,100	580	1,600	<50	3,000	4,440 B	3,900	9,100
	5/97	NS	NS	NS	NS	NS	NS	NS	NS	NS
ERM-6	5/96	15	<1.0	<1.0	<1.0	<2.0	NS	35	63	<473
	11/96	610	230	770	2,400E	<40	5,000	4,054	500	7,800
	2/97	430D	21	300	1,000D	<10	2,000	1,763 B	2,200	4,800
	5/97	430D	21	640D	2,300D	<1.0	1,000	3,391D	1,500	6,700

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Table 2
Historical Groundwater Sampling Results
NEX - March 1995 - May 1997
Naval Submarine Base, Groton, CT

(analytical results in µg/l)
page 2 of 8

Compound		BTEX				MTBE	TPH (By EPA Method 418.1)	Total Volatiles (by EPA Method 8010/8020)	DRO	GRO
		Benzene	Toluene	Ethylbenzene	Xylenes					
Remediation Standard		1.0	1,000	700	530	100	500	NA	NA	NA
Well	Date									
ERM-7	5/96	5	<1.0	<1.0	<1.0	<2.0	NS	8	38	<473
	11/96	<1.0	<1.0	<1.0	<1.0	<1.0	<1,000	4	<500	<500
	2/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	1	<500	<500
	5/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	<1.0	<500	<500
ERM-8	3/95	109	11.5	272	157	<50	NS	665.4	464	2,350
	5/96	NS	NS	NS	NS	NS	NS	NS	NS	NS
	11/96	NS	NS	NS	NS	NS	NS	NS	NS	NS
	2/97	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/97	NS	NS	NS	NS	NS	NS	NS	NS	NS

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D = Analyte concentration was obtained from a diluted analysis, B = Analyte detected in method blank, E = Analyte concentration exceeded the calibration range
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Table 2
Historical Groundwater Sampling Results
NEX - March 1995 - May 1997
Naval Submarine Base, Groton, CT

(analytical results in µg/l)
page 3 of 8

Compound		BTEX				MTBE	TPH (By EPA Method 418.1)	Total Volatiles (By EPA Method 8010/8020)	DRO	GRO
		Benzene	Toluene	Ethylbenzene	Xylenes					
Remediation Standard		1.0	1,000	700	530	100	500	NA	NA	NA
Well	Date									
ERM-9	5/96	<1.0	<1.0	<1.0	<1.0	2	NS	4	3,310	<473
	11/96	NS	NS	NS	NS	NS	NS	NS	NS	NS
	2/97	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/97	NS	NS	NS	NS	NS	NS	NS	NS	NS
ERM-11	11/96	<1.0	<1.0	<1.0	<1.0	<1.0	<1,000	3	<500	<500
	2/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	2	<500	<500
	5/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	<1.0	<500	<500

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Bold numbers indicate an exceedance of State of CT Clean-up Standards
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Table 2
Historical Groundwater Sampling Results
NEX - March 1995 - May 1997
Naval Submarine Base, Groton, CT

(analytical results in µg/l)
page 4 of 8

Compound		BTEX				MTBE	TPH (By EPA Method 418.1)	Total Volatiles (by EPA Method 6010/6020)	DRO	GRO
		Benzene	Toluene	Ethylbenzene	Xylenes					
Remediation Standard		1.0	1,000	700	530	100	500	NA	NA	NA
Well	Date									
ERM-12	3/95	<1.0	<1.0	<1.0	<1.0	<2.0	NS	1	27	<473
	5/96	1	2	7	14	<2.0	NS	61	4,300	1,390
	11/96	<1.0	2	<1.0	9	<1.0	3,000	16	7,300	6,700
	2/97	<1.0	1	2	9	<1.0	15,000	13	4,800	1,300
	5/97	LP	LP	LP	LP	LP	LP	LP	LP	LP
ERM-13	3/95	<1.0	<1.0	<1.0	<1.0	<2.0	NS	534	50	<473
	5/96	<1.0	<1.0	<1.0	<1.0	<2.0	NS	9	<100	<473
	11/96	<1.0	<1.0	<1.0	<1.0	<1.0	<1,000	2	<500	<500
	2/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	<1.0	<500	<500
	5/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	<1.0	<500	<500

