

**UST Remedial Investigation
Report
Coaster Harbor Island**



**Northern Division
Naval Facilities Engineering Command
Contract No. N62472-90-D-1298
Contract Task Order 0150**

April 1995

**UST REMEDIAL INVESTIGATION REPORT
COASTERS HARBOR ISLAND
NEWPORT, RHODE ISLAND**

**COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

**Submitted to:
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April 1995

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STATEMENT OF ACCURACY

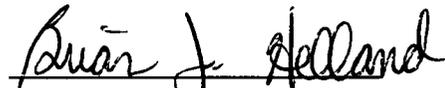
As required by the Rhode Island Department of Environmental Management Regulations for Underground Storage Facilities used for Petroleum Products and Hazardous Materials (DEM DWM-UST05-93) Section 14.12(B)(1), effective December 30, 1993, the undersigned (author) certifies that information presented in this UST Remedial Investigation report for Coasters Harbor Island in Newport, Rhode Island, is accurate to the degree specified in this report and the Final UST Remedial Investigation Work Plan, Coasters Harbor Island (HNUS 5/94).



Lawrence Pannell

Project Manager, ENSR Consulting and Engineering
(under subcontract to Halliburton NUS Corporation)

As required by the Rhode Island Department of Environmental Management Regulations for Underground Storage Facilities used for Petroleum Products and Hazardous Materials (DEM DWM-UST05-93) Section 14.12(B)(2), effective December 30, 1993, the undersigned (facility owner/operator representative) certifies that information presented in this UST Remedial Investigation Report Coasters Harbor Island in Newport, Rhode Island, is complete and accurate to the degree specified in this report and the Final UST Remedial Investigation Work Plan, Coasters Harbor Island (HNUS 5/94).



Brian J. Helland

Remedial Project Manager
Naval Facilities Engineering Command

EXECUTIVE SUMMARY

This report describes the results of the Underground Storage Tank (UST) Remedial Investigation at Coasters Harbor Island (CHI), located in Newport, Rhode Island. The work was performed under the Comprehensive Long-Term Environmental Action Navy (CLEAN) program, Contract No. N62472-90-D-1298, Contract Task Order (CTO) No. 150, dated November 29, 1993. Field work began in July and ended in November of 1994.

CHI is located at the Naval Education and Training Center (NETC), in Newport, RI and is owned and operated by the U.S. Navy. The island is situated just off the coast of Newport within Narragansett Bay and is connected to the mainland via two bridges. The island encompasses an area of approximately 0.2 square miles with approximately 80 to 90 percent of the island occupied by structures and paved areas. There are no known potable water supply wells or potable surface water bodies on the island.

The overall purpose of the investigation program described in this report was to identify and investigate the potential sources of contamination in the area along Taylor Drive and the vicinity of the electrical distribution system manhole adjacent to Structure 143 (this investigation area was subsequently expanded to include the access road south of Structure 149), the abandoned fuel oil line between Structure 86 and the vicinity of Structure A138, and the immediate vicinity of Structure 74 and Porter Avenue north of the Structure; to evaluate available remedial alternatives, and ultimately, to allow for selection of the best available remedial technology for the affected areas.

The old Firefighting Training Area (FFTA) adjacent to the Taylor Drive investigation area was not included within this investigation program as it is currently being investigated under the Installation Restoration Program (IRP) the IRP is a program for investigating and remediating military installations which is separate from the UST program. Groundwater samples and water level measurements were obtained from some of the existing FFTA monitoring wells, however, to obtain data related to the Taylor Drive investigation.

A summary of the field activities, conclusions, and recommendations for further action are provided below for each of the three investigation areas.

Taylor Drive and Structure 143

The field investigation at Taylor Drive and Structure 143 included: inspection of 75 manholes for the presence of visible petroleum hydrocarbons; completion of six soil borings; collection and analysis of subsurface soil samples; installation of three conventional polyvinyl chloride (PVC) monitoring wells and four small-diameter steel monitoring wells; collection and analysis of groundwater samples from a total of nine new and pre-existing monitoring wells; surveying of sampling locations, and water level measurements.

The conclusions reached as a result of the field investigation are as follows:

- Based on the absence of visible petroleum hydrocarbons in the manholes, the underground utilities do not appear to be a conduit for the migration of free-phase hydrocarbons.
- Total petroleum hydrocarbons (TPH) were detected in subsurface soil samples from three soil borings.
- Trace levels of TPH, volatile organic compounds (VOC) and semi-volatile organic compounds (SVOC) well below state or federal action levels were detected in some of the groundwater samples; lead in groundwater samples from two monitoring wells exceeded the US EPA Drinking Water Standard Maximum Contaminant Level (MCL).

Recommendations for further investigation are as follows:

The contamination cannot be attributed to any known existing or former UST, but may be related to the historical use of fuel oil and waste oil during fire fighting exercises at the old FFTA located adjacent to this investigation area. This site is being addressed separately under the Installation Restoration Program. No further action is recommended under the UST program.

Abandoned Fuel-Oil Line

The field investigation along the abandoned fuel-oil line included: installation of two small-diameter steel monitoring wells; collection and analysis of groundwater samples from both small-diameter wells for TPH; surveying of well locations, and water level measurements.

The conclusions reached as a result of the field investigation are as follows:

- TPH was not detected in groundwater samples from this area; floating product was not observed during water level measurements.

The results of the field investigation indicate that the abandoned fuel oil line does not represent a source of, or conduit for, subsurface petroleum hydrocarbon contamination. No further investigation or corrective action is recommended.

Structure 74

The field investigation at Structure 74 included: inspection of 55 manholes for the presence of visible petroleum hydrocarbons; installation of two small-diameter steel monitoring wells; collection and analysis of groundwater samples from 11 monitoring wells and a sump; collection and analysis of floating-product samples from two monitoring wells; surveying of sampling locations, and water level and product thickness measurements.

The conclusions reached as a result of the field investigation at Structure 74 are as follows:

- The underground utilities generally do not appear to act as a preferential pathway for the migration of petroleum hydrocarbons except along the path of the fuel-oil line between Structure 74 and Porter Avenue.
- Dissolved concentrations of TPH, VOC, SVOC and metals in groundwater do not exceed any federal or state MCLs at this time, however the presence of free-phase hydrocarbons on top of the water table in five monitoring wells confirms that a release of fuel oil has occurred in the vicinity of Structure 74. The plume of free-phase hydrocarbons extends beneath Porter Avenue north of Structure 74; the northern extent of the plume has not been determined. The trace detection of TPH as motor oil in a monitoring well south of Structure 74 raises the possibility that a small, separate release of petroleum hydrocarbons may have occurred in this area.
- Dissolved concentrations of lead in the groundwater approach the federal Drinking Water Standard MCL in two monitoring wells.

An interim free product recovery system has been installed north of Structure 74 to create a groundwater capture zone. The system was brought on-line in the spring of 1995. The separate-phase floating product that accumulates in the recovery well is collected and containerized, and groundwater pumped from the recovery well is treated and discharged to the sanitary sewer system under permit.

CONTENTS

1.0	INTRODUCTION	1-1
1.1	OVERVIEW	1-1
1.2	OBJECTIVES OF CURRENT INVESTIGATION	1-1
1.3	SITE DESCRIPTION	1-1
1.3.1	<u>Past and Present Activities on the Site</u>	1-3
1.3.2	<u>Results of Previous Investigations and Compliance History</u>	1-5
1.4	PRESENT AND FORMER UNDERGROUND STORAGE TANKS	1-8
2.0	FIELD INVESTIGATION METHODOLOGY	2-1
2.1	MANHOLE INSPECTION	2-1
2.2	SOIL BORINGS AND SOIL SAMPLING	2-1
2.3	EXISTING MONITORING WELL EVALUATION	2-5
2.4	CONVENTIONAL MONITORING WELL INSTALLATION, DEVELOPMENT AND SAMPLING	2-5
2.5	SMALL-DIAMETER MONITORING WELL INSTALLATION, DEVELOPMENT AND SAMPLING	2-7
2.6	WATER LEVEL AND PRODUCT THICKNESS MEASUREMENTS	2-10
2.7	DECONTAMINATION PROCEDURES	2-11
2.8	SAMPLE HANDLING AND DATA VALIDATION	2-11
2.9	WASTE HANDLING	2-12
2.10	ELEVATION SURVEY	2-13
3.0	SITE PHYSIOGRAPHIC CONDITIONS	3-1
3.1	TOPOGRAPHY	3-1
3.2	GEOLOGY	3-1
3.2.1	<u>Description of Unconsolidated Materials</u>	3-1
3.2.2	<u>Description of Bedrock</u>	3-7
3.3	HYDROGEOLOGY	3-7
3.3.1	<u>Depth to Groundwater and Groundwater Flow Direction</u>	3-7
3.3.2	<u>Description of the Area Surrounding the Site</u>	3-10
4.0	NATURE AND EXTENT OF CONTAMINATION	4-1
4.1	TAYLOR DRIVE AND STRUCTURE 143 INVESTIGATION	4-1
4.1.1	<u>Results of Manhole Inspection</u>	4-1
4.1.2	<u>Results of Soil Borings and Soils Analyses</u>	4-1
4.1.2.1	TPH in Soils	4-1
4.1.3	<u>Results of Well Installation and Groundwater Analyses</u>	4-5
4.1.3.1	TPH in Groundwater	4-5
4.1.3.2	VOC in Groundwater	4-5
4.1.3.3	SVOC in Groundwater	4-14

CONTENTS
(Cont'd)

4.1.3.4	Metals in Groundwater	4-14
4.1.4	<u>Water Level Measurements</u>	4-14
4.1.5	<u>Conclusions</u>	4-16
4.1.6	<u>Recommendations for Further Investigation and/or Corrective Action</u>	4-18
4.2	ABANDONED FUEL OIL LINE	4-18
4.2.1	<u>Results of Well Installation and Groundwater Analyses</u>	4-18
4.2.1.1	TPH in Groundwater	4-18
4.2.2	<u>Water Level Measurements</u>	4-18
4.2.3	<u>Conclusions</u>	4-21
4.2.4	<u>Recommendations for Further Investigation and/or Corrective Action</u>	4-21
4.2.5	<u>Potential Remedial Measures</u>	4-21
4.3	Structure 74 and Porter Avenue Investigation	4-21
4.3.1	<u>Results of Manhole Inspection</u>	4-22
4.3.2	<u>Results of Small-Diameter Well Installation and Groundwater Analyses</u>	4-22
4.3.2.1	TPH in Groundwater	4-22
4.3.2.2	VOC in Groundwater	4-24
4.3.2.3	SVOC in Groundwater	4-24
4.3.2.4	Metals in Groundwater	4-33
4.3.3	<u>TPH in Product Samples</u>	4-33
4.3.4	<u>Water Level and Product Thickness Measurements</u>	4-33
4.3.5	<u>Conclusions</u>	4-38
4.3.6	<u>Recommendations for Further Investigation and/or Corrective Action</u>	4-38
4.3.7	<u>Potential Remedial Measures</u>	4-39
5.0	SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS	5-1
5.1	TAYLOR DRIVE AND STRUCTURE 143 INVESTIGATION	5-1
5.1.1	<u>Conclusions</u>	5-1
5.1.2	<u>Recommendations for Further Investigation and/or Corrective Action</u>	5-1
5.2	Abandoned Fuel-Oil Line	5-1
5.2.1	<u>Conclusions</u>	5-1
5.2.2	<u>Recommendations for Further Investigation and/or Corrective Action</u>	5-2
5.3	STRUCTURE 74	5-2
5.3.1	<u>Conclusions</u>	5-2
5.3.2	<u>Recommendations for Further Investigation and/or Corrective Action</u>	5-3
6.0	REFERENCES	6-1

CONTENTS
(Cont'd)

APPENDICES

- A LIST OF ACRONYMS/ABBREVIATIONS
- B SOIL BORING LOGS
- C WELL CONSTRUCTION DIAGRAMS
- D GROUNDWATER SAMPLE COLLECTION RECORDS

LIST OF TABLES

2-1	Summary of Soil Boring Data	2-3
2-2	Summary of Monitoring Well Construction Details	2-6
2-3	Summary of Monitoring Well Sampling Activities	2-8
2-4	Summary of Small-Diameter Well Installation Attempts	2-9
2-5	Survey Data	2-14
3-1	Water Level and Product Thickness Measurements	3-8
4.1-1	Coasters Harbor Island UST RI/CTO 150 Taylor Drive and Structure 143 Investigation TPH in Soil	4-4
4.1-2	Coasters Harbor Island UST RI/CTO 150 Taylor Drive and Structure 143 Investigation TPH (GC/FID) in Groundwater	4-10
4.1-3	Coasters Harbor Island UST RI/CTO 150 Taylor Drive and Structure 143 Investigation VOC's in Groundwater	4-11
4.1-4	Coasters Harbor Island UST RI/CTO 150 Taylor Drive and Structure 143 Investigation SVOC's in Groundwater	4-12
4.1-5	Coasters Harbor Island UST RI/CTO 150 Taylor Drive and Structure 143 Investigation Metals in Groundwater	4-15
4.2-1	Coasters Harbor Island UST RI/CTO 150 Abandoned Fuel Oil Line Investigation TPH in Groundwater	4-20
4.3-1	Coasters Harbor Island UST RI/CTO 150 Structure 74 Investigation TPH (GC/FID) in Groundwater	4-25
4.3-2	Coasters Harbor Island UST RI/CTO 150 Structure 74 Investigation VOC's in Groundwater	4-28
4.3-3	Coasters Harbor Island UST RI/CTO 150 Structure 74 Investigation SVOC's in Groundwater	4-30
4.3-4	Coaster's Harbor Island UST RI/CTO 150 Structure 74 Investigation Metals in Groundwater	4-34
4.3-5	Coasters Harbor Island UST RI/CTO 150 Structure 74 Investigation TPH (GC/FID) in Product	4-36

LIST OF FIGURES

1-1	Site Location Map - Coasters Harbor Island	1-2
1-2	Project Location - Coasters Harbor Island	1-4
2-1	Investigation Areas	2-2
3-1	Area of Cross-Sections A-A', B-B', C-C' & D-D'	3-2
3-2	Cross-Section A-A'	3-3
3-3	Cross-Section B-B'	3-4
3-4	Cross-Section C-C'	3-5
3-5	Cross-Section D-D'	3-6
3-6	Water Table Contours	3-9
4.1-1	Manhole Inspection Map	4-2
4.1-2	TPH in Soil (GC/FID)	4-3
4.1-3	TPH in Groundwater (GC/FID)	4-6
4.1-4	VOC in Groundwater	4-7
4.1-5	SVOC in Groundwater	4-8
4.1-6	Metals in Groundwater	4-9
4.2-1	TPH in Groundwater (GC/FID)	4-19
4.3-1	Manhole Inspection Map	4-23
4.3-2	TPH in Groundwater (GC/FID)	4-27
4.3-3	VOC in Groundwater	4-29
4.3-4	SVOC in Groundwater	4-32
4.3-5	Metals in Groundwater	4-35
4.3-6	TPH in Product (GC/FID) Distribution of Product	4-37

1.0 INTRODUCTION

1.1 OVERVIEW

This report describes the results of the Underground Storage Tank (UST) Remedial Investigation at Coasters Harbor Island (CHI), located in Newport, Rhode Island. The work was performed under the Comprehensive Long-Term Environmental Action Navy (CLEAN) program, Contract No. N62472-90-D-1298, Contract Task Order (CTO) No. 150, dated November 29, 1993. Field work began in July and ended in November of 1994.

Section 1.0 of this report describes the objectives of the current investigation, provides an introduction to the investigation areas, summarizes the results of previous investigations, and describes the locations of former and present USTs on CHI. Section 2.0 describes the methodology of the field investigation. Section 3.0 reports on the general physiographic conditions present on CHI. Section 4.0 summarizes the results the field investigation. Section 5.0 summarizes the conclusions and recommendations of the field investigation and Section 6.0 contains pertinent references. The Appendices contain a list of acronyms (Appendix A), soil boring logs (Appendix B), well construction diagrams (Appendix C), and groundwater sample collection records (Appendix D).

1.2 OBJECTIVES OF CURRENT INVESTIGATION

The overall purpose of the investigation program described in this report was to identify and investigate the potential sources of contamination in the area along Taylor Drive and the vicinity of the electrical distribution system manhole adjacent to Structure 143 (this investigation area was subsequently expanded to include the access road south of Structure 149), the abandoned fuel oil line between Structure 86 and the vicinity of Structure A138, and the immediate vicinity of Structure 74 and Porter Avenue north of the Structure; to evaluate available remedial alternatives, and ultimately, to allow for selection of the best available remedial technology for the affected areas.

The old Fire Fighting Training Area (FFTA) adjacent to the Taylor Drive investigation area was not included within this investigation program as it is currently being investigated under the IRP (a program for investigating and remediating military installations which is separate from the UST program). Groundwater samples and water level measurements were obtained from some of the existing FFTA monitoring wells, however, to obtain data related to the Taylor Drive investigation.

1.3 SITE DESCRIPTION

CHI is located at the Naval Education and Training Center (NETC), in Newport, RI. NETC (the Activity) is owned and operated by the U.S. Navy. The island is situated just off the coast of the City of Newport, RI within Narragansett Bay and is connected to the mainland via two bridges (Figure 1-1). The island encompasses an area of approximately 0.2 square miles with approximately 80 to 90 percent of the island occupied by structures and paved areas.

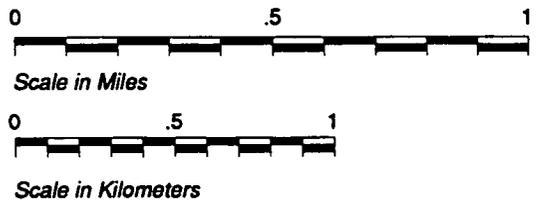
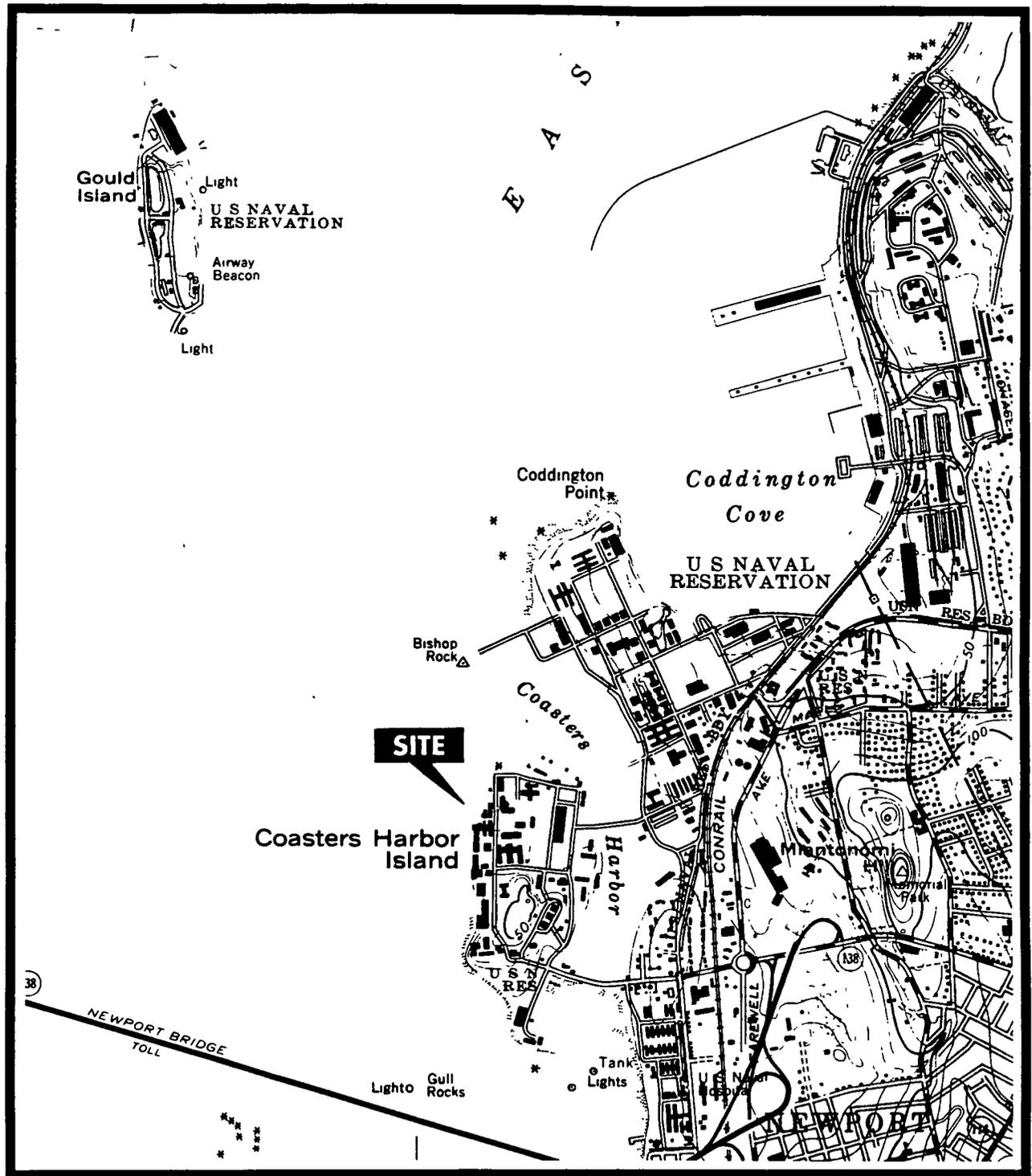


FIGURE 1-1
SITE LOCATION MAP - COASTERS HARBOR ISLAND

During the UST Remedial Investigation, the potential for subsurface contamination by petroleum hydrocarbons was evaluated at three separate areas on the northern portion of CHI. These areas included: Taylor Drive and the vicinity of Structure 143 where petroleum hydrocarbons were reportedly observed by Activity personnel in an electrical manhole, an abandoned fuel oil line formerly connecting the power plant (Structure 86) to a mock-up of a ship's boiler located in Structure A138, and Structure 74, an underground storage bunker used to store the fuel oil burned at Structure 86 (Figure 1-2).

1.3.1 Past and Present Activities on the Site

CHI was acquired by the Navy in 1881 from the City of Newport to serve as a training center. In 1884, the Naval War College (NWC) was established on the island. A causeway and bridge linking the island to the mainland was constructed in 1892. Development of Newport for Navy purposes occurred prior to and during World War I, which caused a significant increase in military activity in Newport. A bridge connecting Coddington Point and CHI was built when approximately 1,700 men were sent to Newport and housed in tents in both areas. Much of the base organization was transferred to Coddington Point when it was purchased by the Navy in 1918.

The Newport base was reduced to caretaker status in 1933 and remained relatively inactive until the late 1930's when it was reactivated in preparation for World War II. In 1940, Coddington Cove was acquired for use as a supply station. New construction at that time included additional barracks and power plant facilities on CHI. Naval activities were reduced when the Newport base reverted to peace time status following World War II. The entire naval complex was consolidated into a single naval command designated the U.S. Naval Base in 1946.

During the peace time status, the Naval Base increased its activities in the fields of research and development, specialized training, and preparedness for modern warfare. The Officer Candidate School was established in 1951. The NWC underwent major expansion during the late 1950's and early 1970's, which transformed the college into a major university. In July of 1971, the Naval Schools Command was restructured and named the Naval Officer Training Center (NOTC).

Other changes during the peace-time status included the construction of Piers 1 and 2 at Coddington Cove in the late 1950's. Newport became the headquarters of the Commander Cruiser-Destroyer Force Atlantic in 1962 with a fleet of approximately 55 naval warships and auxiliary craft home-ported there. In April of 1973, the Shore Establishment Realignment Program (SER) resulted in reduction of forces and excessing of land at Newport and in April of 1974 NOTC was changed to NETC.

Today, NETC serves as a training facility for military officers and also provides logistical support for the entire naval complex. NETC is also the area coordinator for naval activities in Rhode Island. The NWC is currently still active on CHI and the island is still much in use.

1.3.2 Results of Previous Investigations and Compliance History

The following is a discussion of previous investigations that have been conducted at CHI at three separate areas: the Taylor Drive investigation area adjacent to the old FFTA, the abandoned fuel oil pipeline between Building 86 and Structure A138, and Structure 74. Compliance history and corrective actions are summarized where applicable.

Taylor Drive and Structure 143

Environmental investigations in the vicinity of Taylor Drive have been focused on the old FFTA which was located in what is now Katie Field on the north end of CHI (Figure 1-2). The old FFTA was used from approximately 1944 to 1972 for fire fighting practice. It is believed that two of the buildings previously on the site were used as mock "carrier compartments" and were set on fire using a water/oil mixture. Underground piping carried the mixture to the buildings and from the buildings to an on-site oil-water separator (TRC 1994).

Oily subsurface soils were detected during a 1987 geotechnical boring program related to the planned expansion of the child-care facility formerly located at Structure 144 (now closed). TRC Environmental Corporation completed a Phase I Remedial Investigation at the site in 1992, and a Phase II Remedial Investigation in 1994. TRC concluded that elevated levels of semi-volatile organic compounds (SVOC) and inorganics are present in the site soils, especially in surface soils along the edge of the site, adjacent to Narragansett Bay, and in subsurface soils located in the central and western portions of the site. Petroleum odors and staining were present in the subsurface soils throughout the central and western portions of the site. Petroleum odors and a sheen were also noted in groundwater samples from some of the wells. Groundwater contained relatively low SVOC concentrations; one volatile organic compound (VOC) was detected in one well sample. Inorganics were present in many of the groundwater samples at concentrations in excess of MCLs. Based on filtered analyses, the elevated inorganics may be related to fine silt materials in the groundwater samples (TRC 1994).

According to Activity personnel, oil was found in recent years in an electrical manhole located adjacent to Structure 143 at the west end of Taylor Drive, and to the west of the old FFTA. It was suspected at the time that the contamination found in the manhole was related to the FFTA, or to some other source, possibly Structure 74.

Abandoned Fuel Oil Line

The abandoned fuel oil line, located between Building 86 and Structure A138, was considered by the Navy to be a possible pathway for the migration of petroleum hydrocarbons which might have leaked from the line and therefore was included in the investigation described in this report. Construction details of the fuel oil line appear on a plan dated April 28, 1944, titled "Naval Training Station Newport R.I., Large Ship Pre-commissioning Training Center, Engine Training Bld'g & School, Fuel & Diesel Oil Supply Blow-down Tank." The abandoned fuel oil line ran inside of a steam trench and delivered fuel oil from Structure 86 to the Engine Training Building located where Structure A138 now stands.

A Navy report provided by the Activity (Navy, 1993) refers to an inspection of the fuel oil line in preparation for providing a scope of work and a cost estimate for its removal. The report stated that the line was believed to have been out of service for at least 30 years. The inspection revealed that much of the fuel oil line was missing, and where it still existed, was corroded, but appeared to be free of any residual fuel oil. The report concluded that removing the small amount of remaining pipe would be unnecessary since there was no evidence of either fuel oil contamination or residual oil in the line.

Structure 74

Structure 74, an oil storage reservoir centrally located on CHI, has been investigated as a potential source of petroleum hydrocarbon releases to the environment reported at several areas on-site. Structure 74 was constructed during 1917 as the fuel oil storage system for CHI and consists of two (2) 282,000-gallon capacity fuel oil storage bunkers (in one structure). Structure 74 provides fuel to the CHI power plant (Structure 86) via a subsurface trench and piping system. Structure 74 is rectangular in shape and is oriented north/south with approximate dimensions of 145 feet long, by 55 feet wide, by 11 feet deep. A common wall separates the north and south storage vaults. The structure was constructed with reinforced concrete used in the floor slab, walls and ceiling. According to the original plan specifications, four (4) inches of reinforced concrete is present in the floor slab and eight (8) inches of reinforced concrete is present in the walls and ceiling. No information on original structural linings or coatings for the concrete surfaces were noted on the drawings.

From the time of construction through most of 1988, No. 6 fuel oil was used as the fuel source delivered to Structure 74. The fuel type was converted to No. 4 fuel oil in November, 1988. This type of fuel oil is presently still being used on site. Product delivery totals were obtained from NETC for the period 1986 through 1990. For the three year period between 1986 and 1988, deliveries of No. 6 fuel oil amounted to an average of 3.70 million gallons of oil each year. In 1989, when No. 4 oil was being used, the fuel delivery total was approximately 3.28 million gallons. The 1990 fuel delivery total was approximately 2.02 million gallons. Fuel delivery totals for 1991 based on daily delivery records indicate a total of approximately 5.30 million gallons delivered. Without further evaluation, it is not known by Activity personnel why annual fuel usage has varied so much over the last five years for which records have been reviewed.