Notes: NS = Not sampled (NS results have been shaded)
Bold numbers indicate an exceedance of State of CT Clean-up Standards
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Table 2
Historical Groundwater Sampling Results
NEX - March 1995 - May 1997
Naval Submarine Base, Groton, CT

(analytical results in µg/l)
page 5 of 8

Compound		BTEX				MTBE	TPH (By EPA Method 418.1)	Total Volatiles (By EPA Method 6010/6020)	DRO	GRO
		Benzene	Toluene	Ethylbenzene	Xylenes					
Remediation Standard		1.0	1,000	700	530	100	500	NA	NA	NA
Well	Date									
ERM-14	3/95	292	4,880	8,190	6,020	<2.0	NS	19,995	4,840	3,670
	5/96	305	5,670	1,250	8,350	<2.0	NS	22,543	7,290	3,890
	11/96	270	8,300D	1,700D	11,000D	<25	7,000	21,270	12,000	30,000
	2/97	140	4,500D	980	7,100	<100	60,000	12,840	20,000	20,000
	5/97	LP	LP	LP	LP	LP	LP	LP	LP	LP
ERM-15	11/96	280	760	330	1,100	<40	1,000	2,517	2,300	4,500
	2/97	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/97	NS	NS	NS	NS	NS	NS	NS	NS	NS
ERM-16	11/96	37	<2.0	13	16	30	<1,000	68	4,400	2,000
	2/97	56D	<1.0	16	34	27	6,000	136	11,000	1,400
	5/97	34	<1.0	20	42	11	26,000	107	60,000	2,000

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Table 2
Historical Groundwater Sampling Results
NEX - March 1995 - May 1997
Naval Submarine Base, Groton, CT

(analytical results in µg/l)
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Compound		BTEX				MTBE	TPH (By EPA Method 418.1)	Total Volatiles (by EPA Method 6010/6020)	DRO	GRO
		Benzene	Toluene	Ethylbenzene	Xylenes					
Remediation Standard		1.0	1,000	700	530	100	500	NA	NA	NA
Well	Date									
ERM-17	11/96	10	<1.0	<1.0	<1.0	9	<1,000	11	600	600
	2/97	<1.0	<1.0	<1.0	<1.0	<1.0	1,000	<1.0	500	<500
	5/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	<1.0	1,500	<500
ERM-19	11/96	<1.0	<1.0	<1.0	<1.0	<1.0	<1,000	1	<500	<500
	2/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	<1.0	<500	<500
	5/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	<1.0	<500	<500
MW-4	2/97	29	1	<1.0	3	<1.0	NS	33	NS	NS
	5/97	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-6	2/97	<1.0	9	<1.0	<1.0	<1.0	NS	9	NS	NS
	5/97	18	<1.0	2	8	<1.0	<500	28	<500	<500

Notes: NS = Not sampled (NS results have been shaded)
Bold numbers indicate an exceedance of State of CT Clean-up Standards
D = Analyte concentration was obtained from a diluted analysis, B = Analyte detected in method blank, E = Analyte concentration exceeded the calibration range
DRO=Diesel Range Organics, GRO=Gasoline Range Organics

Table 2
Historical Groundwater Sampling Results
NEX - March 1995 - May 1997
Naval Submarine Base, Groton, CT