In April of 1989, an oil spill incident report was filed by NETC which indicated that a release of approximately 200 gallons of No. 4 residual heating oil had occurred with the spill source listed as discharge from Structure 74. The incident was initiated by observations of fuel oil in an oil/water separator located adjacent to Structure 86 followed by observations of seepage into an underground valve station and piping trench next to Structure 74. NETC personnel determined that leakage was occurring from the south tank and responded by evacuating the tank within 24 hours which stopped leakage into the trench. Rhode Island Department of Environmental Management (RIDEM) was notified regarding the incident and discussions were initiated relative to investigation of the extent of environmental impact.

In August of 1989, four four-inch inside-diameter (i.d.) PVC monitoring wells (MW-1 through MW-4) were installed by NETC within approximately 50 feet of the north and west sides of Structure 74. Three of the four wells encountered bedrock at depths of approximately ten feet or less without encountering

groundwater. The remaining well (MW-2) intercepted groundwater with an indication that free product was also present.

In September of 1989, Tracer Research Corporation (Tracer Research) was contracted by NETC to perform leak testing of Structure 74. A leak testing method was developed specifically for use at this investigation area but was not implemented at this time because of the known leakage incident. Leak testing was postponed until tank repairs were completed.

In October of 1989, the interior of the Structure 74 south vault was inspected by NETC personnel prior to repairs. A 25-foot long crack in the concrete floor was observed to be present and actively seeping inward. Contractors installed a small floor drain and pump in an effort to stop the seepage so the crack could be repaired. Once seepage was controlled, the records indicate that epoxy was used to seal the floor crack.

In December of 1989, a blended latex membrane liner with reinforcing fabric was epoxied in place. The south tank was later placed back into service. The north tank was similarly lined a short time later. Total liner thickness is estimated to be approximately 40 ml (minimum thickness) according to installation specifications.

In January of 1990, tank leakage testing was initiated to Tracer Research. The testing procedure involved injection of two gallons of a tracer substance into the south tank, followed by injection of air into exterior probes along the east side of Structure 74, and collection and analysis of air samples from probes placed along other sides of the tank structure. The test was also repeated in the reverse direction. The testing indicated the presence of very low concentrations of tracer substance in some of the samples. A leakage rate of .0032 gallons per day was calculated by Tracer Research. Because of the low leakage rate, assumed to be approximately one gallon per year, Tracer Research certified the tank as not leaking and recommended periodic monitoring to determine liner performance over time.

Intermittent monitoring of oil and water levels in Tracer Research probes by NETC personnel between October, 1989 and January, 1990 indicated the reduction of oil in some probes but an increase in oil in others. NETC personnel noted that three of nine Tracer Research probes (#1, 2, 4) were not functioning on 1/8/90. Sixty percent of the probes were assumed to be present and functioning at the time of the Tracer Research leak test on 1/20/90, according to NETC records. It is not known whether the probes were reinstalled prior to the leak test or exactly what the indicated functioning problem was.

The south tank was fully returned to service in January, 1990. The north tank was briefly taken out of service in early 1990 to allow for liner installation. Facility records indicate that the fuel delivery piping between Structure 74 and Structure 86 (Power House) was replaced in 1989.

In August of 1993, Tracer Research tight-tested Structure 74 by adding a volatile chemical tracer to the product stored within the two vaults and analyzing soil vapor samples collected from probes installed around the perimeter of the structure. Based on detections of the tracer chemical in soil vapor at greater than 0.1 ug/L, Tracer Research classified Structure 74 as failing the tightness testing (Tracer Research, 1993).

In October of 1993, GZA GeoEnvironmental, Inc. (GZA) conducted a subsurface investigation at Structure 74. Five four-inch i.d. PVC monitoring wells (MW-101 through MW-105) were installed to the east, west and north of Structure 74. The wells were installed 35 to 50 feet below ground surface (bgs). Bedrock was encountered between 0.5 and 6 feet bgs and the depth to groundwater ranged from 8.2 to 23.8 feet bgs. Petroleum odors were noted during the drilling of MW-103 and MW-104, and 0.04 feet of free product was observed in MW-103. Soil or groundwater samples were not submitted for laboratory analysis during this investigation. During a concurrent study performed by GZA in October of 1993 for a proposed library located southwest of Structure 74, three test borings were drilled and completed as two-inch i.d. PVC monitoring wells (GZ-1 through GZ-3). The well depths ranged between 24 to 30 feet bgs. Bedrock was encountered from 4.5 to 9 feet bgs in all three wells and the depth to the water table ranged from 12.1 to 15.2 feet bgs. Free product was not noted in any of the wells. Analysis of soil and groundwater samples for VOC and total petroleum hydrocarbons (TPH) resulted in one detection of TPH (21 ppm) in a surficial soil sample from boring GZ-2. No VOC were detected in any of the soil samples and there were no TPH or VOC detections in any of the groundwater samples.

Structure 74 was last leak-tested by Tracer Research in March of 1994 using the same methodology as the August 1993 test. During the March 1994 test, only the north vault was evaluated. The tracer chemical was not detected in soil vapor samples and the north vault was classified as passing the tightness test (Tracer Research, 1994). According to Activity personnel, the south vault was subsequently emptied, cleaned and repaired. As of the date of this Remedial Investigation report, the Navy was evaluating the repairs prior to placing the vault back into service.

In May of 1994, GZA conducted an additional environmental investigation to further evaluate the extent of contamination in the vicinity of Structure 74. Four two-inch i.d. PVC monitoring wells (MW-106 to MW-109) were installed north of Structure 74. The wells were installed 15 to 17.5 feet bgs and intercepted the water table between 7.8 and 14.0 feet bgs. Free-phase floating product was observed in MW-107, MW-108 and MW-109.

Based on the findings of GZA's December 1993 study, NETC contracted with GZA to install an interim separate-phase product recovery system at Structure 74. RIDEM approved the design plans in June of 1994 and GZA completed installing the system by September of 1994. According to Navy personnel, a sewer discharge permit was obtained in the spring of 1995 and the system is now operating.

In November of 1994, GZA submitted to NETC a Correction Action Plan for Structure 74. The plan was prepared to address Sections 14.11 and 14.12 of RIDEM's Regulations for Underground Storage Facilities Used For Petroleum Products and Hazardous Materials (dated December 1993). The plan provides recommendations for the installation of up to two additional product recovery wells with provisions for the capture and storage of the free product, and treatment and discharge of the groundwater.

1.4 PRESENT AND FORMER UNDERGROUND STORAGE TANKS

NETC maintains a list of present and former USTs at CHI. According to Activity personnel, in addition to Structure 74, there are 12 other UST locations, of which, only one (at Structure 29) is presently active. The remaining USTs have been closed and all but one have been removed. Former USTs were present at

Structure 54 (one UST), Structure 55 (three USTs) and Structure 405 (seven USTs). One former UST has been closed in place at Structure 116.

Structure 29 is located north of Porter Avenue opposite Structure 74. A 2500-gallon UST used to store No. 2 fuel oil was installed in 1990, replacing a 3000-gallon UST which was closed and removed.

Structure 54 is located approximately 600 feet east-southeast of Structure 74. A 650-gallon fuel oil UST was removed in August of 1994.

Structure 55 is the fire station located approximately 250 feet east of Structure 74. Three USTs were removed in August of 1994. These included: one 500-gallon fuel oil UST, one 1000-gallon gasoline UST, and one 4000-gallon gasoline UST

Structure 405 was a gas station formerly located approximately 300 feet south southwest of Structure 149. The seven USTs formerly located here included one 20,000-gallon UST used for gasoline, two 10,000-gallon USTs used for gasoline, one 10,000-gallon UST used for diesel, two 5000-gallon USTs used for gasoline, and one 500-gallon UST used for waste oil. All seven tanks were closed in 1987 and removed and the building itself has also been removed. The area is now used for parking

Structure 116 is the security office at Gate 1. A 2000-gallon UST used to store No. 2 fuel-oil was closed in place in 1994 when the building was converted to gas heat.

2.0 FIELD INVESTIGATION METHODOLOGY

2.1 MANHOLE INSPECTION

A manhole inspection survey was conducted at two investigation areas on CHI (Structure 74 and Structure 143 Manhole/Taylor Drive) for the purpose of determining whether hydrocarbon contamination is present within trench backfill materials or the utility lines. Because underground utility trenches may be backfilled with material of a higher permeability than the soil the trench is constructed in, the backfill may act as a preferential pathway for migration of free-phase petroleum hydrocarbons. Occasionally, hydrocarbons which may be present within trench backfill materials will find their way into the utility line itself. Therefore, a simple determination of hydrocarbon contamination can sometimes be made via manhole inspection.

The Halliburton NUS Team identified and opened accessible manhole and storm drain covers for each utility (steam service lines, storm drains, sanitary sewer, water mains, telephone and buried electrical service) which was found to be within an approximate 400-foot radius of each area. The inside atmosphere of the manhole structure was screened using a combustible gas indicator (CGI) before each manhole was opened. CGI readings were made by inserting the probe no more than two feet into the manhole opening or storm drain cover. If a manhole did not have an opening to insert the probe, the manhole cover was removed and a CGI reading was taken before flashlights or tools were used for inspection. After removing the manhole cover, the interior of the manhole structure was inspected for visible hydrocarbons and hydrocarbon odors. No samples of sediment and/or water were collected from the manholes for laboratory analysis because sufficient evidence of petroleum hydrocarbon contamination was not observed. The findings of this survey were documented in the field logbook and on facility drawings.

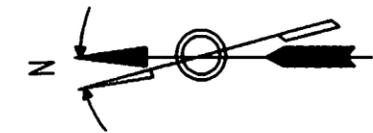
The results of the manhole inspection survey are summarized by investigation area in Sections 4.1 and 4.3.

2.2 SOIL BORINGS AND SOIL SAMPLING

Soil borings were conducted at 13 locations (SB-1 through SB-6 and SB-21 through SB-27) at the Structure 143 and Taylor Drive investigation area indicated on Figure 2-1. Of these, 12 were shallow borings completed to the water table to determine if hydrocarbons are present at the water table interface and one (SB-5) was a deep boring to the bedrock surface. The soil borings were completed in July and August of 1994 by New England Boring Contractors, Inc. of Glastonbury, Connecticut. A summary of the soil boring details is listed in Table 2-1 and boring logs for all of the soil borings are included in Appendix B.

Three soil borings (SB-1 through SB-3) were completed at approximate 150-foot intervals along Taylor Drive. Completion depths of these borings ranged from 12.25 to 14 feet bgs. Two of the borings (SB-2 and SB-3) were later converted to monitoring wells (ENSR-1 and ENSR-2, respectively) and the third boring (SB-1) was backfilled and covered with an asphalt cold patch.

Three soil borings (SB-4 through SB-6) were completed within the vicinity of the manhole near Structure 143. Two of these borings (SB-4 and SB-6) were completed from 6.5 to 8.5 feet into the water table to

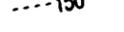


MAG. DEC. N 15° 03' W

SOURCE:

BASE MAP PROVIDED BY NETC NEWPORT

LEGEND

-  BUILDING OR STRUCTURE, PERMANENT
-  BUILDING OR STRUCTURE, SEMI-PERMANENT
-  BUILDING OR STRUCTURE, TEMPORARY
-  ROAD OR PAVED AREA
-  FENCE
-  SHORE LINE
-  INDEX CONTOUR
-  INTERMEDIATE CONTOUR
-  14 SPOT GRADE ELEVATION
-  GZA MONITORING WELL INSTALLED DURING PREVIOUS INVESTIGATION
-  TRC MONITORING WELL INSTALLED DURING PREVIOUS INVESTIGATION
-  ENSR CONVENTIONAL MONITORING WELL INSTALLED DURING UST REMEDIAL INVESTIGATION
-  ENSR SMALL-DIAMETER MONITORING WELL INSTALLED DURING UST REMEDIAL INVESTIGATION
-  ENSR SMALL-DIAMETER MONITORING WELL ATTEMPTED LOCATION, UNABLE TO PERMANENTLY INSTALL WELL DURING UST REMEDIAL INVESTIGATION
-  ENSR SOIL BORING CONDUCTED DURING UST REMEDIAL INVESTIGATION
-  SUMP AT STRUCTURE 114

TAYLOR DRIVE & STRUCTURE 143 INVESTIGATION AREA

STRUCTURE 74 INVESTIGATION AREA

ABANDONED FUEL OIL LINE INVESTIGATION AREA

200 0 200 400

SCALE IN FEET
1" = 200'-0"

FIGURE 2-1



ENSR CONSULTING & ENGINEERING

INVESTIGATION AREAS
COASTERS HARBOR ISLAND
UST REMEDIAL INVESTIGATION

DRAWN BY	DATE	PROJECT NO.
K.P.B.	1/95	5060-045-720

506096B

TABLE 2-1

SUMMARY OF SOIL BORING DATA
COASTERS HARBOR ISLAND UST REMEDIAL INVESTIGATION

Soil Boring I.D.	Total Depth (Feet bgs) ¹	Sample I.D.	Sample Interval (Feet bgs)	Laboratory Analysis ²
SB-1	14	BB01AA	6-8	TPH
SB-2 (ENSR-1) ³	12.5	BB02AA	6-8	TPH
SB-3 (ENSR-2)	12.25	BB03AA	6-8	TPH
SB-4	14	BB04AA	6-8	TPH
SB-5	24.75	BB05AA	6-8	TPH
SB-6 (ENSR-3)	12	BB06AA	6-8 & 8-10 ⁴	TPH
SB-21	10.25	AB21AA	8.5-10.25	TPH
SB-22	9.9	AB22AA	6.5-8.5	TPH
SB-23	10.5	AB23AA	2.5-4.5	TPH
SB-24	10.5	AB24AA	4.5-6.5	TPH
SB-25	8.5	AB25AA	4.5-6.5	TPH
SB-26	8.5	AB26AA	4.5-6.5	TPH
SB-27	8.5	AB27AA	4.5-6.5	TPH

¹ Feet bgs = Feet below ground surface

² Laboratory analysis of TPH was by GC/FID, Method SW846/8000.

³ Three soil borings were converted to monitoring wells and numbered sequentially (ENSR-1 through ENSR-3) as they were installed.

⁴ Sample BB06AA was composited from samples collected at both 6-8' and 8-10' intervals.

a total depth of 12 to 14 feet bgs. Boring SB-6 was later converted into monitoring well ENSR-3. The third boring (SB-5) was completed to a point of refusal which was assumed to be the bedrock surface at 24.75 feet bgs. Borings SB-4 and SB-5 were backfilled upon completion and covered with an asphalt cold patch.

Based on elevated headspace measurements and petroleum hydrocarbon odors observed in borings SB-2 and SB-3, an additional seven borings (SB-21 through SB-27) were completed along the roadway south of Building 149 to identify potential sources. Completion depths for these seven borings ranged from 8.5 to 10.5 feet bgs. Following collection of subsurface soil samples for laboratory analysis, the borings were backfilled and covered with an asphalt cold patch.

The soil borings were completed with a truck-mounted drilling rig using both four and one-quarter-inch i.d. hollow-stem augers with an outside diameter (o.d.) of approximately eight inches, and four-inch o.d. solid-stem augers. The solid-stem augers were used above the water table in some of the soil borings which were not converted to monitoring wells, to minimize the amount of soil cuttings generated. Split-spoon samples were collected continuously from the ground surface to the bottom of each boring using a two-foot long split-spoon (two-inch o.d.). The drilling equipment was steam-cleaned prior to beginning the first boring, and again between each boring. The split-spoons were decontaminated between each sample using a phosphate-free soap and water wash, followed by a potable water rinse, a methanol rinse, and a deionized water rinse.

Split-spoon samples were collected from each boring for visual inspection, and were placed directly into the sample containers for field screening for the presence of VOC using a Foxboro model 128 Organic Vapor Analyzer (OVA) flame-ionized detector (FID) and a headspace measurement technique. The sample exhibiting the highest VOC headspace concentration (as measured by an OVA) from each boring (for a total of thirteen samples) was submitted for laboratory analysis of TPH by GC/FID Method SW846/8000. All observations regarding the calibration and responses of the OVA FID and sample selection were recorded on the boring logs and in the site logbook.

Aqueous Quality Assurance/Quality Control (QA/QC) samples were also submitted for laboratory analysis. The QA/QC samples consisted of a rinsate blank collected daily and analyzed every other day for TPH (GC/FID) and one-time field blanks analyzed for TPH (GC/FID), TCL VOC by method SW846/8240, and TCL SVOC by method SW846/8270. Because the field investigation program for CHI was conducted simultaneously with a UST Remedial Investigation at Coddington Cove (to be described in an upcoming report due in June 1995), the field blanks included analyses used in both programs. The rinsate blank was prepared in the field by pouring deionized water through a decontaminated split-spoon and into the sample bottles. The field blanks consisted of deionized water and source water used for decontamination of the drilling equipment. No soil QA/QC samples were obtained within the Structure 143/Taylor Drive investigation area.

The results of the soil boring analyses from the Taylor Drive and Structure 143 investigation area are discussed in Section 4.1

2.3 EXISTING MONITORING WELL EVALUATION

The existing monitoring wells installed in the vicinity of Structure 74 and the old FFTA were examined to verify well location, well integrity, and the presence of water and/or product. The results of the existing well evaluation were used to determine which existing wells would be selected for groundwater sampling and water level measurements.

2.4 CONVENTIONAL MONITORING WELL INSTALLATION, DEVELOPMENT AND SAMPLING

Three conventional monitoring wells were installed at the Structure 143 and Taylor Drive investigation area (Figure 2-1) for groundwater quality and water level monitoring purposes. The wells were numbered sequentially (ENSR-1 through ENSR-3) as they were installed. These new wells supplement information obtained from existing wells in the nearby old FFTA. The well construction details are summarized in Table 2-2. Appendix C contains the monitoring well construction diagrams.

The wells were constructed of Schedule 40, two-inch i.d. polyvinyl chloride (PVC) riser pipe and well screen, with the screen installed to bridge the water table. The wells were completed with eight-foot screens with a slot size of 0.010 inches. A silica sand pack (Number 2 Morie) was placed around the well screen to a level of approximately two feet above the top of the screen. A one-foot thick layer of bentonite pellets was placed on top of the sand pack. Silica sand was placed on top of the bentonite seal and a protective steel casing with a flush-mount cover was cemented in place. All wells were fitted with locking caps and keyed-alike locks.

The monitoring wells were developed during the period of August 3-17, 1994. Development was accomplished by alternately surging with a surge block and purging with a submersible pump. The objective of the well development was to remove any fine-grained sediments which had settled at the bottom of the well or in the sandpack adjacent to the well screen. Well development continued until the purge water was as free of suspended sediments as possible and fines which had settled at the bottom of the well had been removed.

A groundwater sampling program was conducted during the period of August 29 through September 2, 1994. Groundwater samples were collected from each of the three new conventional monitoring wells plus 11 pre-existing conventional monitoring wells installed by others during previous investigations. Pre-existing wells at Taylor Drive included MW-5 and MW-7S. Pre-existing wells at Structure 74 included GZ-1 through GZ-3, MW-101, MW-102, MW-105, MW-106, MW-107, and MW-108. Well construction diagrams for monitoring wells installed by others during previous investigations and sampled during this investigation are included in Appendix C. One groundwater sample was also collected from a sump located at Structure 114 (Figure 2-1). Samples of the floating product observed in wells MW-104 and MW-109 were collected instead of groundwater samples.

A submersible pump and dedicated tubing was used to purge between 1.3 and 7.2 volumes of water from each of the 14 wells and the sump prior to collecting the samples. As each well volume was removed, pH, conductivity and temperature were measured and recorded on the groundwater sample collection records. Purging continued until these parameters stabilized or until the well was pumped dry, indicating that fresh groundwater was entering the well (wells which had less than three volumes of water removed were those

TABLE 2-2

SUMMARY OF MONITORING WELL CONSTRUCTION DETAILS
COASTERS HARBOR ISLAND UST REMEDIAL INVESTIGATION

Well I.D.	Ground Surface Elevation (NGVD) ¹	Screened Interval (feet bgs) ²	Well Diameter/ Material	Depth to Water ³ (feet bgs)	Water Table Elevation (NGVD)	Geological Unit in Screened Interval ⁴
ENSR-1	8.72	4.4-12.2	2"/PVC	5.55	3.17	Sand, silt and gravel
ENSR-2	6.99	4.1-11.9	2"/PVC	5.59	1.40	Sand, silt and gravel; sandy peat
ENSR-3	6.37	4.0-11.8	2"/PVC	5.44	0.93	Sand, silt and gravel; bedrock
SD-1	7.49	5.25-7.25	1.25"/Steel	6.21	1.28	Sand, silt and gravel
SD-2	10.07	6.85-8.85	1.25"/Steel	7.65	2.42	Sand, silt and gravel
SD-7	30.95	7.5-9.5	1.25"/Steel	8.21	22.74	Weathered Bedrock
SD-8	28.13	9.82-11.82	1.25"/Steel	N/A ⁵	N/A	Weathered Bedrock
SD-17	6.70	4.56-6.56	1.25"/Steel	5.33	1.37	Sand, silt and gravel
SD-18	6.80	4.83-6.83	1.25"/Steel	5.39	1.41	Sand, silt and gravel
SD-20	7.10	4.65-6.65	1.25"/Steel	4.85	2.25	Sand, silt and gravel
SD-21	7.60	4.33-6.33	1.25"/Steel	5.32	2.28	Sand, silt and gravel

¹ NGVD = National Geodetic Vertical Datum, 1929 (feet above sea level)

² Feet bgs = Feet below ground surface

³ Water level measurements were taken on November 9, 1994.

⁴ Information is based on visual inspection of split-spoons collected at ENSR-1, ENSR-2 and ENSR-3 and drill cuttings from the small-diameter wells (SDs).

⁵ Water was not present in SD-8. Free product was measured at 11.27 feet bgs.

which were purged dry). The samples were collected with a disposable bailer. Samples from the three new wells and the 11 existing wells were submitted for laboratory analysis of TPH by GC/FID Method SW846/8000, TCL VOC by Method SW 846/8240, TCL SVOC by Method SW 846/8270 and RCRA 8 metals by Method SW 846/6000 and 7000 series. The sample from the Structure 114 sump was analyzed for TPH by GC/FID Method SW846/8000 only. Sufficient free product was present in two existing wells (MW-104 and MW-109) for a product sample to be collected, which was analyzed for TPH by GC/FID Method SW846/8000 only. The groundwater analyses conducted are summarized by well in Table 2-3. Copies of the Groundwater Sample Collection Records are included in Appendix D.

QA/QC samples were also submitted for laboratory analysis. The QA/QC samples consisted of duplicate groundwater samples collected at ENSR-1 and MW-105 and two trip blanks. The trip blanks were prepared prior to the sampling activities by the subcontractor analytical laboratory and remained with the sampling kits as the samples were collected and shipped to the laboratory.

The results of the groundwater analyses are summarized by investigation area in Sections 4.1, 4.2 and 4.3.

2.5 SMALL-DIAMETER MONITORING WELL INSTALLATION, DEVELOPMENT AND SAMPLING

The UST Remedial Investigation Work Plan for Coasters Harbor Island (Halliburton NUS, 1994) specified that the small-diameter wells were to be driven well points installed within utility trench backfill materials to determine whether petroleum hydrocarbons were present in the backfill and if so, their lateral extent. Several attempts were made to drive the small-diameter wells, however, these were unsuccessful due to the density of the soil. Instead, a truck-mounted drill rig equipped with four-inch o.d. solid-stem augers was used to bore to the water table or to bedrock (whichever came first) to create an opening for the well point. The wells consisted of a 1.25-inch i.d. steel riser pipe, drive point and two-foot long screens with a slot size of 0.010 inches. The assembled well was placed into the borehole and backfilled with drill cuttings or sand pack. After approximately 20 minutes the well was checked for the presence of water or petroleum product. Where water or product was detected in a well, the well was completed as a permanent installation. In the absence of water or product, the well was removed and the boring grouted to the ground surface. At most locations, bedrock was encountered before reaching the water table and a well was not completed. Wells completed as permanent installations were finished with a protective steel casing with a flush-mount cover cemented in place above the well. All wells were fitted with locking caps and keyed-alike locks. Table 2-4 summarizes the small-diameter well installations and failed attempts. The well construction diagrams for completed small-diameter wells are included in Appendix C.

Small-diameter monitoring wells were temporarily installed at 21 locations along utility trenches in the three investigation areas on CHI (Structure 74, Structure 143 Manhole and Taylor Drive, and the abandoned fuel oil line between Building 86 and Structure A138). Eight wells were completed as permanent installations and 13 wells were installed and subsequently removed due to the absence of water or product. The location of each completed and removed small-diameter well is noted on Figure 2-1.

A total of 10 small-diameter well installations were attempted at the Structure 74 investigation area. Of these, two wells (SD-7 and SD-8) were completed as permanent installations and eight wells (SD-9 through SD-16) were installed and removed. The well installation attempts were located along the steam service utility trench in Porter Avenue, along the storm drain line north of and perpendicular to Porter Avenue, and

TABLE 2-3

**SUMMARY OF MONITORING WELL SAMPLING ACTIVITIES
COASTERS HARBOR ISLAND UST REMEDIAL INVESTIGATION
AUGUST 29 - SEPTEMBER 2, 1994**

WELL I.D.	SAMPLE I.D.	LABORATORY ANALYSIS ¹
Taylor Drive and Structure 143 Investigation Area		
ENSR-1	BW01AA	TPH, VOC, SVOC, METALS
ENSR-2	BW02AA	TPH, VOC, SVOC, METALS
ENSR-3	BW03AA	TPH, VOC, SVOC, METALS
MW-5	BWM5AA	TPH, VOC, SVOC, METALS
MW-7S	BWBFAA	TPH, VOC, SVOC, METALS
SD-17	BWS17A	TPH
SD-18	BWS18A	TPH
SD-20	BWS20A	TPH
SD-20	BWS20B	TPH
SD-21	BWS21A	TPH
Abandoned Fuel Oil Line Investigation Area		
SD-1	CWS01A	TPH
SD-2	CWS02A	TPH
Structure 74 Investigation Area		
GZ-1	AWG1AA	TPH, VOC, SVOC, METALS
GZ-2	AWG2AA	TPH, VOC, SVOC, METALS
GZ-3	AWG3AA	TPH, VOC, SVOC, METALS
MW-101	AW101A	TPH, VOC, SVOC, METALS
MW-102	AW102A	TPH, VOC, SVOC, METALS
MW-104	AW104A	TPH ³
MW-105	AW105A	TPH, VOC, SVOC, METALS
MW-105	AW105B	TPH, VOC, SVOC, METALS
MW-106	AGZAAA	TPH, VOC, SVOC, METALS
MW-107	AGAZBA	TPH, VOC, SVOC, METALS
MW-108	AGZACA	TPH, VOC, SVOC, METALS
MW-109	AW103A ²	TPH ³
SD-7	AWS07A	TPH
SD-8	AWS08A	TPH
BLDG. 114 SUMP	ASU01A	TPH

¹ Samples were analyzed by the following methods:

TPH - GC/FID, Method SW846/8000,

TCL VOCs - Method SW846/8240,

TCL SVOCs - Method SW846/8270, and

RCRA 8 Metals - Method SW846/6000 & 7000 Series.

² Monitoring well MW-109 was incorrectly labelled MW-103 in the field.

³ Product samples were collected from MW-104 and MW-109 and analyzed for TPH.

TABLE 2-4

**SUMMARY OF SMALL-DIAMETER WELL INSTALLATION ATTEMPTS
COASTERS HARBOR ISLAND UST REMEDIAL INVESTIGATION**

Well Attempt I.D.	Depth of Well ¹ (Feet bgs) ²	Well Status (C = Completed R = Removed) ³
SD-1	7.55	C
SD-2	9.15	C
SD-3	7.9	R
SD-4	10.1	R
SD-5	10.0	R
SD-5 Offset	8.1	R
SD-6	8.4	R
SD-7	9.8	C
SD-8	12.12	C
SD-9	9.8	R
SD-10	9.8	R
SD-11	9.1	R
SD-12	10.0	R
SD-13	10.55	R
SD-14	6.8	R
SD-15	5.3	R
SD-16	5.3	R
SD-17	6.86	C
SD-18	7.13	C
SD-19	7.3	R
SD-20	6.95	C
SD-21	6.63	C

¹ Refer to Table 2-2 for the screened intervals for permanently completed wells.

² Feet bgs = Feet below ground surface

³ Each small-diameter well was temporarily installed. Some were completed as permanent installations if water and/or free product was noted; the remainder were removed.

along the abandoned fuel and steam line that runs downgradient in the parking lot from Structure 74 to Porter Avenue. Well depths ranged between 5.0 and 10.25 feet bgs.

Five small-diameter well installations were attempted at the Structure 143 Manhole and Taylor Drive investigation area. Four wells (SD-17, 18, 20 and 21) were completed as permanent installations and one well (SD-19) was installed and removed. The well installation attempts were located along the storm drain line which runs in a north-south direction east of Structure 143. Well depths ranged between 6.6 and 7.1 feet bgs.

Six small-diameter well installations were attempted along the abandoned fuel oil pipeline between Building 86 and Structure A138. Two wells (SD-1 and SD-2) were completed as permanent installations and four wells (SD-3 through SD-6) were installed and removed. Well depths ranged between 7.6 and 9.8 feet bgs.

The eight small-diameter monitoring wells remaining as permanent installations were developed on August 17, 1994 by using a low-flow peristaltic pump. The objective of the well development was to remove fine-grained sediments which had settled at the bottom of the well. Well development continued until the purge water was as free of suspended sediments as possible and fines had been removed from the bottom of the well.

Groundwater samples were collected on August 29, 1994 from each of the permanent small-diameter wells using a peristaltic pump and dedicated tubing. Between 1.8 and 18.5 volumes of water were purged from each well prior to collecting a sample. Groundwater parameters including pH, conductivity and temperature were measured and recorded on the groundwater sample collection records. Purging continued until these parameters stabilized or until the well was pumped dry, indicating that fresh groundwater was entering the well (wells which had less than three volumes of water removed were those which were purged dry). The samples were submitted for laboratory analysis of TPH (GC/FID) by Method SW846/8000. The groundwater analyses conducted are summarized by well in Table 2-3. Copies of the Groundwater Sample Collection Records are included in Appendix D.

A QA/QC sample was also submitted for laboratory analysis. The QA/QC sample consisted of a duplicate groundwater sample collected at SD-20.

The results of the small-diameter groundwater analysis are summarized by investigation area in Sections 4.1, 4.2 and 4.3.

2.6 WATER LEVEL AND PRODUCT THICKNESS MEASUREMENTS

Water level and product thickness measurements were made in 28 new and pre-existing wells on November 9, 1994. The data were used to develop a water table elevation contour map and to delineate the extent of any free product found. The results are discussed in Section 3.3 and by investigation area in Sections 4.1, 4.2 and 4.3.

2.7 DECONTAMINATION PROCEDURES

Decontamination procedures were in compliance with RIDEM and Halliburton NUS Team SOP requirements as established in the work plan (Halliburton NUS, 1994). All nondisposable sampling and testing equipment which came in contact with the sample medium was decontaminated to prevent cross-contamination between sampling points. Disposable sampling equipment was used whenever possible. Disposable bailers were used to collect the groundwater samples from the conventional monitoring wells. Dedicated tubing was used with the submersible pumps during purging of the conventional wells and with the peristaltic pump during purging and sampling of the small-diameter wells.

For the use of nondedicated sampling equipment which came in direct contact with samples, such as split-spoons, surge blocks and submersible pumps, the decontamination sequence was as follows:

- (1) Potable water and non-phosphate detergent (Alconox) wash (scrub equipment with brush).
- (2) Potable water rinse.
- (3) Deionized water rinse.
- (4) Methanol (pesticide grade) rinse.
- (5) Deionized water rinse.
- (6) Air dry.

Drilling equipment (i.e., augers, drill rods) was decontaminated between borings by steam-cleaning/pressure washing at an on-site decontamination pad constructed by the drilling subcontractor. Wash water was pumped into a polyethylene storage tank for later characterization and off-site disposal by GAS Environmental, Inc.

2.8 SAMPLE HANDLING AND DATA VALIDATION

While on-site, the samples were stored on ice in an insulated cooler. Samples to be delivered to the laboratory were packed in protective wrap and sealed in a cooler with Chain-of-Custody tape. A Chain-of-Custody form accompanied the samples from the field to the laboratory. Soil and groundwater samples were delivered to the laboratory within 24 hours of collection. All of the samples were analyzed by CEIMIC Corporation of Narragansett, Rhode Island.

The analytical results were reviewed by the Halliburton NUS Team for the following elements: completeness of deliverables with requested analyses, sample holding times, detection limits, and quality control results for surrogate, laboratory control samples (LCS) and MS/MSD recoveries. In addition, all VOC and SVOC sample analyses and results were reviewed for the presence of blank contamination. This review included laboratory, field, rinsate and trip blanks.

The data as reported by the laboratory was within NFESC level "C" guidelines. Sample detection limits met method detection limits (MDL) except for groundwater samples ENSR-1 and MW-108, which required dilutions due to high levels of target or non-target compounds. Detection limits in these samples were elevated by the following dilution factors: two times the MDL for ENSR-1 and 100 times the MDL for MW-108. Associated quality control results were acceptable for these samples.

Methylene chloride, chloroform and acetone were most often detected in the blanks associated with the VOC analyses of these samples. The presence of blank contaminants indicates that false positive results may exist for the contaminant compounds in the associated data. Action levels of 10 times the maximum concentration of any compound were used to evaluate the data. Sample results less than the established action levels should be considered false positives and have been qualified as undetected [coded U(b)] on the sample results tables. Di-n-butylphthalate was detected in some of the blanks associated with the SVOC analyses. This compound was not detected in any associated samples. Reported metals blank results were also evaluated but all metals results exceeded blank action levels and no qualifications were necessary for the metals data.

In order to identify the petroleum hydrocarbon present in the soil, groundwater and product samples, the laboratory analyzed a series of petroleum hydrocarbon standards. These standards included: kerosene, gasoline, fuel oil #2, fuel oil #4, fuel oil #5, fuel oil #6, diesel fuel, jet fuels, motor oil, lube oil and waste oil. The laboratory compared sample chromatograms to standard chromatograms and concluded that the hydrocarbon pattern, when present in the samples, "most closely matches" the diesel fuel standard chromatogram pattern (with one exception at well MW-101 where the hydrocarbon pattern "most closely matches" motor oil). The Halliburton NUS Team reviewed the chromatograms and noted many similarities and subtle differences between the diesel fuel and No. 4 fuel oil patterns. The hydrocarbon pattern in the samples shows a weathered product while the standards represent "fresh" products. Definitive identification of petroleum hydrocarbon patterns are frequently hindered by the weathering process. Based on the known use of No. 4 fuel oil at Structure 74, it is the opinion of the Halliburton NUS Team that the TPH detected at Structure 74 and interpreted by the laboratory as "most closely matching" diesel fuel may actually be No. 4 fuel oil.

2.9 WASTE HANDLING

Investigation-Derived Wastes (IDW) were generated during the field investigation. The wastes consisted of drill cuttings, well purge water, used personal protective equipment (PPE), disposable sampling equipment, and decontamination wash water.

Drill cuttings (and split-spoon samples not submitted for laboratory analysis) that were visibly clean were disposed of in or around the boring as general fill. Soils which were visibly contaminated with hydrocarbons were stockpiled at the soil staging area located in the parking area west of Building 144 for later characterization and off-site disposal by GAS Environmental Inc. The soil was placed on top of a polyethylene liner and was overlain by another sheet of polyethylene. The soil stockpile was surrounded with haybales to prevent dispersion of the soil by wind or water.

Well purge and development water from the conventional and small-diameter monitoring wells which was visibly free of hydrocarbons was discharged to the ground in the vicinity of the well. Well purge water containing visible hydrocarbons was collected and transported to the polyethylene storage tank located at the staging area.

Used PPE was sealed, bagged and disposed of as general refuse. Used sampling equipment was disposed of with the PPE as general refuse.

Phosphat -fr e detergent wash water, rinse water, and dilute decontamination fluids used at each sampling location were coll cted and transported from each sampling location to the poly thylene storage tank located at the staging area.

Characterization and off-site disposal of the contaminated soil and containerized water was subcontracted to GAS Environmental Inc. of Stoughton, MA. Contaminated soils were transported to the Plainville, CT Landfill operated by Laidlaw Inc. The water was delivered to United Oil Recovery in Meriden CT for treatment/disposal.

2.10 ELEVATION SURVEY

All of the newly-installed conventional and small-diameter monitoring wells were surveyed for location and elevation. The soil borings were surveyed for location only. Some of the pre-existing wells at Structure 74 and the old FFTA which were used in the round of water level measurements were also surveyed as a quality assurance check in order to compare the results with established data. All of the survey work was performed by Louis Federici and Associates, licensed surveyors in the state of Rhode Island. Locations of the soil borings and monitoring wells were reported as northing and easting coordinates based on the 1927 Rhode Island State Plane Coordinate System. Elevations of the monitoring wells were reported in feet above sea-level based on the 1929 North American Vertical Datum.

The survey data are summarized in Table 2-5. The results were used in conjunction with the water level and product thickness measurements to generate a groundwater contour map presented in Section 3.0.

TABLE 2-5

SURVEY DATA
COASTERS HARBOR ISLAND UST REMEDIAL INVESTIGATION

	Description	Northing Coordinate ¹	Easting Coordinate ¹	Original Grade Elev. ²	Top of Casing Elev. ²	Top of Riser Elev. ²
Taylor Drive and Structure 143 Investigation Area						
Monitoring Wells	ENSR-1	156735.031	547231.135	8.72	8.72	7.88
	ENSR-2	156772.009	547026.549	6.99	6.99	6.29
	ENSR-3	156831.453	546788.315	6.37	6.37	5.95
	SD-17	156733.049	546948.21	6.7	6.7	6.32
	SD-18	156669.631	546948.298	6.8	6.8	6.22
	SD-20	156501.58	546947.412	7.1	7.1	6.89
	SD-21	156423.972	546948.606	7.6	7.6	7.32
	MW-1	156790.098	547688.002	9.67	9.67	9.47
	MW-2S	156995.551	547435.378	7.33	7.33	6.74
	MW-3	156914.041	547290.053	8.17	8.17	7.94
	MW-4	156944.589	546996.482	6.05	6.05	5.76
	MW-5	156655.421	547366.122	10.78	10.78	10.47
	MW-7S	156781.233	547263.072	9.09	9.09	8.55
	MW10-S	156899.17	547580.075	8.52	8.52	8.36
Soil Borings and Failed Small-Diameter Well Attempts	SB1	156705.844	547368.578			
	SB4	156775.768	546809.597			
	SB5	156806.185	546773.267			
	SB21	156364.022	546972.344			
	SB22	156359.24	547079.708			
	SB23	156355.997	547171.506			
	SB24	156341.524	547271.682			
	SB25	156329.886	547371.399			
	SB26	156335.809	547321.737			
	SB27	156348.554	547222.515			
	SD19	156576.401	546947.385			

**TABLE 2-5
SURVEY DATA
COASTERS HARBOR ISLAND UST REMEDIAL INVESTIGATION
PAGE 2**

	Description	Northing Coordinate ¹	Easting Coordinate ¹	Original Grade Elev. ²	Top of Casing Elev. ²	Top of Riser Elev. ²
Abandoned Fuel-Oil Line						
Monitoring Wells	SD1	156530.769	546670.855	7.49	7.49	7.23
	SD2	156275.044	546628.056	10.07	10.07	9.8
Failed Small-Diameter Well Attempts	SD3	156246.44	546554.731			
	SD4	156003.733	546520.735			
	SD5	155830.166	546499.345			
Structure 74 Investigation						
Monitoring Wells	MW101	155370.475	547015.395	51.58	53.58	53.22
	MW104	155582.663	546932.413	28.47	30.34	29.93
	MW106	155590.785	547071.219	26.1	26.15	26.04
	MW107	155595.001	546981.756	28.98	29.08	28.97
	MW108	155648.254	546918.474	24.5	24.5	24.24
	MW2	155591.708	546931.173	27.61	29.49	NONE
	GZ1	155386.687	546760.049	31.36	31.36	31.18
	SD7	155536.554	546920.218	30.95	30.95	30.61
	SD8	155572.9	546880.936	28.13	28.13	27.89
Failed Small-Diameter Well Attempts	SD9	155612.271	546819.93			
	SD10	155626.617	546879.3			
	SD11	155626.829	546944.719			
	SD12	155624.969	547025.973			
	SD13	155712.434	547026.314			
	SD14	155798.451	547025.894			
	SD15	155620.046	547074.197			
	SD16	155610.85	547162.314			

1 - Based on 1927 Rhode Island State Plane Coordinate System

2 - Feet above Sea-Level Based on 1929 North American Vertical Datum

3.0 SITE PHYSIOGRAPHIC CONDITIONS

3.1 TOPOGRAPHY

CHI lies off the coast of Newport, Rhode Island within Narragansett Bay. The island is roughly oval in shape and is approximately 0.7 miles long by 0.3 miles wide with the long axis trending north/south. The topography of CHI and the Newport area has been shaped by the underlying bedrock geology, glaciation, erosion and filling. Bedrock was the controlling influence in shaping the island during the last period of glaciation. Vertical relief totals approximately 65 feet with the island's highest point (represented by a bedrock high) being south-centrally located. Approximately 80 to 90 percent of the island is developed and covered by pavement or structures.

3.2 GEOLOGY

The geology of NETC Newport and CHI is characterized by surficial unconsolidated glacial deposits underlain by Pennsylvanian-age, non-marine, sedimentary bedrock. The geology is illustrated on four cross-sections; two drawn through the Taylor Drive and Structure 143 investigation area (A-A' and B-B'), the other two drawn through the Structure 74 investigation area (C-C' and D-D'). Figure 3-1 indicates the area of the four cross-sections. The cross-sections themselves appear as Figure 3-2 (A-A'), Figure 3-3 (B-B'), Figure 3-4 (C-C') and Figure 3-5 (D-D'). The cross-sections are based on boring logs generated during this investigation and boring logs generated by others during previous investigations at Structure 74. All of the boring logs are included in Appendix B.

3.2.1 Description of Unconsolidated Materials

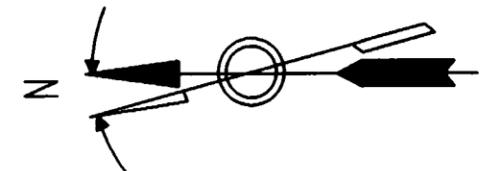
Unconsolidated materials above the bedrock surface consist of probable fill material, organic material and glacial sediments. Probable fill material (brown sand, silt and gravel) was encountered in most of the soil borings completed at Taylor Drive during this investigation program. This material was observed to depths ranging from 4.5 to 8 feet bgs in SB-1 through SB-5 (see Figure 3-2) and to approximately 2 feet bgs in SB-22 and SB-24 through SB-27 (see Figure 3-3). Based on GZA boring logs, fill was observed to 2 feet bgs in MW-108 at Structure 74 (see Figure 3-4).

Layers of organic material, which consist of sandy peat, roots and other organics, were observed between 6 to 8 feet bgs in SB-4, SB-5 and SB-6 along Taylor Drive. These layers are believed to be original deposition surfaces which represent a buried soil horizon. Soils above these layers would therefore be composed of fill material.

Glacial sediments consist of sand, silt, gravel and till and were deposited 10,000 to 12,000 years ago during the Wisconsin glaciation. These glacial deposits directly overlie the bedrock surface, as observed in all of the soil borings completed along Taylor Drive. Based on GZA boring logs at Structure 74, till was observed in MW-108 to 9 feet bgs (Figure 3-4).

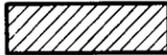
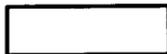
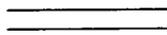
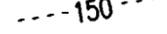
TAYLOR DRIVE &
STRUCTURE 143
INVESTIGATION
AREA

STRUCTURE 74
INVESTIGATION
AREA



MAG. DEC. N 15° 03' W

LEGEND

-  BUILDING OR STRUCTURE, PERMANENT
-  BUILDING OR STRUCTURE, SEMI-PERMANENT
-  BUILDING OR STRUCTURE, TEMPORARY
-  ROAD OR PAVED AREA
-  FENCE
-  SHORE LINE
-  INDEX CONTOUR
-  INTERMEDIATE CONTOUR
-  SPOT GRADE ELEVATION
-  GZA MONITORING WELL INSTALLED DURING PREVIOUS INVESTIGATION
-  ENSR CONVENTIONAL MONITORING WELL INSTALLED DURING UST REMEDIAL INVESTIGATION
-  ENSR SMALL-DIAMETER MONITORING WELL ATTEMPTED LOCATION, UNABLE TO PERMANENTLY INSTALL WELL DURING UST REMEDIAL INVESTIGATION
-  ENSR SOIL BORING CONDUCTED DURING UST REMEDIAL INVESTIGATION

SOURCE:

BASE MAP PROVIDED BY NETC NEWPORT

FIGURE 3-1

ENSR

ENSR CONSULTING & ENGINEERING

AREA OF CROSS-SECTIONS
A-A', B-B', C-C' & D-D'
COASTERS HARBOR ISLAND
UST REMEDIAL INVESTIGATION

DRAWN BY:	DATE:	PROJECT NO.
K.P.B.	1/95	5060-045-720

KATE FIELD

NEW HAMPSHIRE
FIELD

CUSHING ROAD

WALL

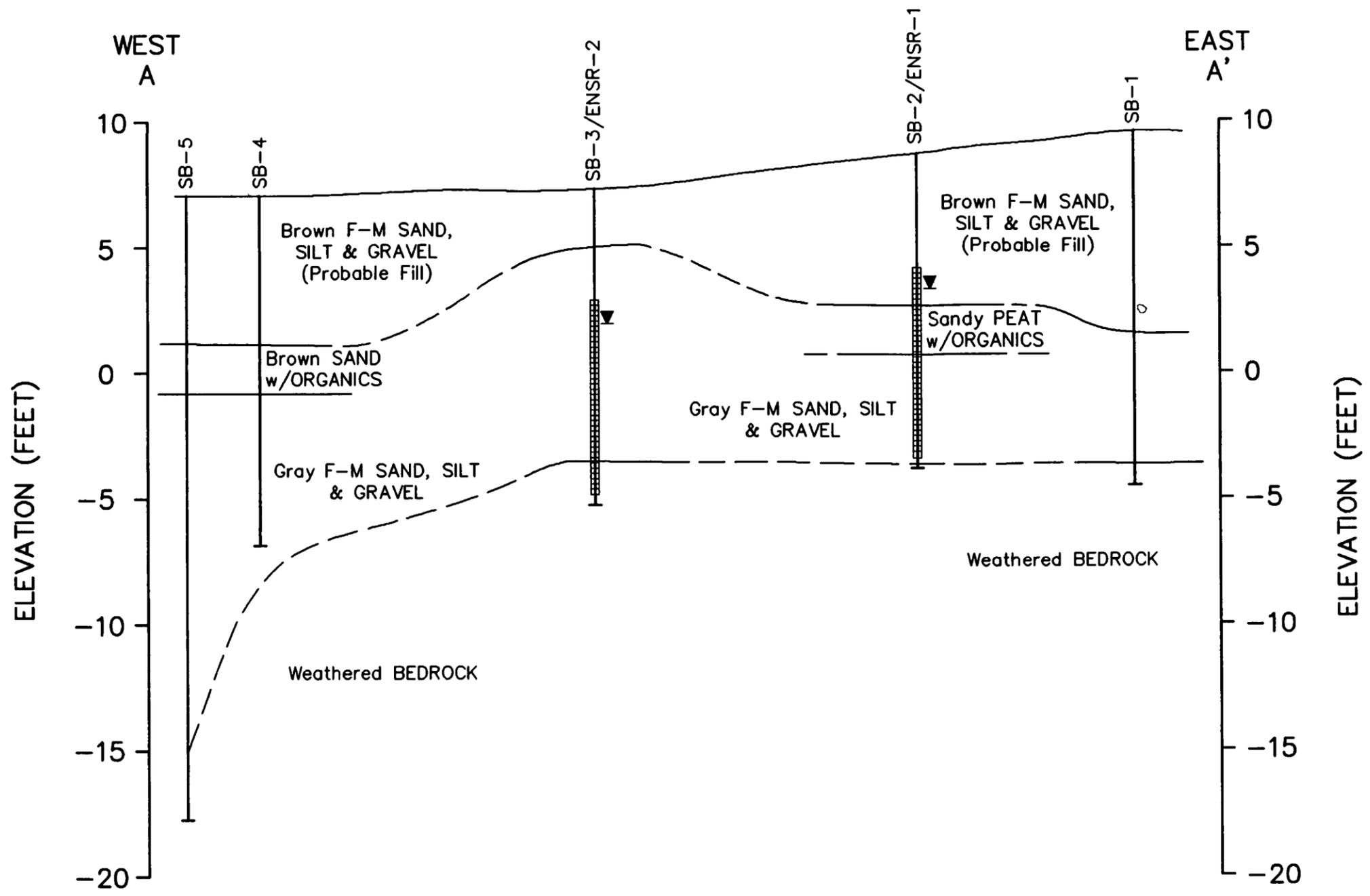
1 FATHOMS
3 FATHOMS

150 0 150 300

SCALE IN FEET
1" = 150'-0"

506097B

21



LEGEND

-  SOIL BORING
-  WELL BORING AND SCREEN LOCATION
-  STRATIGRAPHIC CONTACT (DASHED WHERE INFERRED)
-  WATER TABLE ELEVATION (MEASURED DURING ENSR GROUNDWATER SAMPLING IN AUGUST, 1994)

NOTE:

ELEVATION DATA FOR SOIL BORINGS IS APPROXIMATE.

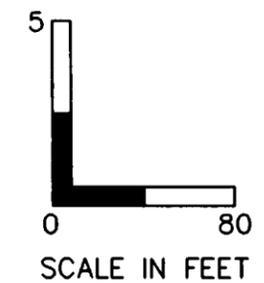
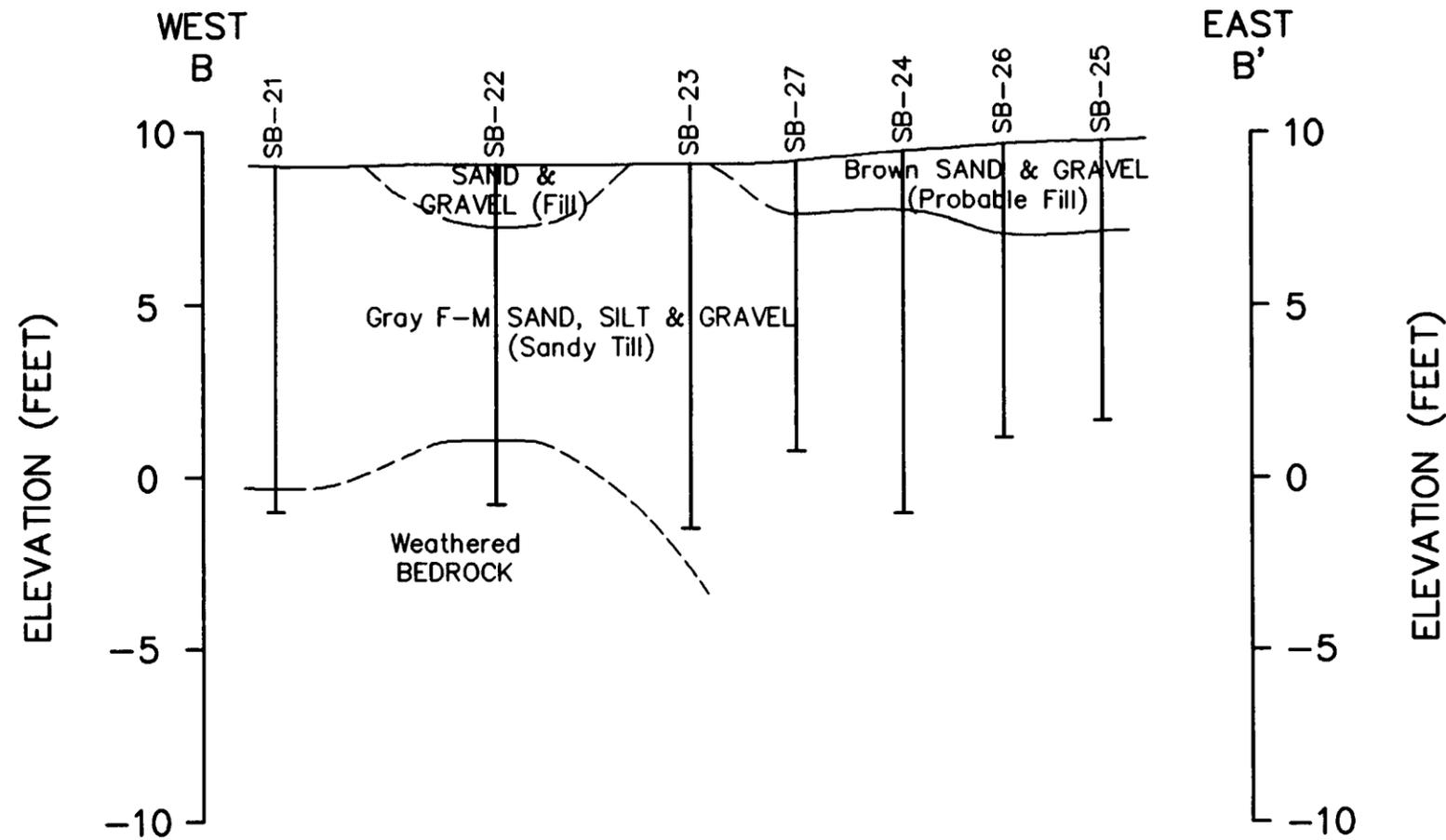


FIGURE 3-2

ENSR		
ENSR CONSULTING & ENGINEERING		
CROSS-SECTION A-A'		
COASTERS HARBOR ISLAND		
UST REMEDIAL INVESTIGATION		
DRAWN BY:	DATE:	PROJECT NO.
K.P.B.	1/95	5060-045-720

506098B



LEGEND

↓ SOIL BORING

— STRATIGRAPHIC CONTACT (DASHED WHERE INFERRED)

NOTE:

ELEVATION DATA FOR SOIL BORINGS IS APPROXIMATE.

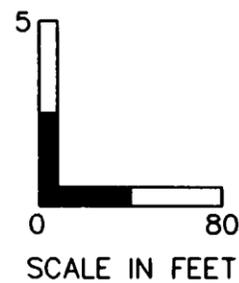
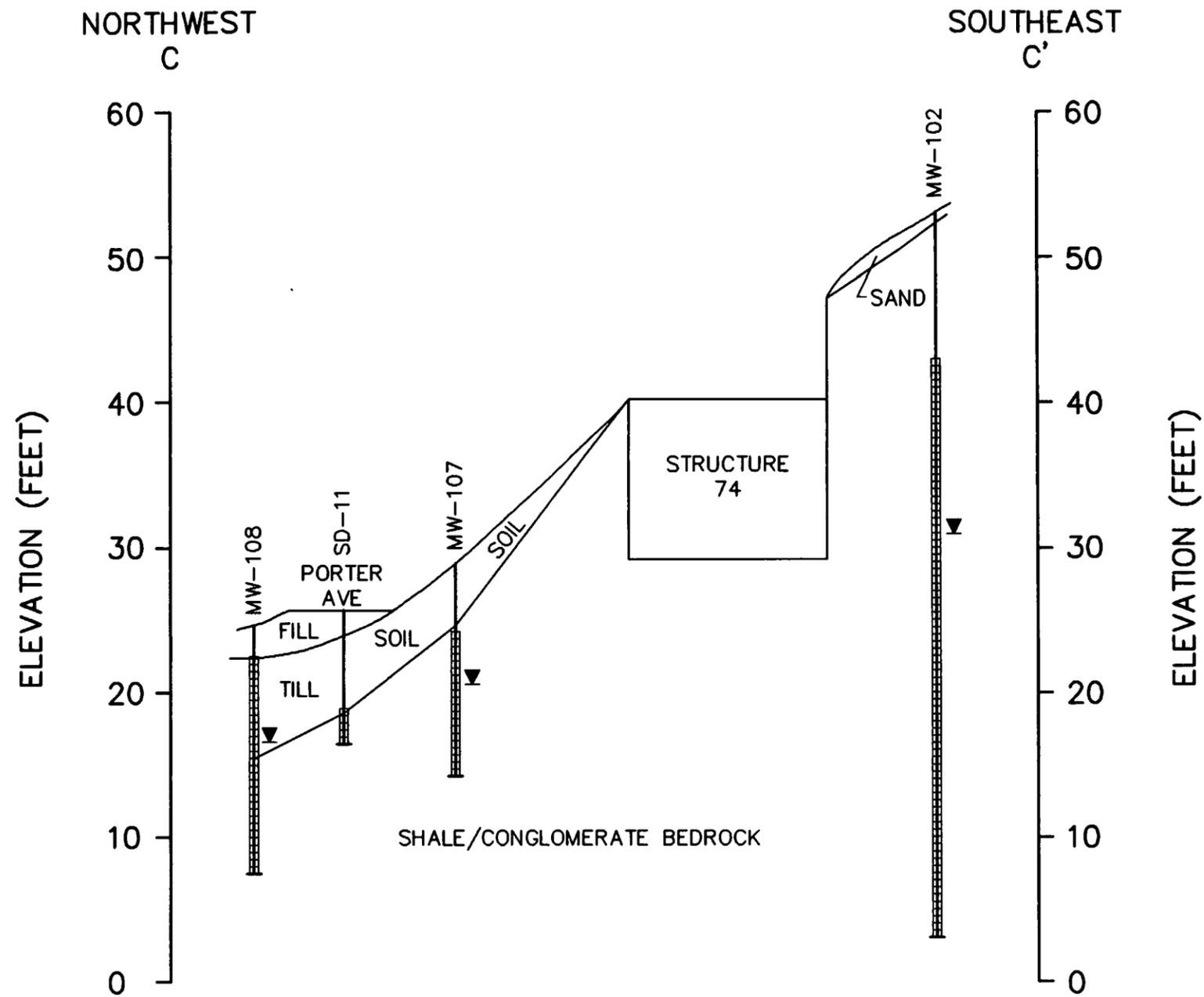


FIGURE 3-3

ENSR		
ENSR CONSULTING & ENGINEERING		
CROSS-SECTION B-B'		
COASTERS HARBOR ISLAND		
UST REMEDIAL INVESTIGATION		
DRAWN BY:	DATE:	PROJECT NO.
K.P.B.	1/95	5060-045-720



LEGEND

-  WELL BORING AND SCREEN LOCATION
-  STRATIGRAPHIC CONTACT (DASHED WHERE INFERRED)
-  WATER TABLE ELEVATION (MEASURED DURING ENSR GROUNDWATER SAMPLING IN AUGUST & SEPTEMBER, 1994)

NOTE:

ELEVATION DATA IN SOME CASES IS APPROXIMATE. SUBSURFACE GEOLOGY IS BASED ON DATA FROM GZA BORING LOGS (NOVEMBER, 1994).