(analytical results in µg/l)
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Compound		BTEX				MTBE	TPH (By EPA Method 418.1)	Total Volatiles (by EPA Method 6010/6020)	DRO	GRO
		Benzene	Toluene	Ethylbenzene	Xylenes					
Remediation Standard		1.0	1,000	700	530	100	500	NA	NA	NA
Well	Date									
NEX-1	3/95	<1.0	<1.0	<1.0	<1.0	<2.0	NS	7	35	<143
	5/96	<1.0	<1.0	<1.0	<1.0	<2.0	NS	8	<122	<143
	11/96	NS	NS	NS	NS	NS	NS	NS	NS	NS
	2/97	NS	NS	NS	NS	NS	NS	NS	NS	NS
	5/97	2	11	4	34	<1.0	<500	57	<500	<500
OBG-1	5/97	480	3,300D	1,100D	10,000D	540	110,000	15,420	260,000	49,000
OBG-2	5/97	77	280	530	9,800D	290	87,000	10,977	120,000	44,000
OBG-4	2/97	<1.0	<1.0	<1.0	<1.0	<1.0	NS	<1.0	NS	NS
	5/97	<1.0	<1.0	<1.0	2	<1.0	6,000	2	3,100	<500
OBG-7	5/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	<1.0	<500	<500
OB9-8	5/97	<1.0	<1.0	<1.0	<1.0	<1.0	<500	<1.0	<500	<500

Notes: NS = Not sampled (NS results have been shaded)
Bold numbers indicate an exceedance of State of CT Clean-up Standards
D = Analyte concentration was obtained from a diluted analysis, B = Analyte detected in method blank, E = Analyte concentration exceeded the calibration range
DRO=Diesel Range Organics, GRO=Gasoline Range Organics

Table 2
Historical Groundwater Sampling Results
NEX - March 1995 - May 1997
Naval Submarine Base, Groton, CT

(analytical results in µg/l)
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Compound		BTEX				MTBE	TPH (By EPA Method 418.1)	Total Volatiles (by EPA Method 6010/6020)	DRO	GRO
		Benzene	Toluene	Ethylbenzene	Xylenes					
Remediation Standard		1.0	1,000	700	530	100	500	NA	NA	NA
Well	Date									
OB9-9	5/97	LP	LP	LP	LP	LP	LP	LP	LP	LP

Notes: NS = Not sampled (NS results have been shaded)
Bold numbers indicate an exceedance of State of CT Clean-up Standards
D = Analyte concentration was obtained from a diluted analysis, B = Analyte detected in method blank, E = Analyte concentration exceeded the calibration range
DRO=Diesel Range Organics, GRO=Gasoline Range Organics