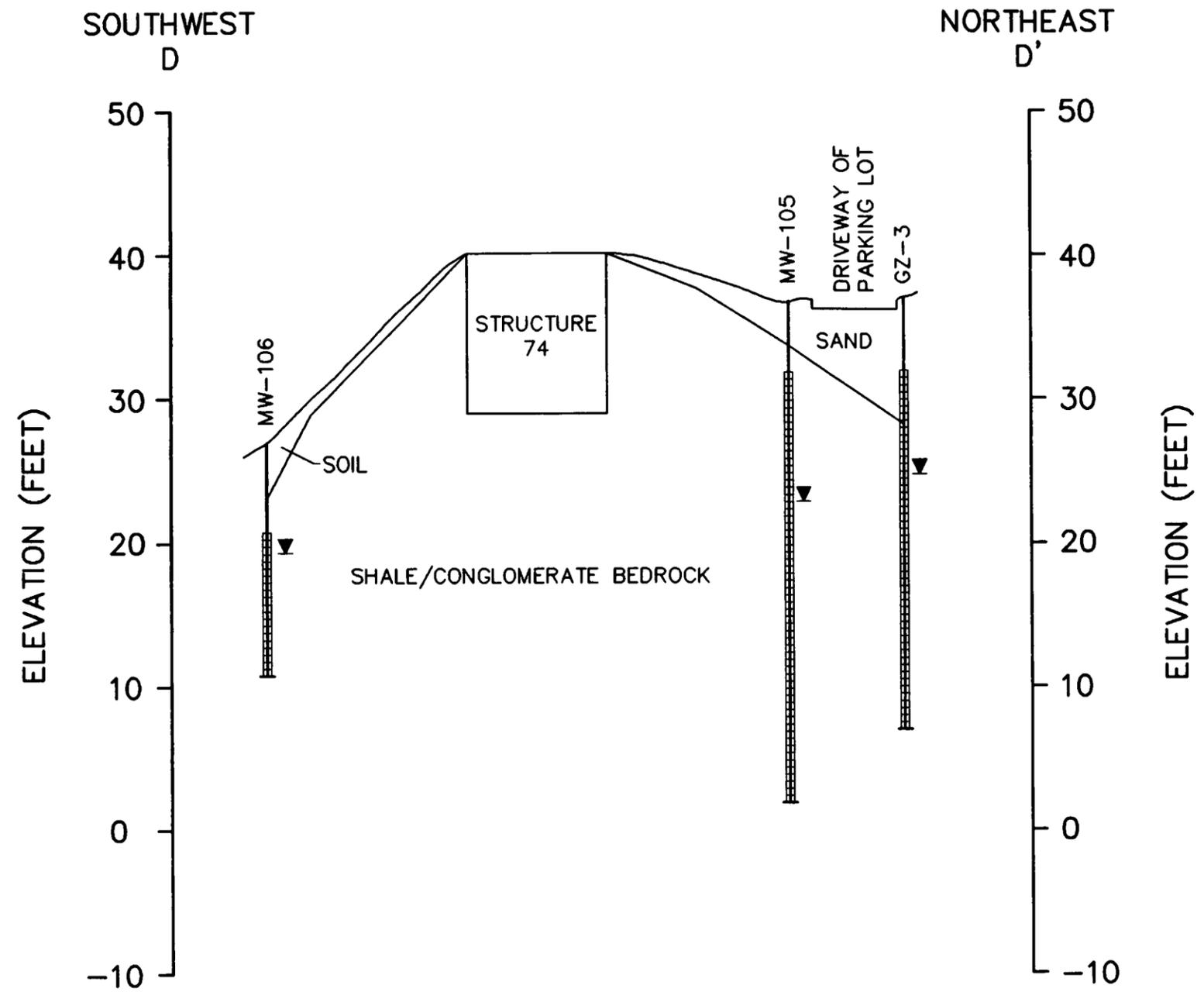
FIGURE 3-4



ENSR CONSULTING & ENGINEERING

CROSS-SECTION C-C'
COASTERS HARBOR ISLAND
UST REMEDIAL INVESTIGATION

DRAWN BY:	DATE:	PROJECT NO.
K.P.B.	1/95	5060-045-720



LEGEND

-  WELL BORING AND SCREEN LOCATION
-  STRATIGRAPHIC CONTACT (DASHED WHERE INFERRED)
-  WATER TABLE ELEVATION (MEASURED DURING ENSR GROUNDWATER SAMPLING IN AUGUST & SEPTEMBER, 1994)

NOTE:

ELEVATION DATA IN SOME CASES IS APPROXIMATE. SUBSURFACE GEOLOGY IS BASED ON DATA FROM GZA BORING LOGS (NOVEMBER, 1994).

FIGURE 3-5

ENSR		
ENSR CONSULTING & ENGINEERING		
CROSS-SECTION D-D' COASTERS HARBOR ISLAND UST REMEDIAL INVESTIGATION		
DRAWN BY:	DATE:	PROJECT NO.
K.P.B.	1/95	5060-045-720

5060101B

3.2.2 Description of Bedrock

NETC is located at the southeastern end of the Narragansett Basin, which is a topographical depression that trends in a north/south direction and drains directly to the Atlantic Ocean. The Pennsylvanian-aged bedrock on CHI is composed of the Rhode Island Formation, which underlies most of the Narragansett Basin. The Rhode Island Formation includes fine to coarse conglomerate, sandstone, lithic graywacke, graywacke, arkose, shale and a small amount of meta-anthracite and anthracite. CHI is mostly covered with coarse-grained conglomerate layers, which are gray to greenish in color and consist of pebbles, cobbles and boulders (up to several feet long) interbedded with sandstone and graywacke. These thick conglomerate layers are more resistant to erosion than are the surrounding rocks and thus, are topographically higher. Conglomerate was encountered at relatively shallow depths (0.5 to 9 feet bgs) in the borings completed by GZA at Structure 74, as depicted in Figures 3-4 and 3-5. Weathered bedrock, consisting of grayish silt and fine sand, which crumbled easily when handled, was observed in several of the borings completed at Taylor Drive (see Figures 3-2 and 3-3). The weathered bedrock was encountered at approximately 12 feet bgs in SB-1, SB-2 and SB-3; at approximately 22 feet bgs in SB-5, and at approximately 8 feet bgs in SB-21 and SB-22.

3.3 HYDROGEOLOGY

3.3.1 Depth to Groundwater and Groundwater Flow Direction

The depth to groundwater depends upon the topographic location, time of year and character of subsurface deposits. Groundwater is obtained from the unconsolidated glacial deposits of till and outwash and from the underlying bedrock of the Rhode Island Formation. Rainfall infiltration is the principal means of groundwater replenishment, however, runoff is controlled over much of the island and directed through storm drains into the Bay. Seasonal water level fluctuations are common in the area. During the late spring and summer, the water table usually declines as a result of evaporation and the uptake of water by plants, and rises during autumn and following winter thaws. In addition, tidal influences can effect hourly changes in the water table close to the shoreline.

A round of synoptic water level measurements were made in 28 conventional and small-diameter monitoring wells on November 9, 1994. Based on the results, groundwater on CHI is present at shallow depths of approximately 5 feet bgs along the shoreline areas where monitoring wells are present (Taylor Drive and old FFTA) and at depths of greater than 25 feet bgs inland (near Structure 74). The water table measurements and groundwater elevation data are included in Table 3-1. The water table elevation contours based on the November 9, 1994 data are depicted on Figure 3-6. The data indicate that groundwater is flowing in a radial arc from the vicinity of Structure 74 towards the northwest, north and northeast. In the vicinity of the Taylor Drive and Structure 143 investigation area, groundwater flows to the north and northwest and presumably discharges into Narragansett Bay. Tidal fluctuations in monitoring wells MW-2 and MW-4 were observed by TRC during the Phase I RI conducted at the old FFTA (TRC, 1992). During that study, the maximum fluctuation of the groundwater table due to tidal influence was 0.91 feet as observed in MW-2S.

TABLE 3-1

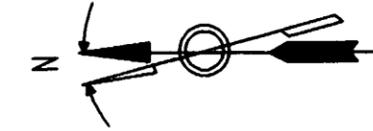
**WATER LEVEL AND PRODUCT THICKNESS MEASUREMENTS
COASTERS HARBOR ISLAND UST REMEDIAL INVESTIGATION
NOVEMBER 9, 1994**

Well I.D.	Depth to Water ¹ (Feet)	Depth to Product ¹ (Feet)	Elevation of Riser Pipe (NGVD ²)	Groundwater Elevation (NGVD ²)	Product Thickness (Feet)
Taylor Drive and Structure 143 Investigation Area					
ENSR-1	4.71	N/A	7.88	3.17	N/A
ENSR-2	4.89	N/A	6.29	1.4	N/A
ENSR-3	5.02	N/A	5.95	0.93	N/A
MW-1	6.73	N/A	9.47	2.74	N/A
MW-2S	5.4	N/A	6.74	1.34	N/A
MW-3	5.74	N/A	7.94	2.2	N/A
MW-4	4.49	N/A	5.76	1.27	N/A
MW-5	7.3	N/A	10.47	3.17	N/A
MW-7S	5.63	N/A	8.55	2.92	N/A
MW-10S	6.8	N/A	8.36	1.56	N/A
SD-17	4.95	N/A	6.32	1.37	N/A
SD-18	4.81	N/A	6.22	1.41	N/A
SD-20	4.64	N/A	6.89	2.25	N/A
SD-21	5.04	N/A	7.32	2.28	N/A
Abandoned Fuel Oil Line Investigation Area					
SD-1	5.95	N/A	7.23	1.28	N/A
SD-2	7.38	N/A	9.8	2.42	N/A
Structure 74 Investigation Area					
GZ-1	17.25	N/A	31.18	13.93	N/A
GZ-2	16.38	N/A	40.29	23.91	N/A
GZ-3	14.12	N/A	36.58	22.46	N/A
MW-101	26.19	N/A	53.22	27.03	N/A
MW-102	28.29	N/A	55.22	26.93	N/A
MW-104	10	9.69	29.93	19.93	0.31
MW-105	16.81	N/A	38.13	21.32	N/A
MW-106	10.44	N/A	26.04	15.6	N/A
MW-107	10	9.98	28.97	18.97	0.02
MW-108	9.63	9.55	24.24	14.61	0.08
SD-7	7.87	N/A	30.61	22.74	N/A
SD-8	N/A	11.03	27.89	N/A	-0.55 ³

¹ Water level and product thickness measurements were taken at the highest point of the riser pipe.

² NGVD = National Geodetic Vertical Datum, 1929 (feet above sea level)

³ Product thickness is estimated, as water was not present in SD-8. Product thickness is based on the amount of product present in the well.

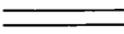
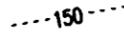
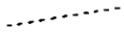


MAG. DEC. N 15° 03' W

SOURCE:

BASE MAP PROVIDED BY NETC NEWPORT

LEGEND

-  BUILDING OR STRUCTURE, PERMANENT
-  BUILDING OR STRUCTURE, SEMI-PERMANENT
-  BUILDING OR STRUCTURE, TEMPORARY
-  ROAD OR PAVED AREA
-  FENCE
-  SHORE LINE
-  INDEX CONTOUR
-  INTERMEDIATE CONTOUR
-  SPOT GRADE ELEVATION
-  GZA MONITORING WELL INSTALLED DURING PREVIOUS INVESTIGATION
-  TRC MONITORING WELL INSTALLED DURING PREVIOUS INVESTIGATION
-  ENSR CONVENTIONAL MONITORING WELL INSTALLED DURING UST REMEDIAL INVESTIGATION
-  ENSR SMALL-DIAMETER MONITORING WELL INSTALLED DURING UST REMEDIAL INVESTIGATION
-  ENSR SMALL-DIAMETER MONITORING WELL ATTEMPTED LOCATION, UNABLE TO PERMANENTLY INSTALL WELL DURING UST REMEDIAL INVESTIGATION
-  ENSR SOIL BORING CONDUCTED DURING UST REMEDIAL INVESTIGATION
-  GROUNDWATER ELEVATION CONTOUR LINE (FEET NGVD), DASHED WHERE INFERRED

2

E 547,000

7

E 546,000

N 157,000

21

N 155,000

N 155,000

200 0 200 400

SCALE IN FEET
1" = 200'-0"

FIGURE 3-6

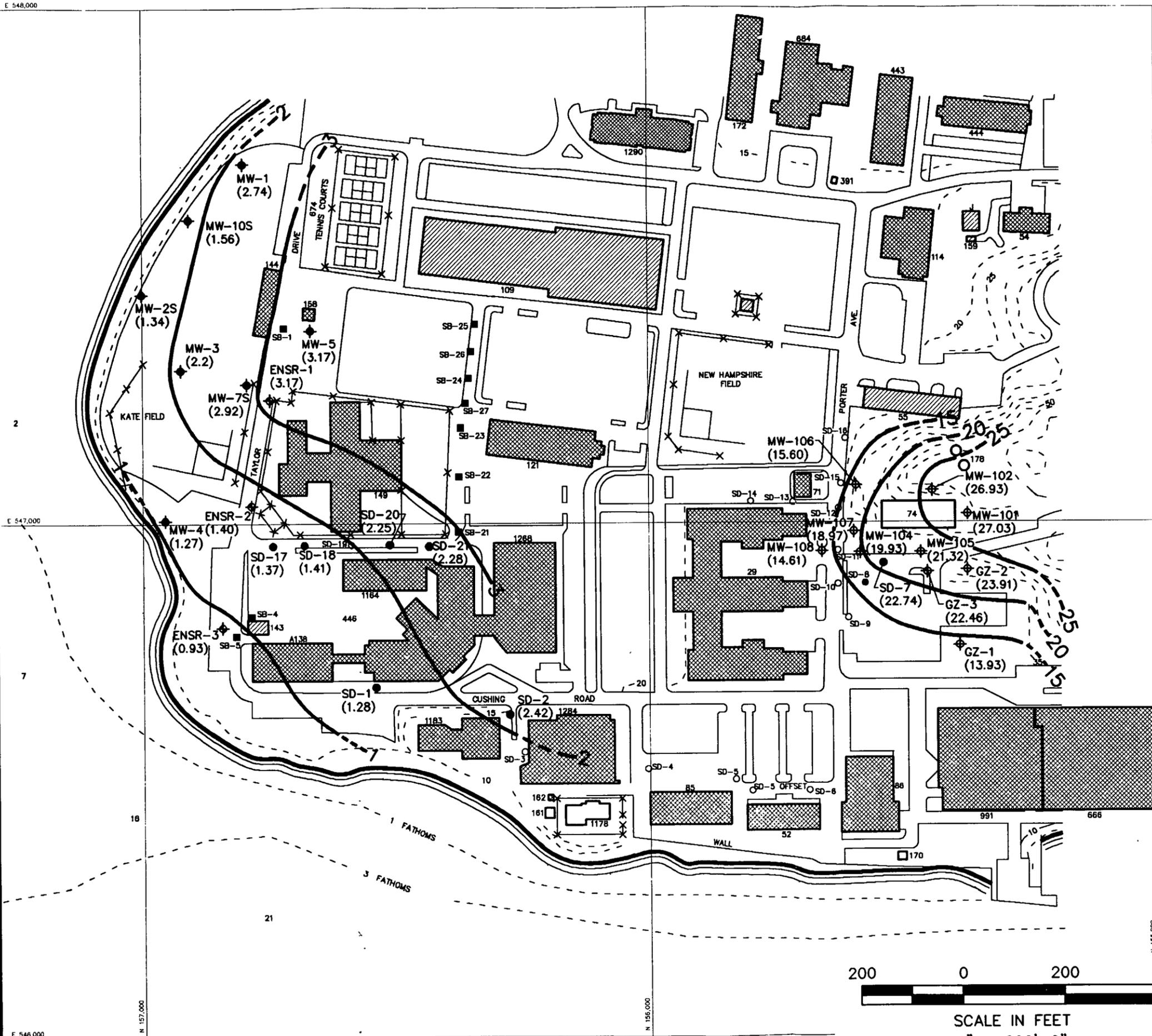
ENSR

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WATER TABLE CONTOURS (11/9/94)
COASTERS HARBOR ISLAND
UST REMEDIAL INVESTIGATION

DRAWN BY:	DATE:	PROJECT NO.
K.P.B.	1/95	5060-045-720

506095B



3.3.2 Description of the Area Surrounding the Site

According to the Groundwater Classification Map dated June, 1993, RIDEM has classified the groundwater on all of Coasters Harbor Island as GB, indicating that it is assumed to be not suitable for public or private drinking water use without treatment. The GB groundwater classification applies to groundwater located beneath highly urbanized areas with dense concentrations of industrial and commercial activity and the areas surrounding and including permanent waste disposal sites. According to the Activity, there are no groundwater supply wells other than monitoring wells present on CHI.

4.0 NATURE AND EXTENT OF CONTAMINATION

4.1 TAYLOR DRIVE AND STRUCTURE 143 INVESTIGATION

4.1.1 Results of Manhole Inspection

As described in Section 2.1 of this report, the objective of the manhole inspection task was to evaluate the potential for subsurface migration of petroleum hydrocarbons through buried utility trenches. This objective was met by opening manhole covers and inspecting the interior of the underground utility chambers for the presence of hydrocarbons. A total of 75 manholes representing storm drains, sewer, electrical and telephone utilities were inspected within a 400-foot radius of Structure 143 and along Taylor Drive to Structure 158. The manholes inspected are illustrated on Figure 4.1-1.

Free-phase petroleum product was not observed in any of the utility chambers. The atmosphere within the utility chambers was measured with a CGI; the results never exceeded background and no petroleum odors were observed by the field team. A very slight sheen (barely discernable) was observed on top of water in three of the manholes (E-2, E-4 and ST-16). The minor nature of the sheens was interpreted as surface runoff; therefore no samples were collected for laboratory analysis.

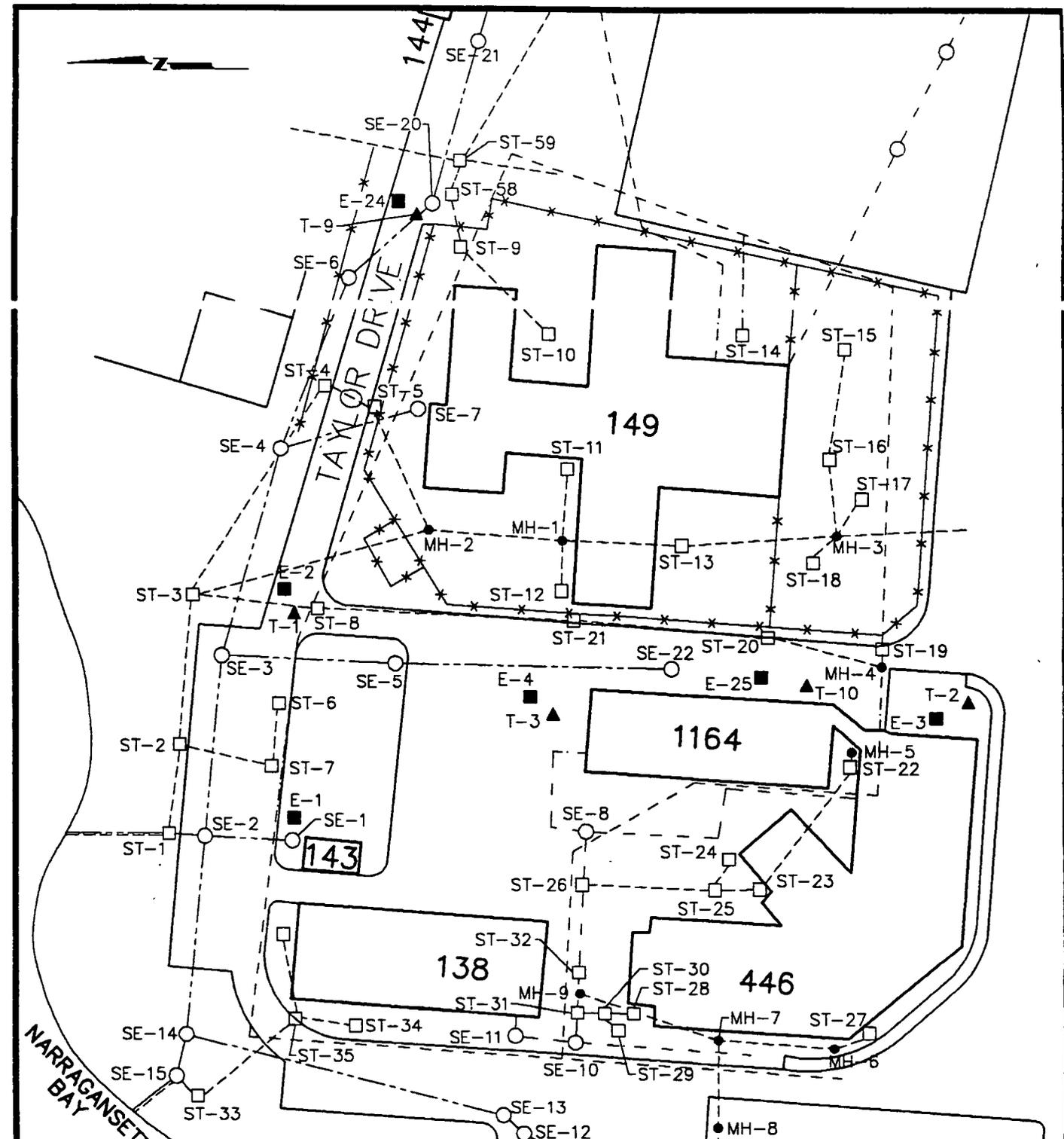
4.1.2 Results of Soil Borings and Soils Analyses

A total of 13 soil borings were conducted in this investigation area at the locations indicated on Figure 4.1-2. The first six borings (SB-1 through SB-6) were conducted along Taylor Drive and in the vicinity of Structure 143. Borings SB-2, SB-3 and SB-6 were completed as monitoring wells ENSR-1, ENSR-2 and ENSR-3 respectively. Based on the results of elevated headspace measurements and petroleum hydrocarbon odors observed in borings SB-2 and SB-3, an additional seven borings (SB-21 through SB-27) were conducted approximately 400 feet south of Taylor Drive to identify potential sources.

One soil sample from each boring was submitted for laboratory analysis of TPH (GC/FID). The methodology used to conduct the borings and collect the soil samples is described in Section 2.2 of this report.

4.1.2.1 TPH in Soils

The only TPH detections occurred at SB-2 (760 mg/kg), SB-3 (550 mg/kg) and SB-4 (13 mg/kg). The fingerprint analysis for TPH was reported by the laboratory as most closely matching diesel fuel. TPH was not detected at any of the other soil borings. The analytical results are summarized in Table 4.1-1 and are displayed on Figure 4.1-2.



LEGEND

- MH-1 ● STEAM-LINE/OTHER MISC. MANHOLE NUMBERS
- SE-1 ○ SEWER MANHOLE NUMBER
- E-1 ■ ELECTRIC MANHOLE NUMBER
- ST-1 □ STORM DRAIN MANHOLE NUMBER
- T-1 ▲ TELEPHONE MANHOLE NUMBER
- - - - - STEAM LINE
- - - - - SEWER LINE
- - - - - STORMDRAIN LINE
- - - - - WATER LINE

NOTE:

MAP BASED ON UTILITY PLANS SUPPLIED BY NETC NEWPORT AND FIELD OBSERVATIONS. LOCATION OF UTILITY LINES AND MANHOLES ARE APPROXIMATE. PLANS FOR TELEPHONE AND ELECTRIC UTILITIES WERE UNAVAILABLE AT THE TIME THIS MAP WAS PREPARED. UNLABELED MANHOLES WERE NOT OPENED DURING THE MANHOLE INSPECTION TASK.

SCALE: 1" = 100'-0"

FIGURE 4.1-1

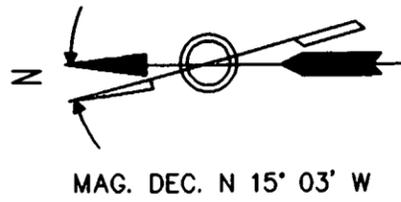


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MANHOLE INSPECTION MAP
 TAYLOR DRIVE & STRUCTURE 143 INVESTIGATION
 COASTERS HARBOR ISLAND
 UST REMEDIAL INVESTIGATION

DRAWN BY:	DATE:	PROJECT NO
K.P.B.	1/95	5060-045

506036A



- LEGEND**
- BUILDING OR STRUCTURE, PERMANENT
 - ROAD OR PAVED AREA
 - FENCE
 - ENSR CONVENTIONAL MONITORING WELL INSTALLED DURING UST REMEDIAL INVESTIGATION
 - ENSR SOIL BORING CONDUCTED DURING UST REMEDIAL INVESTIGATION
 - TOTAL PETROLEUM HYDROCARBONS IN SUBSURFACE SOILS AT SPECIFIED DEPTH BY GC/FID.
ND = NOT DETECTED

SOURCE:
BASE MAP PROVIDED BY NETC NEWPORT

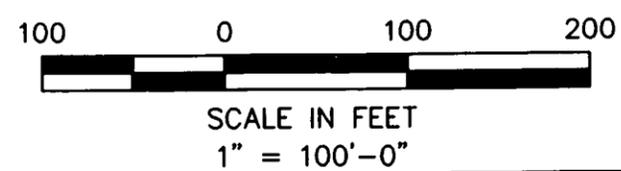
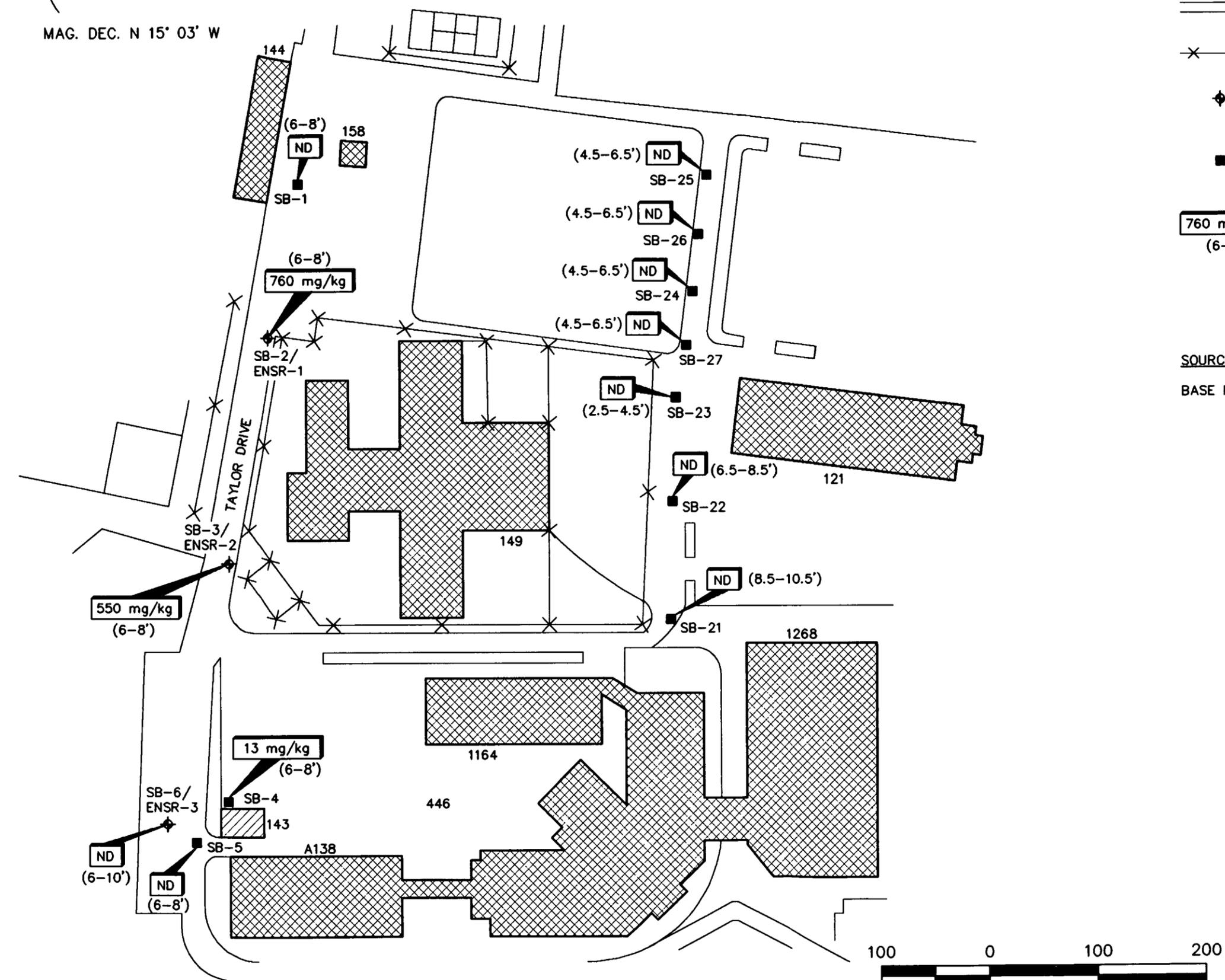


FIGURE 4.1-2

ENSR		
ENSR CONSULTING & ENGINEERING		
TPH IN SOIL (GC/FID)		
TAYLOR DRIVE AND STRUCTURE 143 INVESTIGATION AREA COASTERS HARBOR ISLAND UST REMEDIAL INVESTIGATION		
DRAWN BY	DATE	PROJECT NO
K.P.B.	1/95	5060-045-720

506084B

TABLE 4.1-1

**COASTERS HARBOR ISLAND UST R/CTO 150
TAYLOR DRIVE AND STRUCTURE 143 INVESTIGATION
TPH IN SOIL**

BORING ID:	SB-1	SB-2	SB-3	SB-4	SB-5	SB-6	SB-21	SB-22	SB-23	SB-24	SB-25	SB-26	SB-27
SAMPLE ID:	BB01AA	BB02AA	BB03AA	BB04AA	BB05AA	BB06AA	AB21AA	AB22AA	AB23AA	AB24AA	AB25AA	AB26AA	AB27AA
DEPTH (feet):	6-8'	6-8'	6-8'	6-8'	6-8'	6-10'	8.5-10'	6.5-8.5'	2.5-4.5'	4.5-6.5'	4.5-6.5'	4.5-6.5'	4.5-6.5'
DATE SAMPLED:	07/29/94	07/29/94	07/29/94	07/29/94	07/29/94	07/29/94	08/12/94	08/12/94	08/12/94	08/15/94	08/15/94	08/15/94	08/15/94
LABORATORY ID:	940673-01	940673-02	940673-04	940673-05	940673-06	940673-08	940711-14	940711-15	940711-16	940720-01	940720-02	940720-03	940720-04
TPH SOIL (MG/KG)													
GASOLINE	11 U				11 U	12 U	11 U	12 U					
DIESEL FUEL	11 U	760	550	13	11 U	12 U	11 U	12 U					
KEROSENE	11 U				11 U	12 U	11 U	12 U					
JP-4 JET FUEL	11 U				11 U	12 U	11 U	12 U					
JET FUEL A	11 U				11 U	12 U	11 U	12 U					
JP-5 JET FUEL	11 U				11 U	12 U	11 U	12 U					
MOTOR OIL	11 U				11 U	12 U	11 U	12 U					
#2 FUEL OIL	11 U				11 U	12 U	11 U	12 U					
#4 FUEL OIL	11 U				11 U	12 U	11 U	12 U					
#5 FUEL OIL	11 U				11 U	12 U	11 U	12 U					
#6 FUEL OIL	11 U				11 U	12 U	11 U	12 U					
WASTE OIL	11 U				11 U	12 U	11 U	12 U					

U = Undetected at specified detection limit.

4.1.3 Results of Well Installation and Groundwater Analyses

Three conventional monitoring wells (ENSR-1 through ENSR-3) and four permanent small-diameter wells (SD-17, SD-18, SD-20, and SD-21) were installed at the locations indicated on Figures 4.1-3 through 4.1-6. Approximately one week after development, groundwater samples were collected from ENSR-1, ENSR-2, ENSR-3, SD-17, SD-18, SD-20 and SD-21, as well as nearby monitoring wells MW-5 and MW-7S installed by TRC during previous investigations at the old FFTA. Groundwater samples collected from ENSR-1, ENSR-2, ENSR-3, MW-5 and MW-7 were analyzed for TPH (GC/FID), VOC, SVOC and RCRA 8 Metals. A duplicate field sample was collected from ENSR-1 and submitted for analysis along with the regular field sample. Groundwater samples collected from SD-17, SD-18, SD-20 and SD-21 were analyzed for TPH (GC/FID) only. The methodology used to install and develop the conventional ENSR-series and small-diameter monitoring wells, and to collect the groundwater samples is described in Sections 2.4 and 2.5 of this report.

The following sub-sections summarize the results of groundwater analyses for TPH, VOC, SVOC and RCRA 8 metals and include federal and state standards for Maximum Contaminant Levels (MCLs). RIDEM uses the US EPA Drinking Water Standard MCLs for sites which have groundwater classified as GA. For sites where groundwater is classified as GB, RIDEM has no published standards for MCLs, but instead examines the sites on a case-by-case basis (personal communication 11/7/94). As discussed in Section 3.3 of this report, groundwater at all of NETC Newport is classified as GB and the US EPA Drinking Water Standard MCLs do not apply. However, in the absence of any published RIDEM groundwater MCLs for GB-classified sites, the US EPA MCLs have been included for discussion purposes.

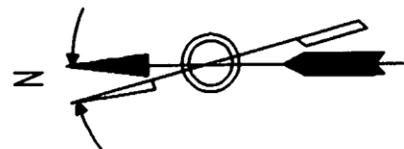
4.1.3.1 TPH in Groundwater

The only TPH detections occurred at ENSR-1 (11 mg/L in the field sample, 9.8 mg/L in the field duplicate sample) and ENSR-2 (1.4 mg/L). The fingerprint analysis for TPH was reported by the laboratory as most closely matching diesel fuel. As discussed in Section 2.8, it is the Halliburton NUS Team's opinion that, due to similarities between standard chromatograms, the TPH reported in these samples is most likely No. 4 fuel oil. TPH was not detected at any of the other conventional or small diameter monitoring wells sampled. The analytical results are summarized in Table 4.1-2 and are depicted on Figure 4.1-3.

The US EPA does not presently have a Drinking Water Standard MCL for TPH.

4.1.3.2 VOC in Groundwater

The only VOC detections occurred at ENSR-1. Benzene was detected at an estimated concentration (below the detection limit) of 1.0 ug/L in both the field sample and the duplicate field sample. Total xylenes were detected at an estimated concentration (below the detection limit) of 2.0 ug/L in the field duplicate sample, but were undetected in the regular field sample. There were no other VOCs detected in the two samples from ENSR-1 and no VOCs were detected in any of the other groundwater samples collected from the conventional monitoring wells in this area. The analytical results are summarized in Table 4.1-4 and are depicted on Figure 4.1-3.



MAG. DEC. N 15° 03' W

LEGEND

-  BUILDING OR STRUCTURE, PERMANENT
-  ROAD OR PAVED AREA
-  FENCE
-  TRC MONITORING WELL INSTALLED DURING OLD FIRE FIGHTING TRAINING AREA INVESTIGATION
-  ENSR CONVENTIONAL MONITORING WELL INSTALLED DURING UST REMEDIAL INVESTIGATION
-  ENSR SMALL-DIAMETER MONITORING WELL INSTALLED DURING UST REMEDIAL INVESTIGATION
-  ENSR SMALL-DIAMETER MONITORING WELL ATTEMPTED LOCATION, UNABLE TO INSTALL WELL DURING UST REMEDIAL INVESTIGATION

11.0/9.8 mg/l

TOTAL PETROLEUM HYDROCARBONS IN GROUNDWATER BY GC/FID. NUMBERS SEPERATED BY A SLASH (/) INDICATE RESULTS OF FIELD SAMPLE AND DUPLICATE SAMPLE. ND = NOT DETECTED

SOURCE:

BASE MAP PROVIDED BY NETC NEWPORT

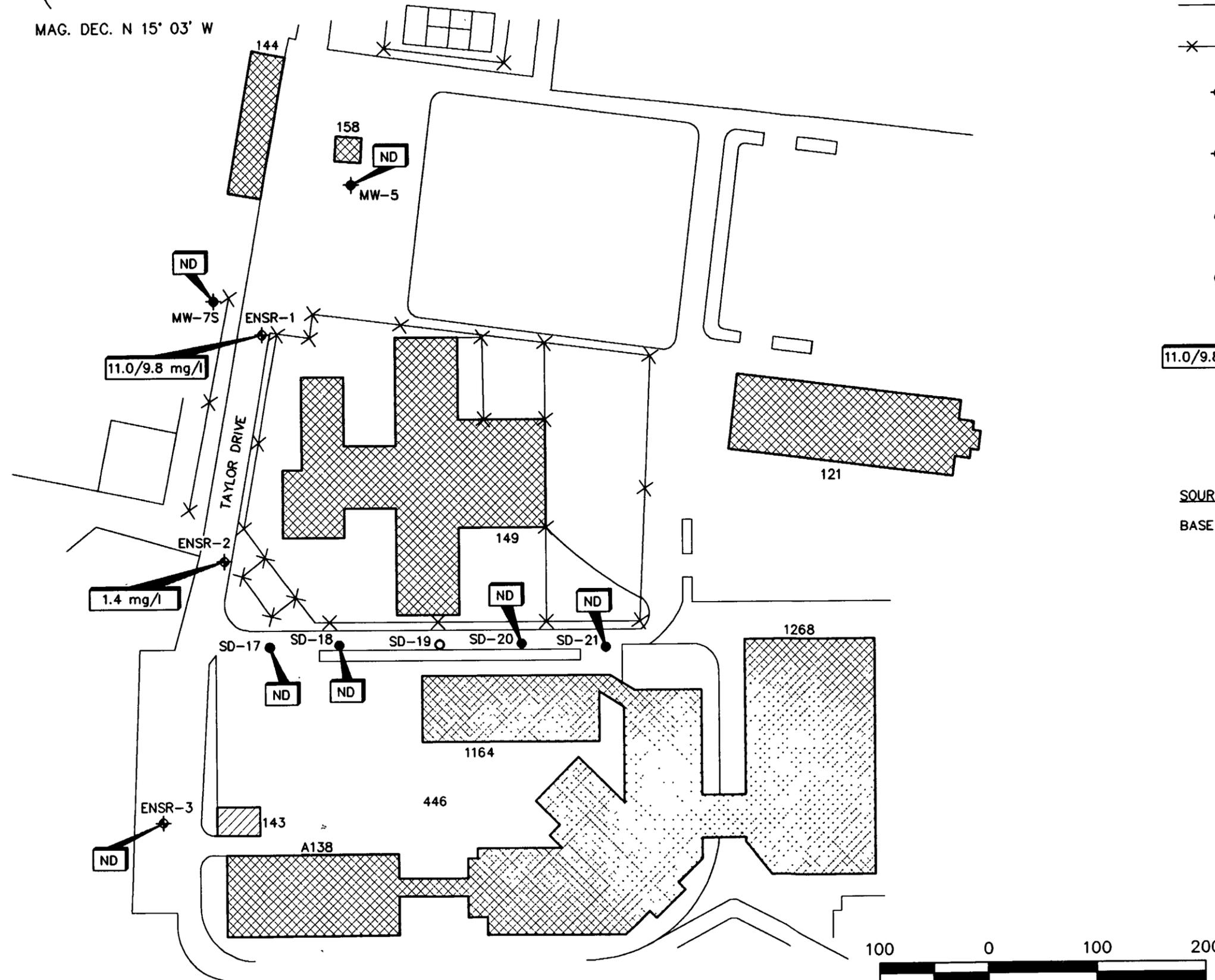
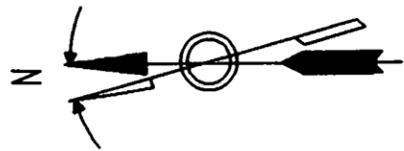


FIGURE 4.1-3

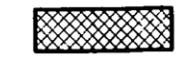
ENSR		
ENSR CONSULTING & ENGINEERING		
TPH IN GROUNDWATER (GC/FID)		
TAYLOR DRIVE AND STRUCTURE 143 INVESTIGATION AREA COASTERS HARBOR ISLAND UST REMEDIAL INVESTIGATION		
<small>DRAWN BY</small> K.P.B.	<small>DATE</small> 1/95	<small>PROJECT NO</small> 5060-045-720

506085B

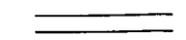


MAG. DEC. N 15° 03' W

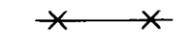
LEGEND



BUILDING OR STRUCTURE, PERMANENT



ROAD OR PAVED AREA



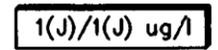
FENCE



TRC MONITORING WELL INSTALLED DURING PREVIOUS INVESTIGATION



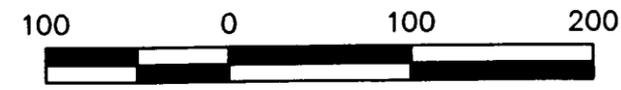
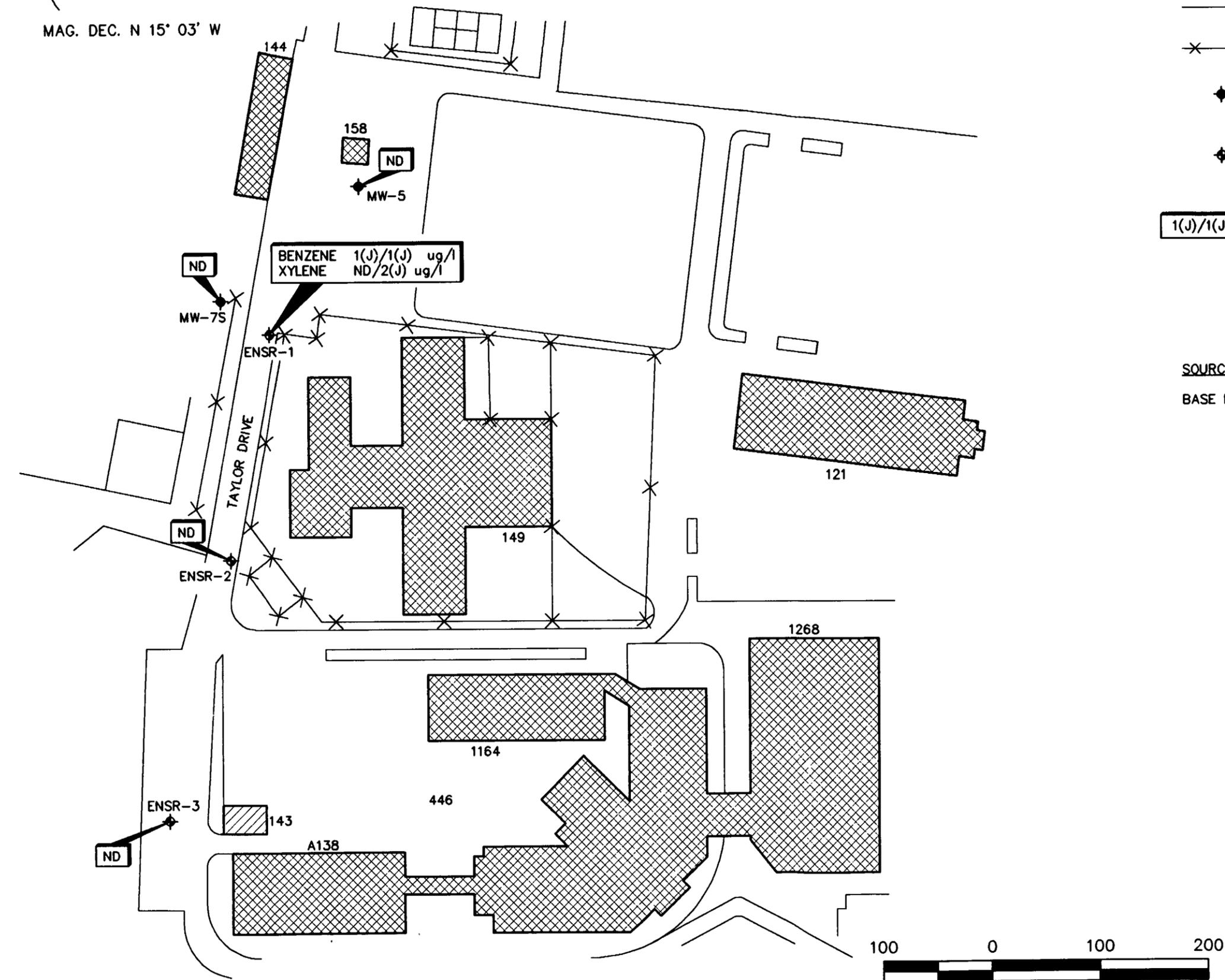
ENSR CONVENTIONAL MONITORING WELL INSTALLED DURING UST REMEDIAL INVESTIGATION



VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER. NUMBERS SEPERATED BY A SLASH (/) INDICATE RESULTS OF FIELD SAMPLE AND DUPLICATE SAMPLE.
ND = NOT DETECTED
J = ESTIMATED CONCENTRATION BELOW THE DETECTION LIMIT

SOURCE:

BASE MAP PROVIDED BY NETC NEWPORT



SCALE IN FEET
1" = 100'-0"

FIGURE 4.1-4



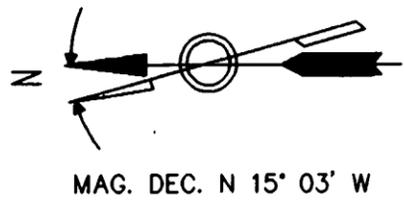
ENSR CONSULTING & ENGINEERING

VOC IN GROUNDWATER

TAYLOR DRIVE AND STRUCTURE 143 INVESTIGATION AREA
COASTERS HARBOR ISLAND
UST REMEDIAL INVESTIGATION

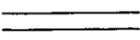
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506086B



NAPHTHALENE	23/32 ug/l
2-METHYLNAPHTHALENE	140/48 ug/l
PHENANTHRENE	24/18 ug/l
ACENAPHTHRENE	15(J)/14 ug/l
DIBENZOFURAN	11(J)/12 ug/l
FLUORENE	17(J)/19 ug/l
BIS(2-ETHYLHEXYL)PHTHALATE	4(J)/ND
N-NITROSODIPHENYLAMINE	ND/6(J) ug/l
ANTHRACENE	ND/1(J) ug/l

LEGEND

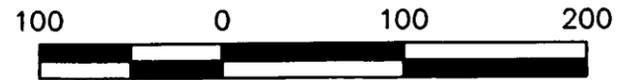
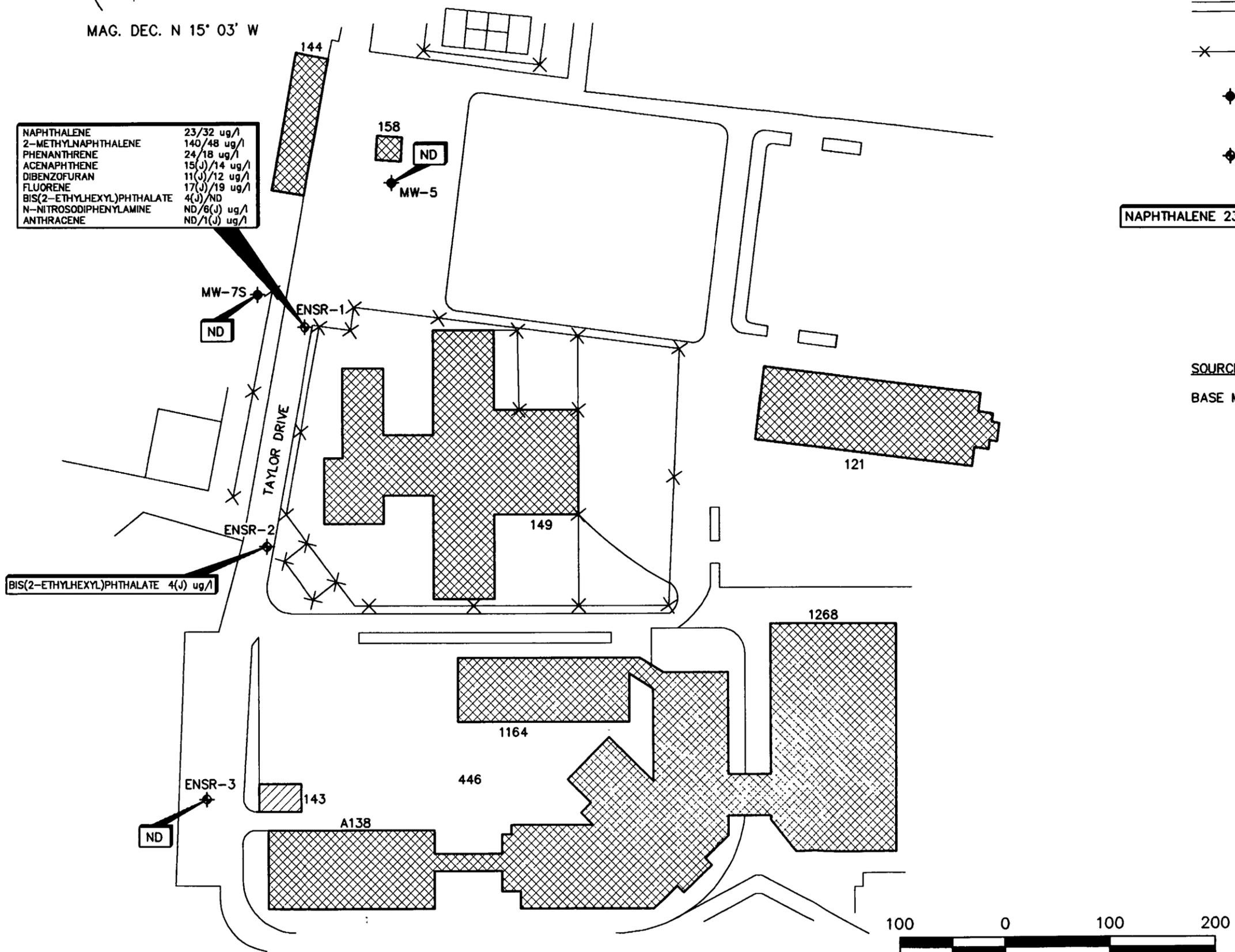
-  BUILDING OR STRUCTURE, PERMANENT
-  ROAD OR PAVED AREA
-  FENCE
-  TRC MONITORING WELL INSTALLED DURING PREVIOUS INVESTIGATION
-  ENSR CONVENTIONAL MONITORING WELL INSTALLED DURING UST REMEDIAL INVESTIGATION

NAPHTHALENE 23/32 ug/l

SEMI-VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER. NUMBERS SEPERATED BY A SLASH (/) INDICATE RESULTS OF FIELD SAMPLE AND DUPLICATE SAMPLE.
 ND = NOT DETECTED
 J = ESTIMATED CONCENTRATION BELOW THE DETECTION LIMIT

SOURCE:

BASE MAP PROVIDED BY NETC NEWPORT

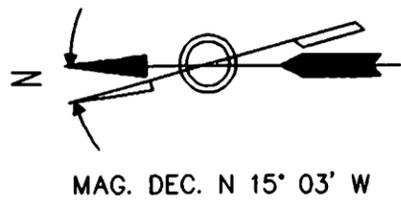


SCALE IN FEET
 1" = 100'-0"

FIGURE 4.1-5

ENSR		
ENSR CONSULTING & ENGINEERING		
SVOC IN GROUNDWATER		
TAYLOR DRIVE AND STRUCTURE 143 INVESTIGATION AREA COASTERS HARBOR ISLAND UST REMEDIAL INVESTIGATION		
DRAWN BY	DATE	PROJECT NO
K.P.B.	1/95	5060-045-720

506087B



- LEGEND**
- BUILDING OR STRUCTURE, PERMANENT
 - ROAD OR PAVED AREA
 - FENCE
 - TRC MONITORING WELL INSTALLED DURING PREVIOUS INVESTIGATION
 - ENSR CONVENTIONAL MONITORING WELL INSTALLED DURING UST REMEDIAL INVESTIGATION
- ARSENIC 24.9/25 ug/l** RCRA 8 METALS IN GROUNDWATER. NUMBERS SEPERATED BY A SLASH (/) INDICATE RESULTS OF FIELD SAMPLE AND DUPLICATE SAMPLE. ND = NOT DETECTED

SOURCE:
BASE MAP PROVIDED BY NETC NEWPORT

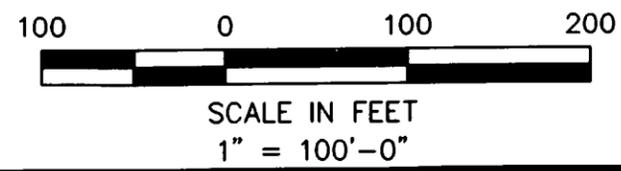
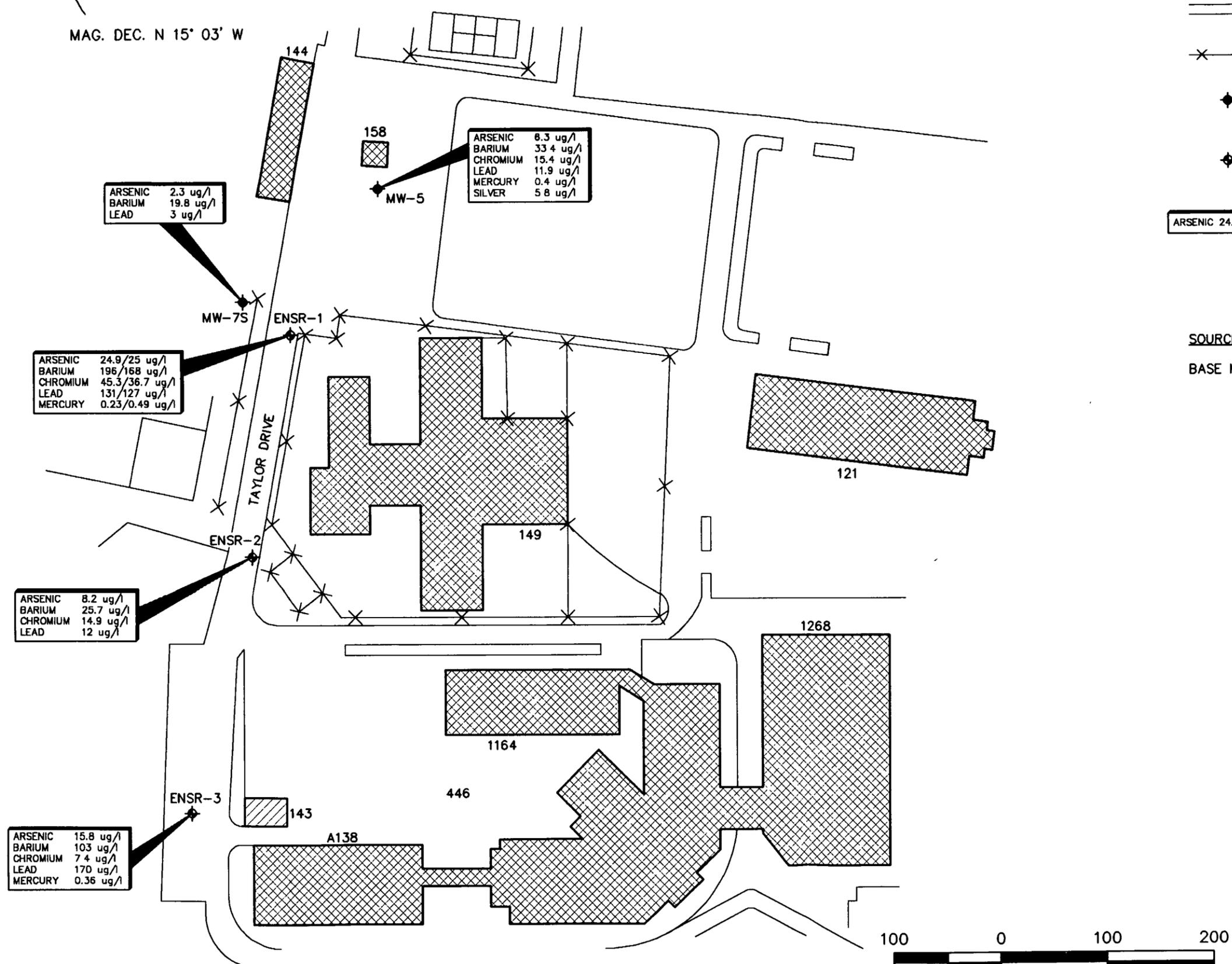


FIGURE 4.1-6

ENSR
ENSR CONSULTING & ENGINEERING

METALS IN GROUNDWATER
TAYLOR DRIVE AND STRUCTURE 143 INVESTIGATION AREA
COASTERS HARBOR ISLAND
UST REMEDIAL INVESTIGATION

DRAWN BY	DATE	PROJECT NO
K.P.B.	1/95	5060-045-720

506088E

TABLE 4.1-2

COASTERS HARBOR ISLAND UST RI/CTO 150
TAYLOR DRIVE AND STRUCTURE 143 INVESTIGATION
TPH (GC/FID) IN GROUNDWATER

WELL ID:	ENSR-1	ENSR-1 dup	ENSR-2	ENSR-3	MW-5	MW-7	SD-17	SD-18	SD-20	SD-20 dup	SD-21
SAMPLE ID:	BW01AA	BW01AB	BW02AA	BW03AA	BWM5AA	BWBFAA	BWS17A	BWS18A	BWS20A	BWS20B	BWS21A
DATE SAMPLED:	08/29/94	08/29/94	08/29/94	08/29/94	08/29/94	08/30/94	08/30/94	08/30/94	08/30/94	08/30/94	08/30/94
LABORATORY ID:	940766-02	940766-02	940766-03	940766-05	940766-06	940767-07	940771-09	940771-10	940771-11	940771-12	940771-13
TPH WATERS (mg/L)											
GASOLINE				1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
DIESEL FUEL	11	9.8	1.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
KEROSENE				1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
JP-4 JET FUEL				1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
JET FUEL A				1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
JP-5 JET FUEL				1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
MOTOR OIL				1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
#2 FUEL OIL				1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
#4 FUEL OIL				1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
#6 FUEL OIL				1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
WASTE OIL				1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

U = Undetected at specified detection limit.