ATTACHMENT 7

MW-7 WELL CONSTRUCTION LOG

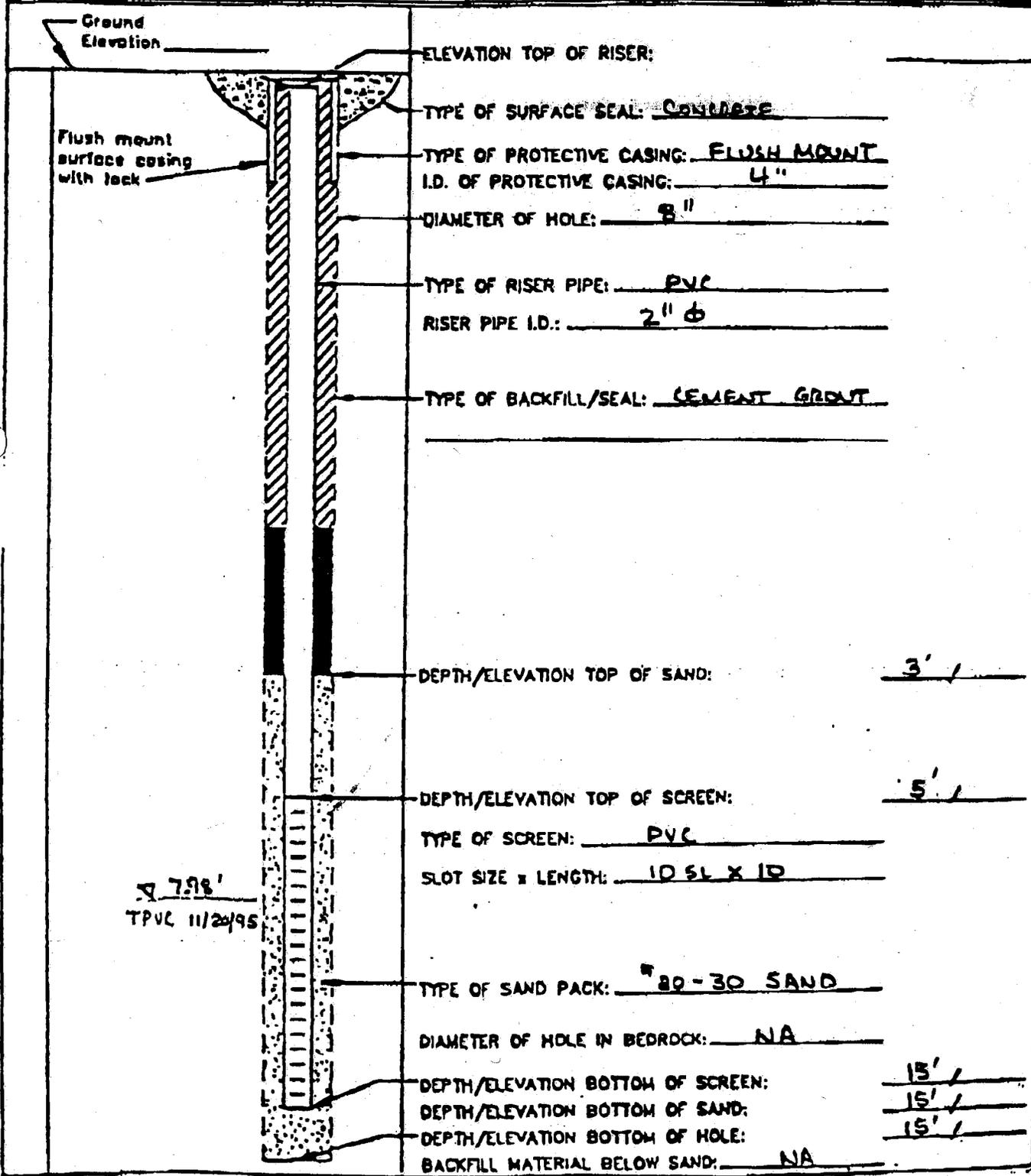


MONITORING WELL SHEET

TANK FARM WELLS

PROJECT NSE NLON LOCATION GROTON, CT.
 PROJECT NO. 4626 BORING HN05-07
 ELEVATION _____ DATE 10-3-95
 FIELD GEOLOGIST CONTI

DRILLER SOILTEST, INC.
 DRILLING METHOD HSA
 DEVELOPMENT METHOD PUMP



ELEVATION TOP OF RISER: _____
 TYPE OF SURFACE SEAL: CONCRETE
 TYPE OF PROTECTIVE CASING: FLUSH MOUNT
 I.D. OF PROTECTIVE CASING: 4"
 DIAMETER OF HOLE: 8"
 TYPE OF RISER PIPE: PVC
 RISER PIPE I.D.: 2" Ø
 TYPE OF BACKFILL/SEAL: CEMENT GROUT
 DEPTH/ELEVATION TOP OF SAND: 3' /
 DEPTH/ELEVATION TOP OF SCREEN: 5' /
 TYPE OF SCREEN: PVC
 SLOT SIZE x LENGTH: 10 SL x 10
 TYPE OF SAND PACK: #20-30 SAND
 DIAMETER OF HOLE IN BEDROCK: NA
 DEPTH/ELEVATION BOTTOM OF SCREEN: 15' /
 DEPTH/ELEVATION BOTTOM OF SAND: 15' /
 DEPTH/ELEVATION BOTTOM OF HOLE: 15' /
 BACKFILL MATERIAL BELOW SAND: NA

7.98'
TPVC 11/20/95