4-10

TABLE 4.1-3

**COASTERS HARBOR ISLAND UST R/VCTO 150
TAYLOR DRIVE AND STRUCTURE 143 INVESTIGATION
VOC's IN GROUNDWATER**

WELL ID:	ENSR-1	ENSR-1 dup	ENSR-2	ENSR-3	MW-5	MW-7
SAMPLE ID:	BW01AA	BW01AB	BW02AA	BW03AA	BWM5AA	BWBFAA
LABORATORY ID:	940766-01	940766-02	940766-04	940766-05	940766-06	940767-07
SAMPLE DATE:	8/29/94	8/29/94	8/29/94	8/29/94	8/29/94	8/30/94
UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
TCL VOLATILES						
Chloromethane	10 U	10 U	10 U	10 U	10 U	10 U
Bromomethane	10 U(b)	10 U	10 U	10 U	10 U	10 U
Vinyl Chloride	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane	10 U	10 U	10 U	10 U	10 U	10 U
Methylene Chloride	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Disulfide	10 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethene	10 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethane	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethane	10 U	10 U	10 U	10 U	10 U	10 U
2-Butanone	10 U	10 U	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Tetrachloride	10 U	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloropropane	10 U	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethene	10 U	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	1 J	1 J	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	10 U
Bromoform	10 U	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	10 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	10 U	10 U	10 U	10 U	10 U	10 U
Styrene	10 U	10 U	10 U	10 U	10 U	10 U
Xylene (total)	10 U	2 J	10 U	10 U	10 U	10 U

U = Undetected at specified detection limit.

J = Estimated value, results less than detection limit.

Dup = Field duplicate sample

**COASTERS HARBOR ISLAND UST RI/CTO 150
TAYLOR DRIVE AND STRUCTURE 143 INVESTIGATION
SVOC's IN GROUNDWATER**

WELL ID:	ENSR-1	ENSR-1 dup	ENSR-2	ENSR-3	MW-5	MW-7
SAMPLE ID:	BW01AA	BW01AB	BW02AA	BW03AA	BWM5AA	BWBFAA
LABORATORY ID:	940766-01	940766-02	940766-04	940766-05	940766-06	940767-07
SAMPLE DATE	8/29/94	8/29/94	8/29/94	8/29/94	8/29/94	8/30/94
UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
TCL SEMIVOLATILES						
PHENOL	20 U	10 U	10 U	10 U	10 U	10 U
BIS(2-CHLOROETHYL)ETHER	20 U	10 U	10 U	10 U	10 U	10 U
2-CHLOROPHENOL	20 U	10 U	10 U	10 U	10 U	10 U
1,3-DICHLOROBENZENE	20 U	10 U	10 U	10 U	10 U	10 U
1,4-DICHLOROBENZENE	20 U	10 U	10 U	10 U	10 U	10 U
1,2-DICHLOROBENZENE	20 U	10 U	10 U	10 U	10 U	10 U
2-METHYLPHENOL	20 U	10 U	10 U	10 U	10 U	10 U
2,2'-OXYBIS(1-CHLOROPROPANE)	20 U	10 U	10 U	10 U	10 U	10 U
4-METHYLPHENOL	20 U	10 U	10 U	10 U	10 U	10 U
N-NITROSO-DI-n-PROPYLAMINE	20 U	10 U	10 U	10 U	10 U	10 U
HEXACHLOROETHANE	20 U	10 U	10 U	10 U	10 U	10 U
NITROBENZENE	20 U	10 U	10 U	10 U	10 U	10 U
ISOPHORONE	20 U	10 U	10 U	10 U	10 U	10 U
2-NITROPHENOL	20 U	10 U	10 U	10 U	10 U	10 U
2,4-DIMETHYLPHENOL	20 U	10 U	10 U	10 U	10 U	10 U
BIS(2-CHLOROETHOXY)METHANE	20 U	10 U	10 U	10 U	10 U	10 U
2,4-DICHLOROPHENOL	20 U	10 U	10 U	10 U	10 U	10 U
1,2,4-TRICHLOROBENZENE	20 U	10 U	10 U	10 U	10 U	10 U
NAPHTHALENE	23	32	10 U	10 U	10 U	10 U
4-CHLOROANILINE	20 U	10 U	10 U	10 U	10 U	10 U
HEXACHLOROBTADIENE	20 U	10 U	10 U	10 U	10 U	10 U
4-CHLORO-3-METHYLPHENOL	20 U	10 U	10 U	10 U	10 U	10 U
2-METHYLNAPHTHALENE	140	48	10 U	10 U	10 U	10 U
HEXACHLOROCYCLOPENTADIENE	20 U	10 U	10 U	10 U	10 U	10 U
2,4,6-TRICHLOROPHENOL	20 U	10 U	10 U	10 U	10 U	10 U
2,4,5-TRICHLOROPHENOL	50 U	25 U	25 U	25 U	25 U	25 U
2-CHLORONAPHTHALENE	20 U	10 U	10 U	10 U	10 U	10 U
2-NITROANILINE	50 U	25 U	25 U	25 U	25 U	25 U
DIMETHYLPHTHALATE	20 U	10 U	10 U	10 U	10 U	10 U
ACENAPHTHYLENE	20 U	10 U	10 U	10 U	10 U	10 U
2,6-DINITROTOLUENE	20 U	10 U	10 U	10 U	10 U	10 U
3-NITROANILINE	50 U	25 U	25 U	25 U	25 U	25 U

TABLE 4.1-4
 COASTERS HARBOR ISLAND UST R/CTO 150
 TAYLOR DRIVE AND STRUCTURE 143 INVESTIGATION
 SVOC's IN GROUNDWATER
 PAGE 2

	WELL ID:	ENSR-1	ENSR-1 dup	ENSR-2	ENSR-3	MW-5	MW-7
	SAMPLE ID:	BW01AA	BW01AB	BW02AA	BW03AA	BWM5AA	BWBFAA
	LABORATORY ID:	940766-01	940766-02	940766-04	940766-05	940766-06	940767-07
	SAMPLE DATE	8/29/94	8/29/94	8/29/94	8/29/94	8/29/94	8/30/94
	UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
	TCL SEMIVOLATILES						
	ACENAPHTHENE	15 J	14	10 U	10 U	10 U	10 U
	2,4-DINITROPHENOL	50 U	25 U	25 U	25 U	25 U	25 U
	4-NITROPHENOL	50 U	25 U	25 U	25 U	25 U	25 U
	DIBENZOFURAN	11 J	12	10 U	10 U	10 U	10 U
	2,4-DINITROTOLUENE	20 U	10 U	10 U	10 U	10 U	10 U
	DIETHYL PHTHALATE	20 U	10 U	10 U	10 U	10 U	10 U
	4-CHLOROPHENYL-PHENYL ETHER	20 U	10 U	10 U	10 U	10 U	10 U
	FLUORENE	17 J	19	10 U	10 U	10 U	10 U
	4-NITROANILINE	50 U	25 U	25 U	25 U	25 U	25 U
	4,6-DINITRO-2-METHYLPHENOL	50 U	25 U	25 U	25 U	25 U	25 U
	N-NITROSODIPHENYLAMINE	20 U	6 J	10 U	10 U	10 U	10 U
	4-BROMOPHENYL-PHENYL ETHER	20 U	10 U	10 U	10 U	10 U	10 U
	HEXACHLOROBENZENE	20 U	10 U	10 U	10 U	10 U	10 U
4-13	PENTACHLOROPHENOL	50 U	25 U	25 U	25 U	25 U	25 U
	PHENANTHRENE	24	18	10 U	10 U	10 U	10 U
	ANTHRACENE	20 U	1 J	10 U	10 U	10 U	10 U
	Di-n-BUTYLPHthalate	20 U	10 U	10 U	10 U	10 U	10 U
	FLUORANTHENE	20 U	10 U	10 U	10 U	10 U	10 U
	CARBAZOLE	20 U	10 U	10 U	10 U	10 U	10 U
	PYRENE	20 U	10 U	10 U	10 U	10 U	10 U
	BUTYLBENZYLPHthalate	20 U	10 U	10 U	10 U	10 U	10 U
	3,3'-DICHLOROBENZIDINE	20 U	10 U	10 U	10 U	10 U	10 U
	BENZO(a)ANTHRACENE	20 U	10 U	10 U	10 U	10 U	10 U
	CHRYSENE	20 U	10 U	10 U	10 U	10 U	10 U
	BIS(2-ETHYLHEXYL)PHthalate	4 J	10 U	1 J	10 U	10 U	10 U
	Di-n-OCTYLPHthalate	20 U	10 U	10 U	10 U	10 U	10 U
	BENZO(b)FLUORANTHENE	20 U	10 U	10 U	10 U	10 U	10 U
	BENZO(k)FLUORANTHENE	20 U	10 U	10 U	10 U	10 U	10 U
	BENZO(a)PYRENE	20 U	10 U	10 U	10 U	10 U	10 U
	INDENO(1,2,3-cd)PYRENE	20 U	10 U	10 U	10 U	10 U	10 U
	DIBENZO(a,h)ANTHRACENE	20 U	10 U	10 U	10 U	10 U	10 U
	BENZO(g,h,i)PERYLENE	20 U	10 U	10 U	10 U	10 U	10 U

U = Undetected at specified detection limit.

J = Estimated value; result less than detection limit.

Dup = Field duplicate sample.

The US EPA Drinking Water Standard MCL for benzene is 5.0 ug/L and for total xylenes is 10,000 ug/L. Neither of these standards were exceeded.

4.1.3.3 SVOC in Groundwater

The only SVOC detections occurred at ENSR-1 and ENSR-2. At ENSR-1, nine SVOC compounds were detected, of which seven were polynuclear aromatic hydrocarbons (PAHs) associated with fuel oil. Total PAH detections were 230 ug/L in the field sample and 144 ug/L in the field duplicate sample. The PAH compound detected at the highest concentration was 2-methylnaphthalene at 140 ug/L in the field sample and 48 ug/L in the field duplicate sample. Non-PAH detections at ENSR-1 totaled 4 ug/L in the field sample and 6 ug/L in the field duplicate sample (both were estimated concentrations below the detection limit). At ENSR-2, the only SVOC detected was bis(2-ethylhexyl)phthalate at an estimated concentration (below the detection limit) of 1.0 ug/L. Bis (2-ethylhexyl)phthalate is frequently associated with laboratory contamination, but was not detected in the field or laboratory blanks analyzed with these samples. Results for this compound less than the contract required detection limit (CRDL) of 10 ug/L, should be used with caution since they may be associated with laboratory "background" levels. Results greater than the CRDL should not be eliminated from consideration, but should be used with discretion. SVOCs were not detected in any of the other groundwater samples collected from the conventional monitoring wells in this area. The analytical results are summarized in Table 4.1-4 and are depicted on Figure 4.1-5.

The US EPA does not presently have Drinking Water Standard MCLs for any of the PAHs or other SVOCs detected at this investigation area.

4.1.3.4 Metals in Groundwater

Arsenic, barium and lead were detected in all of the groundwater samples. Chromium was detected in all of the samples except the one from MW-7. Mercury was only detected at ENSR-1, ENSR-3 and MW-5. Silver was only detected at MW-5. Cadmium and selenium were not detected in any of the samples. In accordance with the Work Plan, the samples were not filtered prior to preservation and some portion of the concentration of metals present may represent metals occurring in sediments inadvertently collected with the water samples. The analytical results are summarized in Table 4.1-5 and are depicted on Figure 4.1-6.

The US EPA Drinking Water Standard MCL for lead (15 ug/L) was exceeded at ENSR-1 (131 ug/L in the field sample and 127 ug/L in the field duplicate sample) and ENSR-3 (170 ug/L). Drinking Water Standard MCLs were not exceeded for any other RCRA 8 metals in any of the other groundwater samples collected from the conventional monitoring wells in this area.

4.1.4 Water Level Measurements

On November 9, 1994, water level measurements were made in all accessible conventional and small-diameter monitoring wells in the vicinity of the Taylor Drive and Structure 143 investigation area, the abandoned fuel oil line investigation area, and the Structure 74 investigation area. The results were used to produce the water table contour map (Figure 3-6).

TABLE 4.1-5

COASTERS HARBOR ISLAND UST RI/CTO 150
TAYLOR DRIVE AND STRUCTURE 143 INVESTIGATION
METALS IN GROUNDWATER

WELL ID:	ENSR-1	ENSR-1 dup	ENSR-2	ENSR-3	MW-5	MW-7	USEPA
SAMPLE ID:	BW01AA	BW01AB	BW02AA	BW03AA	BWM5AA	BWBFAA	DRINKING WATER
LABORATORY ID:	940766-01	940766-02	940766-04	940766-05	940766-06	940767-07	STANDARDS
SAMPLE DATE:	8/29/94	8/29/94	8/29/94	8/29/94	8/29/94	8/30/94	MCLs
UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
ARSENIC	24.9	25.0	8.2	15.8	8.9	2.3	50
BARIUM	196	168	26	103	33	20	2000
CADMIUM	4 U	4 U	4 U	4 U	4 U	4 U	5
CHROMIUM	45.3	36.7	14.9	7.4	15.4	7.0 U	100
LEAD	131	127	12.0	170	11.9	3.0	15
MERCURY	0.23	0.49	0.13 U	0.36	0.40	0.13 U	2
SELENIUM	4 U	4 U	4 U	4 U	4 U	4 U	50
SILVER	4 U	4 U	4 U	4 U	5.8	4 U	100 (secondary)

U = Undetected at specified detection limit.

Dup = Field duplicate sample.

MCL = Maximum Contaminant Level

In the vicinity of the Taylor Drive and Structure 143 investigation area, water level measurements were made in 14 conventional and small diameter monitoring wells. Depth-to-water varied from 7.61 feet bgs at MW-5 to 4.78 feet bgs at MW-4. As illustrated on Figure 3-6, groundwater in this area flows towards the north and northwest and discharges into Narragansett Bay. Free-phase petroleum hydrocarbons were not observed in any of the monitoring wells within this investigation area.

4.1.5 Conclusions

Based on the results of the manhole inspection, the underground utilities at this investigation area do not appear to act as a conduit for the migration of free-phase hydrocarbons. Of the 75 manholes inspected, none contained free-phase petroleum hydrocarbons or petroleum odors. A slight sheen, believed to be related to surface run-off from parking lots and other paved areas was observed in three of the manholes.

Based on the round of water level measurements, it was determined that groundwater flows to the north and northwest. It is assumed that the groundwater eventually discharges into Narragansett Bay. Free-phase petroleum hydrocarbons were not detected in any of the monitoring wells.

The results of the TPH analyses for soil, and groundwater analyses for TPH, VOC and SVOC indicate that a release of petroleum hydrocarbons has occurred in the vicinity of Taylor Drive near the northern side of Structure 149. This release is believed to be related to the historical use of the old FFTA located to the north and northeast of the Taylor Drive investigation area. The conclusion that the old FFTA is the source of subsurface contamination detected along Taylor Drive is based on the following:

- The results of the Phase II Remedial Investigation of the old Fire Fighting Training Area (TRC, 1994) revealed the presence of subsurface petroleum contamination in soils upgradient of the old FFTA in the general vicinity of Taylor Drive. Subsurface soil samples collected by TRC from well borings MW-5 and MW-7 had a petroleum odor and sheen, and contained total SVOC detections of 12,875 ppb and 18,500 ppb respectively. Almost all of the SVOC detected represented PAHs, indicating petroleum contamination.
- The TRC investigation did not establish the limits of contamination in the southwesterly direction (the area now occupied by monitoring wells ENSR-1 and ENSR-2). Subsurface soil samples from the borings for ENSR-1 and ENSR-2 (borings SB-2 and SB-3 respectively) also exhibited a petroleum odor and sheen and contained elevated concentrations of TPH (760 mg/kg and 550 mg/kg respectively). Like MW-5 and MW-7, the groundwater sample from ENSR-1 contained only low to trace concentrations of SVOCs, primarily PAHs.
- Structure 149 does not appear on the list (discussed in Section 1.4) of present and former UST locations at CHI. There were no TPH detections in the seven soil borings conducted south of Structure 149, indicating that a source upgradient of Structure 149, such as Structure 74 or the former filling station at Structure 405 (no longer in existence) is unlikely.
- There were no TPH detections in the groundwater samples obtained from SD-17, SD-18, SD-20, and SD-21 located between Structure 149 and Structure 1164, thus ruling out the possibility of a source to the west of Structure 149.

- The results of the manhol inspection task indicate that the underground utilities are not a conduit for subsurface migration of petroleum hydrocarbons, and the contaminants detected north of Structure 149 were probably not transported there via underground utility trenches.

Dissolved concentrations of TPH, VOC and SVOC in groundwater do not trigger any federal or state MCLs at this time, however, dissolved concentrations of lead in the groundwater exceed the federal Drinking Water Standard MCL at ENSR-1 and further to the west at ENSR-3. There is insufficient data at this time to evaluate potential sources of the elevated lead concentrations in groundwater, however dissolved concentrations of metals are often elevated when petroleum hydrocarbons are present in the groundwater. The reason for this is that petroleum hydrocarbons provide a source of microbiologically available carbon, which stimulates microbial growth when released to the subsurface. The increase in microbial activity often results in a decrease in dissolved oxygen and a corresponding decrease in the Eh of the groundwater. The decrease in Eh can result in the reduction of some metals to a more soluble state (Pannell, Levy; 1993). While this may explain the elevated lead detection at ENSR-1, it does not explain the elevated lead detected at ENSR-3 since that well did not have any TPH detected in the sample collected from it. It is also possible that the elevated concentration of metals in groundwater is the result of high concentrations of metals naturally occurring in soil and/or bedrock at the investigation area. Background samples were not collected during this investigation, therefore a comparison of the investigation area results to background was not made.

The soil samples containing the highest TPH concentrations were obtained from 6-8 feet below pavement. Potential receptors would include construction or utility workers opening an excavation to that depth. Based on headspace measurements (recorded on the boring logs provided in Appendix B), subsurface soils above that depth may also contain TPH at lower concentrations.

Potential receptors of contaminated groundwater are limited by the following:

- No GB groundwater MCLs have been established. Applying the stricter GA standard (which uses the federal Drinking Water MCLs), all of the dissolved contaminants for which MCLs exist, with the exception of lead, occurred below the established MCLs.
- There are no known groundwater wells (other than monitoring wells) in the vicinity of the investigation area and therefore no direct contact by site personnel with contaminated groundwater.
- Although ENSR-1 contained the highest concentrations of dissolved TPH, VOC and SVOC, there were no contaminants detected in downgradient well MW-7 indicating that contamination from this area is probably not migrating to the north at this time.

The quality of the groundwater discharging into Narragansett Bay was not evaluated during this investigation. Therefore it is unknown if the elevated dissolved lead concentration detected at ENSR-3 is migrating into the bay. If contaminated groundwater was discharging to the bay, it would become immediately diluted with the waters of the bay and potential receptors would include humans and environmental organisms in contact with or ingesting organisms that were in contact with waters of the bay.

4.1.6 Recommendations for Further Investigation and/or Corrective Action

The subsurface contamination identified in this investigation area cannot be attributed to any known existing or former UST, but may be related to the historical use of fuel oil and waste oil during fire fighting exercises at the old FFTA located adjacent to this investigation area. This site is being addressed separately under the Installation Restoration Program. No further action is recommended under the UST program.

4.2 ABANDONED FUEL OIL LINE

The objective of the abandoned fuel oil line investigation was to determine if petroleum hydrocarbons were present in the materials used as backfill for the utility trench which contained the former fuel oil line. It was anticipated that the objective would be met through the installation of up to six small-diameter driven wells in the trench backfill materials. During the investigation it was discovered that the utility trench consisted of concrete which was probably poured in place within an excavation made in the till or bedrock. Due to the absence of trench backfill material, and the frequent occurrence of bedrock at or just below the ground surface only two of the six well locations were completed as monitoring wells (SD-1 and SD-2).

4.2.1 Results of Well Installation and Groundwater Analyses

The installation of small-diameter monitoring wells was attempted at the six locations (SD-1 through SD-6) indicated on Figure 4.2-1. These locations were chosen to provide broad coverage along the route of the abandoned fuel oil line which formerly connected Structure 86 and Structure A138. Bedrock was encountered above the water table at four of the six locations (SD-3 through SD-6), preventing the completion of monitoring wells at these locations. Small-diameter wells were successfully installed at locations SD-1 and SD-2.

Groundwater samples were collected from SD-1 and SD-2 and submitted for analysis of TPH (GC/FID) only. The methodology used to install and develop the small-diameter monitoring wells and to collect the groundwater samples is described in Sections 2.4 and 2.5 of this report.

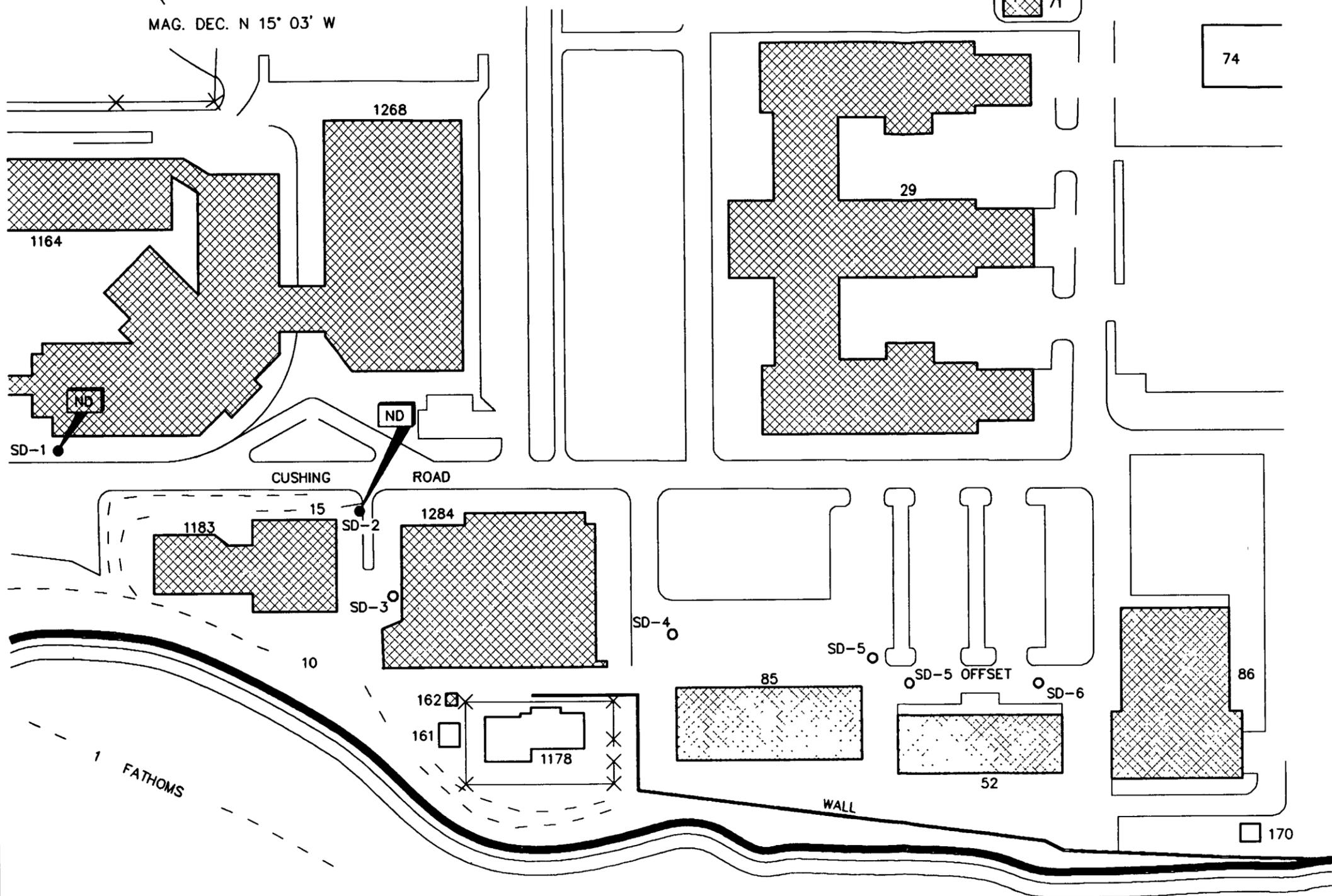
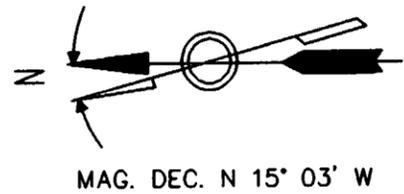
4.2.1.1 TPH in Groundwater

TPH was not detected in groundwater from either SD-1 or SD-2. The analytical results are summarized in Table 4.2-1 and are illustrated on Figure 4.2-1.

4.2.2 Water Level Measurements

On November 9, 1994, water level measurements were made in all accessible conventional and small-diameter monitoring wells in the vicinity of the Taylor Drive and Structure 143 investigation area, the abandoned fuel oil line investigation area, and the Structure 74 investigation area. The results were used to produce the water table contour map (Figure 3-6).

In the abandoned fuel oil line investigation area, water level measurements were made in the two small-diameter monitoring wells (SD-1 and SD-2). Depth-to-water varied from 6.21 feet bgs at SD-1 to 7.65 feet bgs at SD-2. As illustrated on Figure 3-6, groundwater in this area flows to the northwest and presumable



LEGEND

- BUILDING OR STRUCTURE, PERMANENT
- ROAD OR PAVED AREA
- TRAIL OR EARTH ROAD
- FENCE
- SHORE LINE
- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- SPOT GRADE ELEVATION ON SPOT
- ENSR SMALL-DIAMETER MONITORING WELL INSTALLED DURING UST REMEDIAL INVESTIGATION
- ENSR SMALL-DIAMETER MONITORING WELL ATTEMPTED LOCATION, UNABLE TO INSTALL WELL DURING UST REMEDIAL INVESTIGATION
- TOTAL PETROLEUM HYDROCARBONS IN GROUNDWATER BY GC/FID. ND = NOT DETECTED

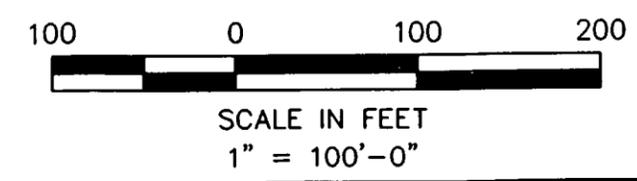
SOURCE:
BASE MAP PROVIDED BY NETC NEWPORT

FIGURE 4.2-1



ENSR CONSULTING & ENGINEERING

TPH IN GROUNDWATER (GC/FID)
ABANDONED FUEL OIL LINE INVESTIGATION AREA
COASTERS HARBOR ISLAND
UST REMEDIAL INVESTIGATION



DRAWN BY	DATE	PROJECT NO
K.P.B.	1/95	5060-045-720

506089B

TABLE 4.2-1

**COASTERS HARBOR ISLAND UST RI/CTO 150
ABANDONED FUEL OIL LINE INVESTIGATION
TPH IN GROUNDWATER**

WELL ID:	SD-1	SD-2
SAMPLE ID:	CWSO1A	CWSO2A
DATE SAMPLED:	08/30/94	08/30/94
LABORATORY ID:	940767-08	940767-09
TPH In Groundwater (mg/L)		
GASOLINE	1 U	1 U
DIESEL FUEL	1 U	1 U
KEROSENE	1 U	1 U
JP-4 JET FUEL	1 U	1 U
JET FUEL A	1 U	1 U
JP-5 JET FUEL	1 U	1 U
MOTOR OIL	1 U	1 U
#2 FUEL OIL	1 U	1 U
#4 FUEL OIL	1 U	1 U
#6 FUEL OIL	1 U	1 U
WASTE OIL	1 U	1 U

U = Undetected at specified detection limit.

discharges into Narragansett Bay. Free-phase petroleum hydrocarbons were not observed in either of the small-diameter monitoring wells within this investigation area.

4.2.3 Conclusions

Petroleum hydrocarbons were not observed in any of the six well locations during well installation. At the two locations where wells were completed and sampled (SD-1 and SD-2), TPH was not detected in either of the two groundwater samples analyzed. A fuel line inspection report provided by the Activity (discussed in Section 1.3.2) stated that much of the fuel oil line was missing, and where it still existed, was corroded, but appeared to be free of any residual fuel oil. The report concluded that removing the small amount of remaining pipe would be unnecessary since there was no evidence of either fuel oil contamination or residual oil in the line.

Based on the data generated during this investigation, the abandoned fuel oil line does not appear to represent a potential source of, or conduit for, subsurface petroleum hydrocarbon contamination.

Based on the round of water level measurements, it was determined that groundwater in the vicinity of monitoring wells SD-1 and SD-2 flows to the northwest. It is assumed that the groundwater eventually discharges into Narragansett Bay.

4.2.4 Recommendations for Further Investigation and/or Corrective Action

Based on the data generated during this investigation, no further investigation or corrective action is recommended for the abandoned fuel oil line.

4.2.5 Potential Remedial Measures

Based on the data generated during this investigation, no remedial measures are necessary for the abandoned fuel oil line.

4.3 Structure 74 and Porter Avenue Investigation

The objective of the Structure 74 and Porter Avenue investigation was to determine the extent of petroleum hydrocarbon release in the vicinity of Structure 74. As described in Section 1.3.2 of this report, previous investigations of Structure 74 had resulted in the identification of free-phase petroleum product in the subsurface north of the structure and the discovery that Structure 74 contained fractures in the floor of the south vault (since repaired). Due to the number of monitoring wells already installed around Structure 74, no additional soil borings or conventional monitoring wells were installed around the structure during this investigation. Two small-diameter monitoring wells were installed along the fuel-oil line between Structure 74 and Porter Avenue, and eight were attempted at several locations adjacent to underground utilities along Porter Avenue and north of Porter Avenue.

4.3.1 Results of Manhole Inspection

As described in Section 2.1 of this report, the objective of the manhole inspection task was to evaluate the potential for subsurface migration of petroleum hydrocarbons through buried utility trenches. This objective was met by opening manhole covers and inspecting the interior of the underground utility chambers for the presence of hydrocarbons. A total of 55 manholes representing storm drains, sewer, electrical and telephone utilities were inspected within a 400-foot radial arc north of Structure 74. The manholes inspected are illustrated on Figure 4.3-1.

Free-phase petroleum product was not observed in any of the manholes. The atmosphere within the manholes was measured with a CGI; the results never exceeded background and no petroleum odors were observed by the field team. A very slight sheen was observed on top of water in one of the utility chambers (MH-16) and was interpreted as surface runoff from a parking lot. Due to the minor nature of the sheen, no samples were collected. Absorbent pads and possible petroleum stains were observed in MH-28 located along the fuel oil line from Structure 74 to Porter Avenue. Because this material was related to a known, well documented release of fuel oil in April of 1989 (Navy, 1989), no samples were collected.

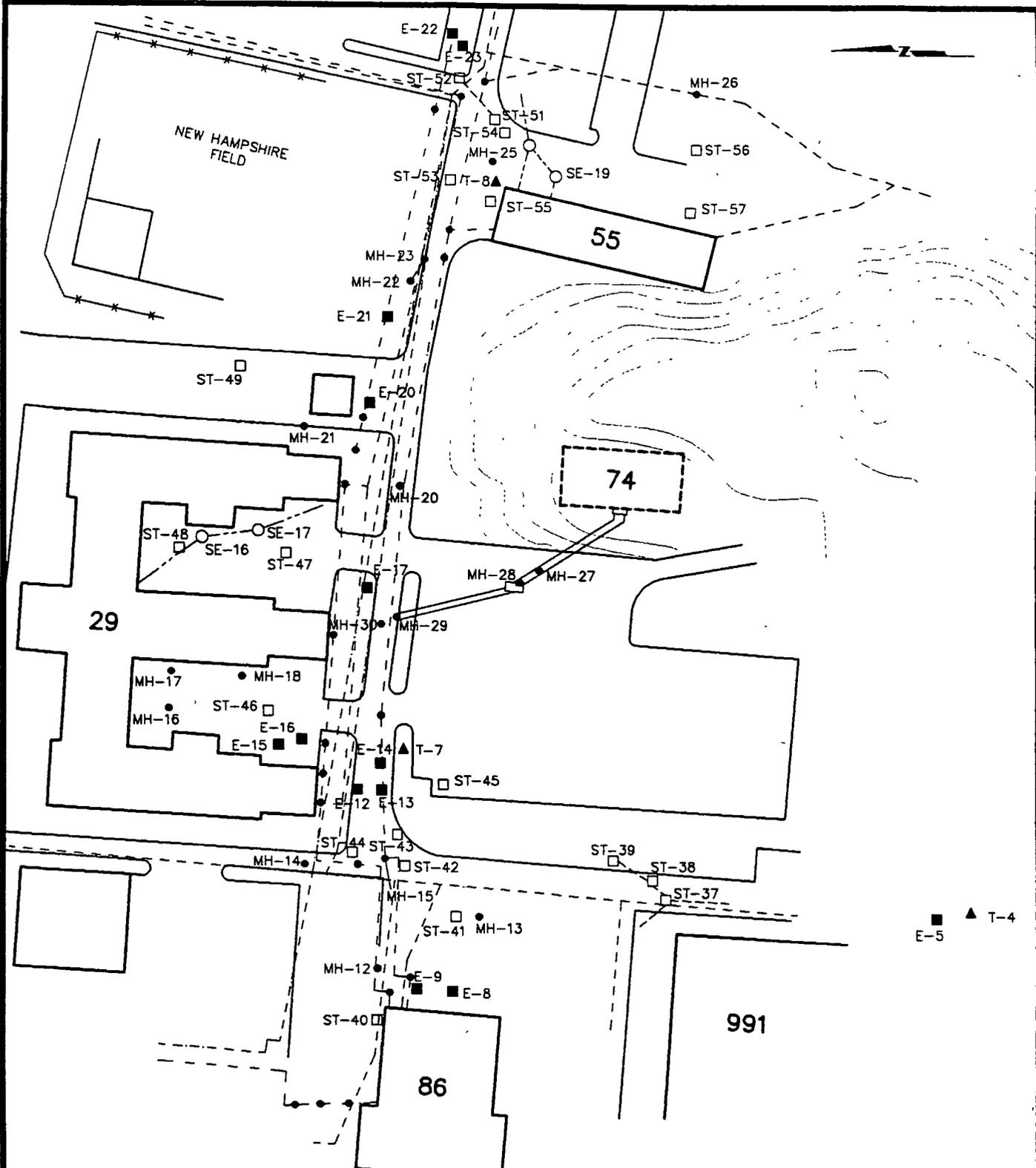
4.3.2 Results of Small-Diameter Well Installation and Groundwater Analyses

Two small-diameter wells (SD-7 and SD-8) were completed as permanent installations along the fuel-oil line between Structure 74 and Porter Avenue. Groundwater samples collected from SD-7 and SD-8 were analyzed for TPH (GC/FID). Samples were also collected from existing monitoring wells installed by others during previous investigations at and in the vicinity of Structure 74. These wells included: MW-101, MW-102, MW-104, MW-105, MW-106, MW-107, MW-108, MW-109, GZ-1, GZ-2 and GZ-3. Groundwater samples collected from MW-101, MW-102, MW-105, MW-106, MW-107, MW-108, GZ-1, GZ-2 and GZ-3 were analyzed for TPH (GC/FID), VOC, SVOC and RCRA 8 metals. A duplicate field sample was collected from MW-105 and submitted for analysis along with the regular field sample. A groundwater sample was also collected from a sump located in the basement entrance to Structure 114 and was analyzed for TPH (GC/FID) only. Product samples collected from MW-104 and MW-109 were analyzed for TPH (GC/FID) only. The methodology used to install and develop the small-diameter monitoring wells, and to collect the groundwater samples, is described in Sections 2.4 and 2.5 of this report.

The following sub-sections summarize the results of groundwater analyses for TPH, VOC, SVOC and RCRA 8 metals and include federal and state standards for MCLs. RIDEM uses the US EPA Drinking Water Standard MCLs for sites which have groundwater classified as GA. For sites where groundwater is classified as GB, RIDEM has no published standards for MCLs, but instead examines the sites on a case-by-case basis (personal communication 11/7/94). As discussed in Section 3.3 of this report, groundwater at all of NETC Newport is classified as GB and the US EPA Drinking Water Standard MCLs do not apply. However, in the absence of any published RIDEM groundwater MCLs for GB-classified sites, the US EPA MCLs have been included for discussion purposes.

4.3.2.1 TPH in Groundwater

The only TPH detections in groundwater occurred at MW-101 (5.5 mg/L), MW-107 (3.6 mg/L), MW-108 (28 mg/L), SD-7 (2.1 mg/L) and SD-8 (3.4 mg/L). The fingerprint analysis of TPH was reported by the



LEGEND

- MH-1 ● STEAM-LINE/OTHER MISC. MANHOLE NUMBERS
- SE-1 ○ SEWER MANHOLE NUMBER
- E-1 ■ ELECTRIC MANHOLE NUMBER
- ST-1 □ STORM DRAIN MANHOLE NUMBER
- T-1 ▲ TELEPHONE MANHOLE NUMBER

- - - - STEAM LINE
- SEWER LINE
- STORM DRAIN LINE
- - - - WATER LINE

NOTE

MAP BASED ON UTILITY PLANS SUPPLIED BY NETC NEWPORT AND FIELD OBSERVATIONS. LOCATION OF UTILITY LINES AND MANHOLES ARE APPROXIMATE PLANS FOR TELEPHONE AND ELECTRIC UTILITIES WERE UNAVAILABLE AT THE TIME THIS MAP WAS PREPARED. UNLABELED MANHOLES WERE NOT OPENED DURING THE MANHOLE INSPECTION TASK.

SCALE: 1" = 125'-0"

FIGURE 4.3-1

ENSR		
ENSR CONSULTING & ENGINEERING		
MANHOLE INSPECTION MAP STRUCTURE 74 INVESTIGATION AREA COASTERS HARBOR ISLAND UST REMEDIAL INVESTIGATION		
DRAWN BY	DATE	PROJECT NO
J.E.B.	1/95	5060-045

506037A

laboratory as most closely matching diesel fuel at MW-107, MW-108, SD-7 and SD-8. As discussed in Section 2.8, it is the Halliburton NUS Team's opinion that, due to similarities between standard chromatograms, the TPH reported in these samples is most likely No. 4 fuel oil. The TPH at MW-101 was interpreted by the laboratory as motor oil. TPH was not detected at any of the other conventional or small diameter monitoring wells or in the Structure 114 sump. The analytical results are summarized in Table 4.3-1 and are depicted on Figure 4.3-2.

The US EPA does not presently have a Drinking Water Standard MCL for TPH.

4.3.2.2 VOC in Groundwater

The only VOC detections occurred at MW-101 and MW-108. At MW-101, styrene was detected at 11 ug/L. At MW-108, carbon disulfide was detected at an estimated concentration (below the detection limit) of 5.0 ug/L and toluene was detected at an estimated concentration (below the detection limit) of 4.0 ug/L. There were no other VOCs detected in any of the other groundwater samples collected in this area. The analytical results are summarized in Table 4.3-2 and are depicted on Figure 4.3-3.

The US EPA Drinking Water Standard MCL for styrene is 100 ug/L; for toluene the MCL is 1000 ug/L. Neither of these standards were exceeded. There is no US EPA Drinking Water Standard MCL for carbon disulfide at present.

4.3.2.3 SVOC in Groundwater

The only SVOC detections occurred at MW-101, MW-106, MW-107 and MW-108. At MW-101 and MW-106, the only SVOC compound detected was bis(2-ethylhexyl)phthalate at an estimated concentration (below the detection limit) of 3.0 ug/L at MW-101 and 4.0 ug/L at MW-106. At MW-107 a total of seven SVOC compounds were detected, six of which were polynuclear aromatic hydrocarbons (PAHs) associated with fuel oil. Total PAH detections were 38 ug/L. The PAH compound detected at the highest concentration was 2-methylnaphthalene at 23 ug/L. The remaining PAHs were all detected at trace estimated concentrations below the detection limit. The only non-PAH compound detected at MW-107 was bis(2-ethylhexyl)phthalate at 28 ug/L. At MW-108, two SVOC compounds were detected at estimated concentrations below the detection limit, both of which were PAHs: 2-methylnaphthalene at an estimated concentration (below the detection limit) of 42 ug/L and phenanthrene at 20 ug/L. Bis(2-ethylhexyl)phthalate is frequently associated with laboratory contamination, but was not detected in field or laboratory blanks analyzed with these samples. Results for this compound less than the CRDL of 10 ug/L, should be used with caution since they may be associated with laboratory "background" labels. Results greater than the CRDL should not be eliminated from consideration, but should be used with discretion. SVOCs were not detected in any of the other groundwater samples collected in this area. The analytical results are summarized in Table 4.3-3 and are depicted on Figure 4.3-4.

The US EPA does not presently have Drinking Water Standard MCLs for any of the PAHs or other SVOCs detected at this investigation area.

TABLE 4.3-1

COASTERS HARBOR ISLAND UST RI/CTO 150
STRUCTURE 74 INVESTIGATION
TPH (GC/FID) IN GROUNDWATER

WELL ID:	MW-101	MW-102	MW-105	MW-105 dup	MW-106	MW-107	MW-108	GZ-1	GZ-2	GZ-3
SAMPLE ID:	AW101A	AW102A	AW105A	AW105B	AGZAAA	AGZABA	AGZACA	AGW1AA	AGW2AA	AGW3AA
DATE SAMPLED:	08/30/94	08/30/94	08/31/94	08/31/94	08/31/94	08/31/94	08/31/94	09/01/94	09/01/94	09/01/94
LABORATORY ID:	940771-03	940771-04	940771-06	940771-07	940771-01	940771-02	940777-1	940767-01	940767-02	940767-03
TPH in Groundwater (mg/L)										
GASOLINE		1 U	1 U	1 U	1 U			1 U	1 U	1 U
DIESEL FUEL		1 U	1 U	1 U	1 U	3.6	28	1 U	1 U	1 U
KEROSENE		1 U	1 U	1 U	1 U			1 U	1 U	1 U
JP-4 JET FUEL		1 U	1 U	1 U	1 U			1 U	1 U	1 U
JET FUEL A		1 U	1 U	1 U	1 U			1 U	1 U	1 U
JP-5 JET FUEL		1 U	1 U	1 U	1 U			1 U	1 U	1 U
MOTOR OIL	5.5	1 U	1 U	1 U	1 U			1 U	1 U	1 U
#2 FUEL OIL		1 U	1 U	1 U	1 U			1 U	1 U	1 U
#4 FUEL OIL		1 U	1 U	1 U	1 U			1 U	1 U	1 U
#6 FUEL OIL		1 U	1 U	1 U	1 U			1 U	1 U	1 U
WASTE OIL		1 U	1 U	1 U	1 U			1 U	1 U	1 U

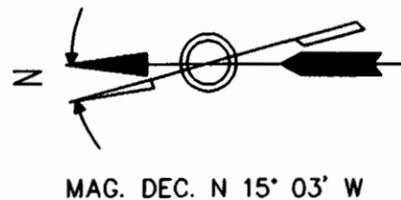
U = Undetected at specified detection limit.

4-25

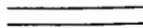
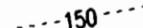
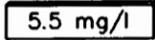
**TABLE 4.3-1
 COASTERS HARBOR ISLAND UST R/CTO 150
 STRUCTURE 74 INVESTIGATION
 TPH (GC/FID) IN GROUNDWATER
 PAGE 2**

	WELL ID:	SD-7	SD-8	Bldg 114 Sump
	SAMPLE ID:	AWS07A	AWS08A	ASU01A
	DATE SAMPLED:	08/30/94	08/30/94	08/30/94
	LABORATORY ID:	940767-05	940767-06	940771-08
TPH in Groundwater (mg/L)				
GASOLINE				1 U
DIESEL FUEL		2.1	3.4	1 U
KEROSENE				1 U
JP-4 JET FUEL				1 U
JET FUEL A				1 U
JP-5 JET FUEL				1 U
MOTOR/LUBE OIL				1 U
#2 FUEL OIL				1 U
#4 FUEL OIL				1 U
#6 FUEL OIL				1 U
WASTE OIL				1 U

U = Undetected at specified detection limit.

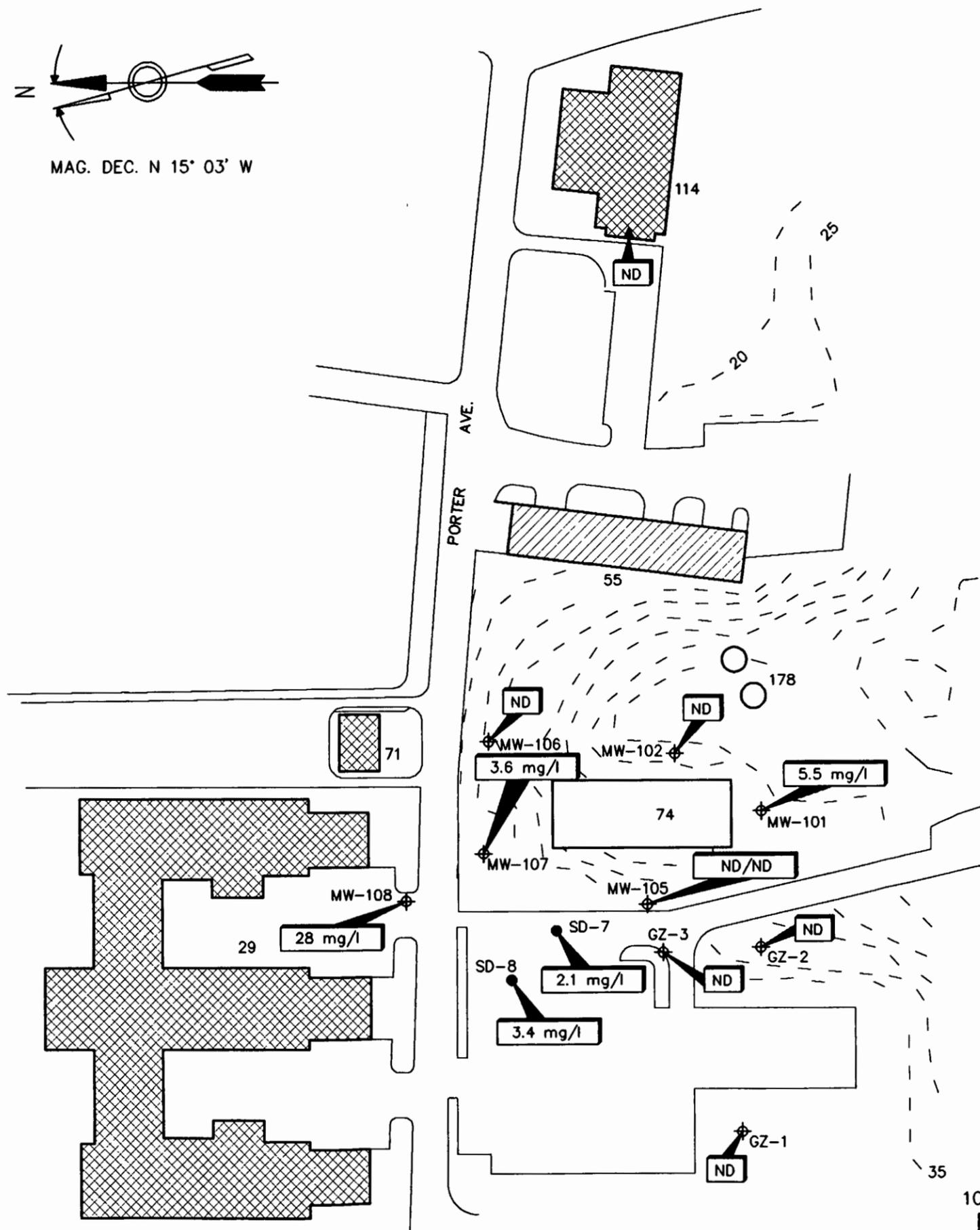


LEGEND

-  BUILDING OR STRUCTURE, PERMANENT
-  BUILDING OR STRUCTURE, TEMPORARY
-  ROAD OR PAVED AREA
-  INDEX CONTOUR
-  INTERMEDIATE CONTOUR
-  SPOT GRADE ELEVATION ON SPOT
-  GZA MONITORING WELL INSTALLED DURING PREVIOUS INVESTIGATIONS
-  ENSR SMALL-DIAMETER MONITORING WELL INSTALLED DURING UST REMEDIAL INVESTIGATION
-  SUMP AT STRUCTURE 114
-  TOTAL PETROLEUM HYDROCARBONS IN GROUNDWATER BY GC/FID. ND/ND INDICATES RESULTS OF FIELD SAMPLE AND DUPLICATE SAMPLE. ND = NOT DETECTED

SOURCE:

BASE MAP PROVIDED BY NETC NEWPORT



SCALE IN FEET
1" = 100'-0"

FIGURE 4.3-2

ENSR		
ENSR CONSULTING & ENGINEERING		
TPH IN GROUNDWATER (GC/FID)		
STRUCTURE 74 INVESTIGATION AREA COASTERS HARBOR ISLAND UST REMEDIAL INVESTIGATION		
DRAWN BY	DATE	PROJECT NO
K.P.B.	1/95	5060-045-720

**COASTERS HARBOR ISLAND UST R/CTO 150
STRUCTURE 74 INVESTIGATION
VOC's IN GROUNDWATER**

WELL ID:	MW-101	MW-102	MW-105	MW-105 dup	MW-106	MW-107	MW-108	GZ-1	GZ-2	GZ-3
SAMPLE ID:	AW101A	AW102A	AW105A	AW105B	AGZAAA	AGZABA	AGZACA	AWG1AA	AWG2AA	AWG3AA
LABORATORY ID:	940771-03	940771-04	940771-06	940771-07	940771-01	940771-02	940777-01	940767-01	940767-02	940767-03
SAMPLE DATE:	8/30/94	8/30/94	8/31/94	8/31/94	8/31/94	8/31/94	8/31/94	8/30/94	8/30/94	8/30/94
UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
TCL VOLATILES										
Chloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromomethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl Chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethan	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylene Chloride	14 U(b)	10 U	10 U	10 U	10 U	10 U	10 U(b)	10 U	10 U	10 U
Acetone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Disulfide	10 U	10 U	10 U	10 U	10 U	10 U	5 J	10 U	10 U	10 U
1,1-Dichloroethene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloro thane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Butanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbon T trachloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloropropane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichloro thene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromoform	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Styrene	11	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Xylene (total)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

U = Undetected at specified detection limit.
 U(b) = Undetected at specified detection limit due to blank contamination.
 J = Estimated value; results less than detection limit.
 Dup = Field duplicate sample.

4-28

ORCA

COASTERS HARBOR ISLAND UST R/VCTO 150
STRUCTURE 74 INVESTIGATION
SVOC'S IN GROUNDWATER

WELL ID:	MW-101	MW-102	MW-105	MW-105 dup	MW-106	MW-107	MW-108	GZ-1	GZ-2	GZ-3
SAMPLE ID:	AW101A	AW102A	AW105A	AW105B	AGZAAA	AGZABA	AGZACA	AWG1AA	AWG2AA	AWG3AA
LABORATORY ID:	840771-03	840771-04	840771-06	840771-07	840771-01	840771-02	840777-01	840787-01	840787-02	840787-03
SAMPLE DATE:	8/30/94	8/30/94	8/31/94	8/31/94	8/31/94	8/31/94	9/1/94	8/30/94	8/30/94	8/30/94
UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
TCL SEMIVOLATILES										
PHENOL	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
BIS(2-CHLOROETHYL)ETHER	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
2-CHLOROPHENOL	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
1,3-DICHLOROBENZENE	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
1,4-DICHLOROBENZENE	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
1,2-DICHLOROBENZENE	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
2-METHYLPHENOL	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
2,2-OXYBIS(1-CHLOROPROPANE)	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
4-METHYLPHENOL	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
N-NITROSO-DI-N-PROPYLAMINE	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
HEXACHLOROETHANE	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
NITROBENZENE	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
ISOPHORONE	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
2-NITROPHENOL	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
2,4-DIMETHYLPHENOL	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
BIS(2-CHLOROETHOXY)METHANE	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
2,4-DICHLOROPHENOL	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
1,2,4-TRICHLOROBENZENE	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
NAPHTHALENE	10 U	10 U	10 U	10 U	10 U	5 J	100 U	10 U	10 U	10 U
4-CHLOROANILINE	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
HEXACHLOROBTADIENE	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
4-CHLORO-3-METHYLPHENOL	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
2-METHYLNAPHTHALENE	10 U	10 U	10 U	10 U	10 U	23	42 J	10 U	10 U	10 U
HEXACHLOROCYCLOPENTADIENE	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
2,4,6-TRICHLOROPHENOL	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
2,4,5-TRICHLOROPHENOL	25 U	25 U	25 U	25 U	25 U	25 U	250 U	25 U	25 U	25 U
2-CHLORONAPHTHALENE	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
2-NITROANILINE	25 U	25 U	25 U	25 U	25 U	25 U	250 U	25 U	25 U	25 U
DIMETHYLPHTHALATE	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
ACENAPHTHYLENE	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
2,6-DINITROTOLUENE	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
3-NITROANILINE	25 U	25 U	25 U	25 U	25 U	25 U	250 U	25 U	25 U	25 U

4-30

TABLE 4.3-3
 COASTERS HARBOR ISLAND UST RI/CTO 150
 STRUCTURE 74 INVESTIGATION
 SVOC'S IN GROUNDWATER
 PAGE 2

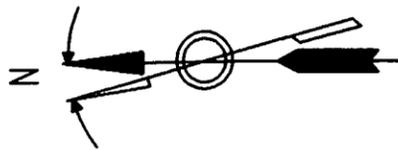
	WELL ID:	MW-101	MW-102	MW-105	MW-105 dup	MW-108	MW-107	MW-108	GZ-1	GZ-2	GZ-3
	SAMPLE ID:	AW101A	AW102A	AW105A	AW105B	AGZAAA	AGZABA	AGZACA	AWG1AA	AWG2AA	AWG3AA
	LABORATORY ID:	940771-03	940771-04	940771-06	940771-07	940771-01	940771-02	940777-01	940787-01	940787-02	940787-03
	SAMPLE DATE:	8/30/94	8/30/94	8/31/94	8/31/94	8/31/94	8/31/94	9/1/94	8/30/94	8/30/94	8/30/94
	UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
ACENAPHTHENE		10 U	10 U	10 U	10 U	10 U	2 J	100 U	10 U	10 U	10 U
2,4-DINITROPHENOL		25 U	25 U	25 U	25 U	25 U	25 U	250 U	25 U	25 U	25 U
4-NITROPHENOL		25 U	25 U	25 U	25 U	25 U	25 U	250 U	25 U	25 U	25 U
DIBENZOFURAN		10 U	10 U	10 U	10 U	10 U	2 J	100 U	10 U	10 U	10 U
2,4-DINITROTOLUENE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
DIETHYL PHTHALATE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
4-CHLOROPHENYL-PHENYL ETHER		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
FLUORENE		10 U	10 U	10 U	10 U	10 U	3 J	100 U	10 U	10 U	10 U
4-NITROANILINE		25 U	25 U	25 U	25 U	25 U	25 U	250 U	25 U	25 U	25 U
4,6-DINITRO-2-METHYLPHENOL		25 U	25 U	25 U	25 U	25 U	25 U	250 U	25 U	25 U	25 U
N-NITROSODIPHENYLAMINE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
4-BROMOPHENYL-PHENYL ETHER		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
HEXACHLOROBENZENE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
PENTACHLOROPHENOL		25 U	25 U	25 U	25 U	25 U	25 U	250 U	25 U	25 U	25 U
PHENANTHRENE		10 U	10 U	10 U	10 U	10 U	3 J	20 J	10 U	10 U	10 U
ANTHRACENE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
Di-n-BUTYLPHTHALATE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
FLUORANTHENE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
CARBAZOLE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
PYRENE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
BUTYLBENZYLPHTHALATE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
3,3'-DICHLOROBENZIDINE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
BENZO(a)ANTHRACENE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
CHRYSENE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
BIS(2-ETHYLHEXYL)PHTHALATE		3 J	10 U	10 U	10 U	4 J	28	100 U	10 U	10 U	10 U
Di-n-OCTYLPHTHALATE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
BENZO(b)FLUORANTHENE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
BENZO(k)FLUORANTHENE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
BENZO(a)PYRENE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
INDENO(1,2,3-cd)PYRENE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
DIBENZO(a,h)ANTHRACENE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U
BENZO(g,h,i)PERYLENE		10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U

U = Undetected at specified detection limit.

J = Estimated value; results less than detection limit.

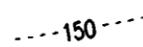
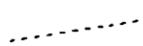
Dup = Field duplicate sample.

4-31



MAG. DEC. N 15° 03' W

LEGEND

-  BUILDING OR STRUCTURE, PERMANENT
-  BUILDING OR STRUCTURE, TEMPORARY
-  ROAD OR PAVED AREA
-  INDEX CONTOUR
-  INTERMEDIATE CONTOUR
-  14 SPOT GRADE ELEVATION ON SPOT
-  GZA MONITORING WELL INSTALLED DURING PREVIOUS INVESTIGATIONS

BIS(2-ETHYLHEXYL)PHTHALATE 3(J) ug/l

SEMI-VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER. ND/ND INDICATES RESULTS OF FIELD SAMPLE AND DUPLICATE SAMPLE. ND = NOT DETECTED
J = ESTIMATED CONCENTRATION BELOW THE DETECTION LIMIT

SOURCE:

BASE MAP PROVIDED BY NETC NEWPORT

BIS(2-ETHYLHEXYL)PHTHALATE 28 ug/l
2-METHYLNAPHTHALENE 23 ug/l
NAPHTHALENE 5 (J)
FLUORENE 3 (J)
PHENANTHRENE 3 (J)
DIBENZOFURAN 2 (J)
ACENAPHTHENE 2 (J)

BIS(2-ETHYLHEXYL)PHTHALATE 4(J) ug/l

178

ND

BIS(2-ETHYLHEXYL)PHTHALATE 3(J) ug/l

MW-101

ND/ND

MW-105

GZ-3

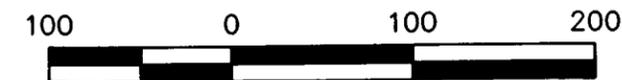
ND

GZ-2

ND

GZ-1

35



SCALE IN FEET
1" = 100'-0"

FIGURE 4.3-4



ENSR CONSULTING & ENGINEERING

SVOC IN GROUNDWATER
STRUCTURE 74 INVESTIGATION AREA
COASTERS HARBOR ISLAND
UST REMEDIAL INVESTIGATION

DRAWN BY	DATE	PROJECT NO
K.P.B.	1/95	5060-045-720

506092B

4.3.2.4 Metals in Groundwater

Arsenic was detected at seven of the nine locations with the highest concentration occurring at MW-107 (15.8 ug/L). Barium was detected in all of the groundwater samples with the highest concentration occurring at MW-101 (73.1 ug/L). Chromium was detected at MW-108 only (8.4 ug/L). Lead was detected at 7 locations with the highest concentration occurring at MW-108 (14.8 ug/L). Mercury was only detected at GZ-1 (0.18 ug/L). Silver was only detected at MW-107 (4.2 ug/L) and MW-108 (8.2 ug/L). Cadmium and selenium were not detected in any of the samples. The analytical results are summarized in Table 4.3-4 and are depicted on Figure 4.3-5.

US EPA Drinking Water Standard MCLs were not exceeded for any of the RCRA 8 metals in groundwater samples collected from this area. However, the MCL for lead (15 ug/L) was closely approached at MW-108 (14.8 ug/L) and GZ-1 (13.3 ug/L).

4.3.3 TPH in Product Samples

Monitoring wells MW-104 and MW-109 contained sufficient free-phase petroleum hydrocarbons on top of the water table to allow the collection of a free product sample. The product samples were analyzed for TPH (GC/FID) only. In accordance with the Work Plan, a groundwater sample was not collected from either of these two wells.

TPH detection in the product sample from MW-104 was 9,200 mg/kg. The TPH detection in the product sample from MW-109 was 510,000 mg/kg. The fingerprint analysis of TPH was reported by the laboratory as most closely matching diesel fuel. As discussed in Section 2.8, it is the Halliburton NUS Team's opinion that, due to similarities between standard chromatograms, the TPH reported in these samples is most likely No. 4 fuel oil. Although free-phase petroleum hydrocarbons were also observed in monitoring wells MW-107, MW-108 and SD-8 at the time of sampling, there was insufficient free-product in these other monitoring wells to allow for the collection of product samples. The analytical results are summarized in Table 4.3-5 and are depicted on Figure 4.3-6.

4.3.4 Water Level and Product Thickness Measurements

On November 9, 1994, water level and product thickness measurements were made in all accessible conventional and small-diameter monitoring wells in the vicinity of the Taylor Drive and Structure 143 investigation area, the abandoned fuel oil line investigation area, and the Structure 74 investigation area. The results were used to produce the water table contour map (Figure 3-6).

In the vicinity of Structure 74, water level and product thickness measurements were made in 13 conventional and small-diameter monitoring wells. Depth-to-water varied from 7.87 feet bgs at SD-7 to 28.29 feet bgs at MW-102. As illustrated on Figure 3-6, groundwater in this area flows from the south to the northwest, north and northeast.

During the round of water level and product thickness measurements, free-phase petroleum hydrocarbons were observed on top of the water table in the following four monitoring wells within this investigation area: MW-104 (thickness of 0.31 feet), MW-107 (thickness of 0.03 feet), MW-108 (thickness of 0.08 feet), and

TABLE 4.3-4

COASTERS HARBOR ISLAND UST RI/CTO 150
STRUCTURE 74 INVESTIGATION
METALS IN GROUNDWATER

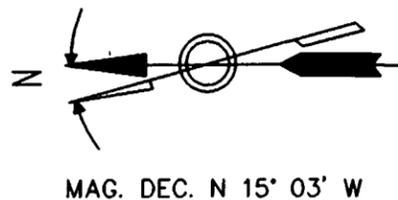
WELL ID:	MW-101	MW-102	MW-105	MW-105 dup	MW-106	MW-107	MW-108	GZ-1	GZ-2	GZ-3	USEPA
SAMPLE ID:	AW101A	AW102A	AW105A	AW105B	AGZAAA	AGZABA	AGZACA	AWG1AA	AWG2AA	AWG3AA	DRINKING WATER
LABORATORY ID:	840771-03	840771-04	840771-06	840771-07	840771-01	840771-02	840771-01	840767-01	840767-02	840767-03	STANDARDS
SAMPLE DATE:	8/30/94	8/30/94	8/31/94	8/31/94	8/31/94	8/31/94	8/31/94	8/30/94	8/30/94	8/30/94	MCL
UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
ARSENIC	3.5	2.0 U	2.6	3.2	2.2	15.8	12.7	9.4	2.0 U	3.7	50
BARIIUM	73.1	25.1	16.9	15.7	7.5	55.8	44.8	35.9	21.5	53.2	2000
CADIUM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	5
CHR MIUM	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	8.4	7.0 U	7.0 U	7.0 U	100
LEAD	3.7	1.2	1.0 U	1.0 U	1.0 U	4.8	14.8	13.3	1.4	5.7	15
MERCURY	0.13 U	0.13 U	0.14 U	0.14 U	0.13 U	0.13 U	0.13 U	0.18	0.14 U	0.13 U	2
SELENIUM	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	50
SILVER	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.2	8.2	4.0 U	4.0 U	4.0 U	100 (sec ndary)

U = Undetected at specified detection limit.

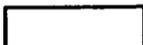
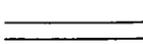
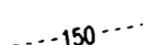
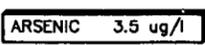
Dup = Field duplicate sample.

MCL = Maximum Contaminant Level.

4-34



LEGEND

-  BUILDING OR STRUCTURE, PERMANENT
-  BUILDING OR STRUCTURE, TEMPORARY
-  ROAD OR PAVED AREA
-  INDEX CONTOUR
-  INTERMEDIATE CONTOUR
-  SPOT GRADE ELEVATION ON SPOT
-  GZA MONITORING WELL INSTALLED DURING PREVIOUS INVESTIGATIONS
-  RCRA 8 METALS IN GROUNDWATER. NUMBERS SEPERATED BY A SLASH (/) INDICATE RESULTS OF FIELD SAMPLE AND DUPLICATE SAMPLE.

SOURCE:

BASE MAP PROVIDED BY NETC NEWPORT

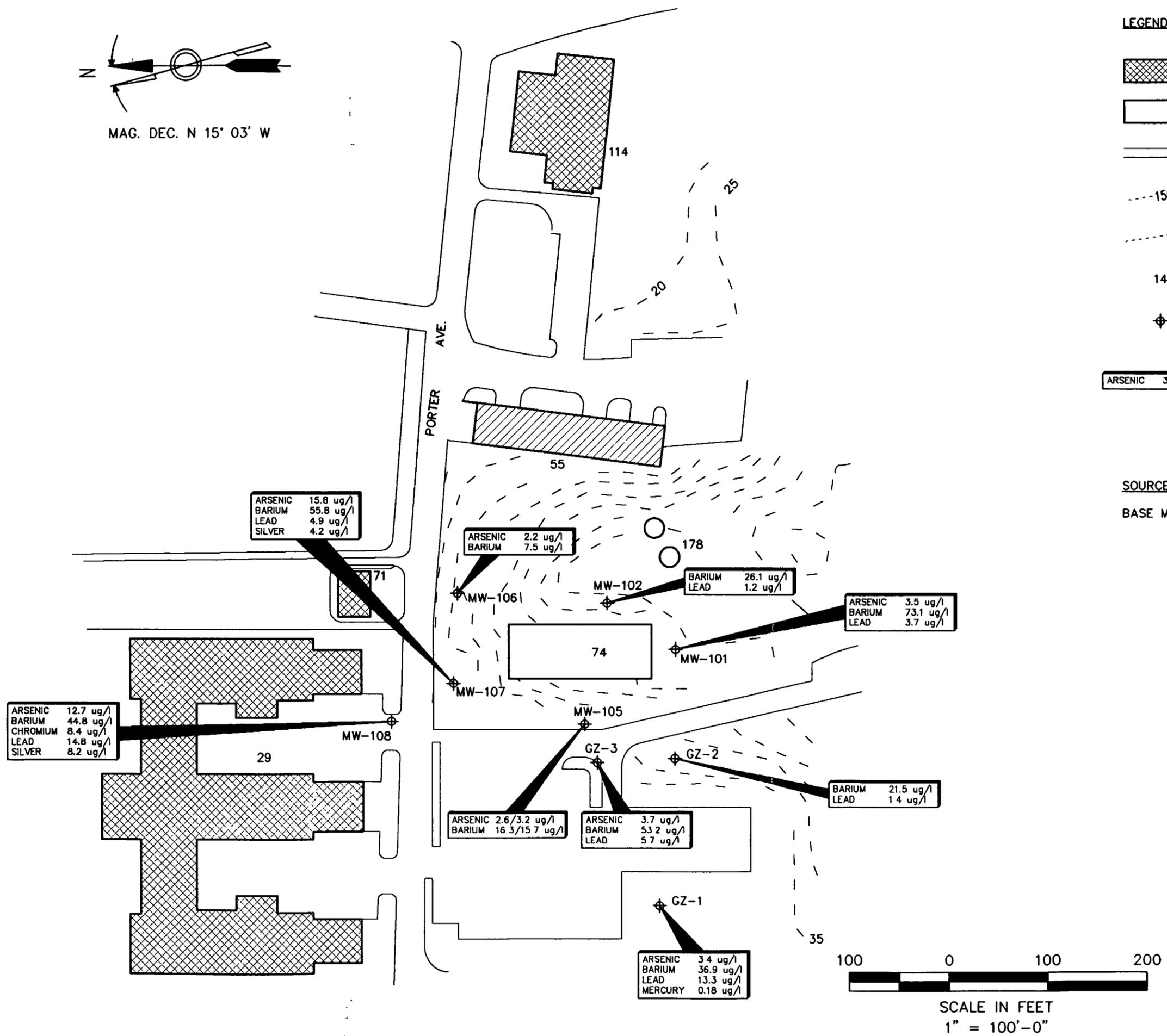


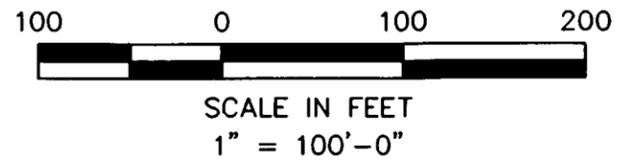
FIGURE 4.3-5



ENSR
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METALS IN GROUNDWATER
STRUCTURE 74 INVESTIGATION AREA
COASTERS HARBOR ISLAND
UST REMEDIAL INVESTIGATION

DRAWN BY	DATE	PROJECT NO
K.P.B.	1/95	5060-045-720

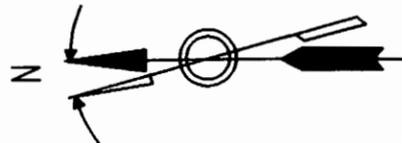


506093B

TABLE 4.3-5

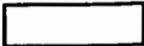
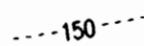
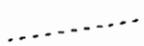
COASTERS HARBOR ISLAND UST RI/CTO 150
 STRUCTURE 74 INVESTIGATION
 TPH (GC/FID) IN PRODUCT

WELL ID:	MW-104	MW-109
SAMPLE ID:	AW103A	AW104A
DATE SAMPLED:	09/01/94	08/31/94
LABORATORY ID:	940777-14	940771-05
TPH in PRODUCT (mg/Kg)		
GASOLINE		
DIESEL FUEL	9,200	510,000
KEROSENE		
JP-4 JET FUEL		
JET FUEL A		
JP-5 JET FUEL		
MOTOR OIL		
#2 FUEL OIL		
#4 FUEL OIL		
#6 FUEL OIL		
JP-5		



MAG. DEC. N 15° 03' W

LEGEND

-  BUILDING OR STRUCTURE, PERMANENT
-  BUILDING OR STRUCTURE, TEMPORARY
-  ROAD OR PAVED AREA
-  INDEX CONTOUR
-  INTERMEDIATE CONTOUR
-  14 SPOT GRADE ELEVATION ON SPOT
-  GZA MONITORING WELL INSTALLED DURING PREVIOUS INVESTIGATIONS
-  ENSR SMALL-DIAMETER MONITORING WELL INSTALLED DURING UST REMEDIAL INVESTIGATION
-  TOTAL PETROLEUM HYDROCARBONS IN FLOATING PRODUCT (GC/FID).

SOURCE:

BASE MAP PROVIDED BY NETC NEWPORT

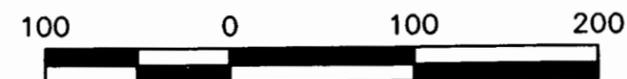
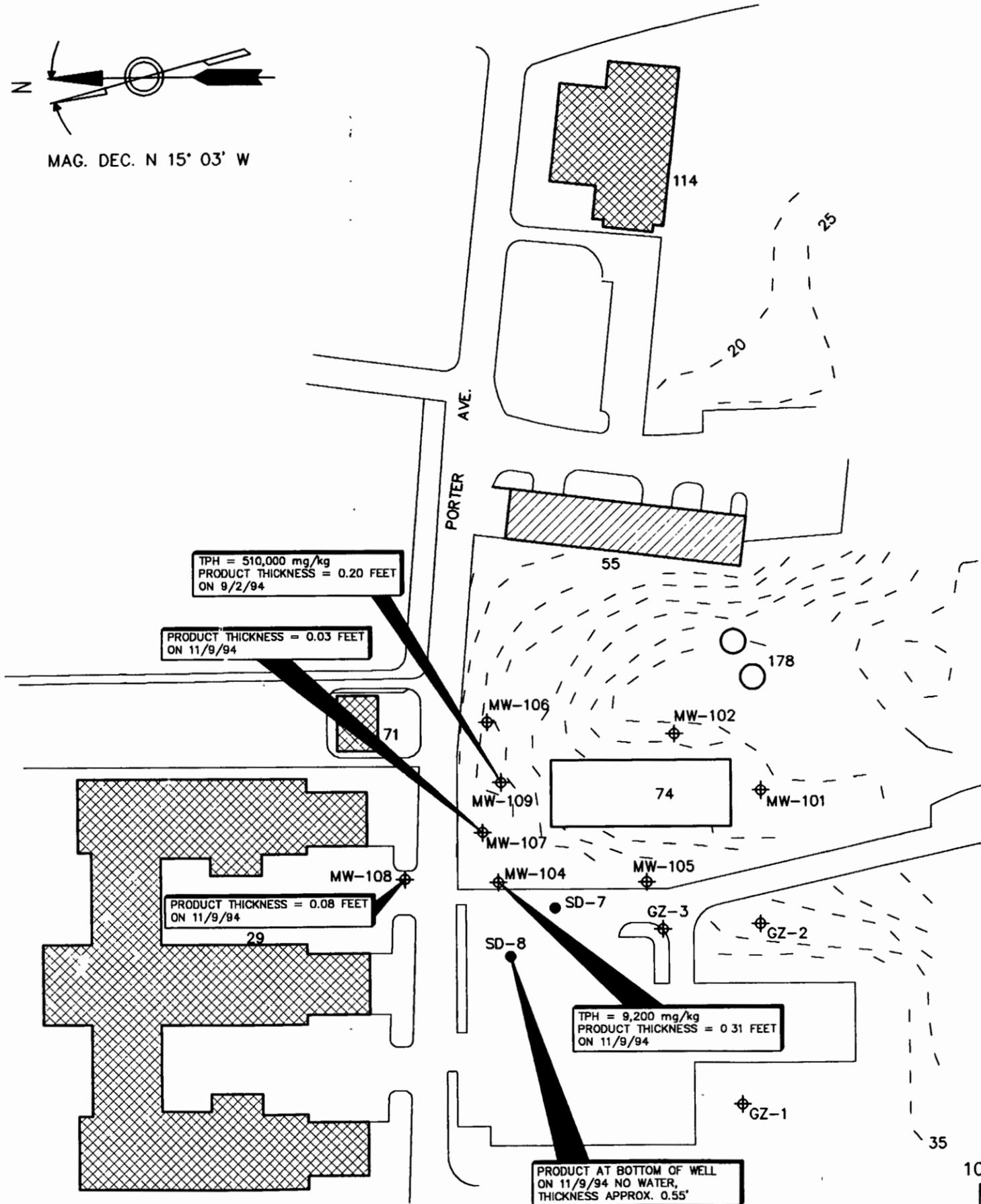
FIGURE 4.3-6



ENSR CONSULTING & ENGINEERING

TPH IN PRODUCT (GC/FID) & DISTRIBUTION OF PRODUCT
 STRUCTURE 74 INVESTIGATION AREA
 COASTERS HARBOR ISLAND
 UST REMEDIAL INVESTIGATION

DRAWN BY	DATE	PROJECT NO
K.P.B.	1/95	5060-045-720



SCALE IN FEET
 1" = 100'-0"

SD-8 (product at bottom of well, no water present; thickness estimated at 0.55 feet). During groundwater sampling, free-product was sampled from MW-109 (thickness of 0.20 feet at time of sampling). This well was locked during the round of water level and product thickness measurements, which prevented a second measurement.

4.3.5 Conclusions

Based on the results of the manhole inspection, the underground utilities generally do not act as a preferential pathway for the migration of petroleum hydrocarbons except along the path of the fuel-oil line between Structure 74 and Porter Avenue where absorbent pads and possible petroleum stains (related to a known release) were observed in MH-28. In the other 54 manholes inspected, none contained free-phase petroleum product. The atmosphere within the manholes (as measured with a CGI) never exceeded background and no petroleum odors were observed by the field team. A very slight sheen was observed on top of water in one of the manholes (MH-16) and was interpreted as surface runoff from a parking lot.

Based on the round of water level and product thickness measurements, it was determined that groundwater in this area flows in a radial arc from the south to the northwest, north and northeast. Free-phase petroleum hydrocarbons ranging in thickness from 0.03 feet to approximately 0.55 feet were observed on top of the water table in five monitoring wells.

The results of the TPH analyses for product, and groundwater analyses for TPH, VOC and SVOC confirm the discovery of previous investigations that a release of petroleum hydrocarbons has occurred in the vicinity of Structure 74. Dissolved concentrations of TPH, VOC, SVOC and metals in groundwater do not trigger any federal or state MCLs at this time, however the presence of free-phase hydrocarbons on top of the water table indicates that a significant release has occurred over time. The plume of free-phase hydrocarbons extends beneath Porter Avenue and has reached MW-108. The northern extent of the plume has not been determined. The trace TPH detection at MW-101 interpreted by the laboratory as motor oil raises the possibility that a small, separate release of petroleum hydrocarbons has occurred in the vicinity of MW-101.

Potential receptors of contaminated groundwater are limited by the following:

- No GB groundwater MCLs have been established. Applying the stricter GA standard (which uses the federal Drinking Water MCLs), all of the dissolved contaminants for which MCLs exist, occurred below the established MCLs.
- There are no known groundwater wells (other than monitoring wells) in the vicinity of the investigation area and therefore no direct contact by site personnel with contaminated groundwater.

4.3.6 Recommendations for Further Investigation and/or Corrective Action

The Navy (through its subcontractor GZA), has installed an interim free-product recovery system to the north of Structure 74 (GZA, 1994). The system was brought on-line in the spring of 1995 and is designed to use a groundwater depression pump in MW-103 (near MW-109 on Figure 4.3-6) to create a groundwater

capture zone. The separate-phase floating product that accumulates in the recovery well is collected and containerized using a belt-driven product recovery device. The groundwater pumped from the recovery well is collected and treated using a prefilter and a 55-gallon drum of granular activated carbon, and then is discharged under permit to the sanitary sewer system. The GZA report referenced above also includes recommendations for the installation of five additional monitoring wells, four of which would be located north of Porter Avenue in the area of Structure 29, and the fifth located south of Porter Avenue approximately 100 feet west of SD-8. Groundwater samples collected from the new monitoring wells would be analyzed for VOC and TPH (GC/FID). The wells would be monitored for the possible presence of floating petroleum product. Based on the results of this additional investigation, two additional recovery wells may be recommended, one approximately 30 feet east of MW-108, the other approximately 30 feet northwest of SD-8. Groundwater extraction and treatment, and product recovery in the two additional recovery systems would be similar to the system presently operating. Once both recovery wells are brought on-line, routine monitoring of the effectiveness of the entire system will include measurements of groundwater flow rates, total flow readings, and product thickness. Regular inspection of the system components will be required as part of system operation and maintenance.

4.3.7 Potential Remedial Measures

Structure 74 was leak-tested by Tracer Research in March of 1994. The results indicated that the north vault was tight, but that the south vault was leaking. According to Activity personnel, the south vault was subsequently emptied, cleaned and repaired. As of the date of this Remedial Investigation report, the Navy was evaluating the repairs prior to placing the vault back into service.

As discussed in Section 4.3.6 above, a groundwater treatment and product recovery system has been installed and is operating. This system is expected to control further migration of the contaminated groundwater and free-phase petroleum hydrocarbon plume.

5.0 SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

5.1 TAYLOR DRIVE AND STRUCTURE 143 INVESTIGATION

5.1.1 Conclusions

Based on the results of the manhole inspection, the underground utilities at this investigation area do not appear to act as a conduit for the migration of free-phase hydrocarbons. Of the 75 manholes inspected, none contained free-phase petroleum hydrocarbons or petroleum odors. A slight sheen, believed to be related to surface run-off from roads and other paved areas was observed in three of the manholes.

Based on one round of water level measurements, groundwater flows to the north and northwest and presumably discharges into Narragansett Bay. Free-phase petroleum hydrocarbons were not detected in any of the monitoring wells.

The results of the TPH analyses for soil, and groundwater analyses for TPH, VOC and SVOC indicate that a release of petroleum hydrocarbons has occurred in the vicinity of Taylor Drive near the northern side of Structure 149. This release is believed to be related to the historical use of the old FFTA located to the north and northeast of the Taylor Drive investigation area. Elevated TPH concentrations were detected in subsurface soils, however, dissolved concentrations of TPH, VOC and SVOC in groundwater do not trigger any federal or state MCLs at this time.

Dissolved concentrations of lead in the groundwater exceed the federal Drinking Water Standard MCL at ENSR-1 and further to the west at ENSR-3. There is insufficient data at this time to ascertain the source(s) of the elevated lead concentrations in groundwater.

5.1.2 Recommendations for Further Investigation and/or Corrective Action

The subsurface contamination detected in soil and groundwater in this investigation area cannot be attributed to any known existing or former UST, but may be related to the historical use of fuel oil and waste oil during fire fighting exercises at the old FFTA located adjacent to this investigation area. This site is being addressed separately under the Installation Restoration Program. No further action is recommended under the UST program.

5.2 Abandoned Fuel-Oil Line

5.2.1 Conclusions

Based on the round of water level measurements, it was determined that groundwater in the vicinity of monitoring wells SD-1 and SD-2 flows to the northwest. It is assumed that the groundwater eventually discharges into Narragansett Bay.

Petroleum hydrocarbons were not observed in any of the six well locations during well installation. At the two locations where wells were completed and sampled (SD-1 and SD-2), TPH was not detected in either of the two groundwater samples analyzed. A fuel line inspection report provided by the Activity (discussed in Section 1.3.2) stated that much of the fuel oil line was missing, and where it still existed, was corroded, but appeared to be free of any residual fuel oil. The report concluded that removing the small amount of remaining pipe would be unnecessary since there was no evidence of either fuel oil contamination or residual oil in the line.

Based on the data generated during this investigation, the abandoned fuel oil line does not appear to represent a potential source of, or conduit for, subsurface petroleum hydrocarbon contamination.

5.2.2 Recommendations for Further Investigation and/or Corrective Action

Based on the data generated during this investigation, no further investigation or corrective action is recommended for the abandoned fuel oil line.

5.3 STRUCTURE 74

5.3.1 Conclusions

Based on the results of the manhole inspection, the underground utilities at this investigation area do not appear to act as a conduit for the migration of free-phase hydrocarbons, except along the path of the fuel-oil line between Structure 74 and Porter Avenue where absorbent pads and possible petroleum stains (related to a known release) were observed in one manhole. A slight sheen, believed to be related to surface run-off from a parking lot was observed in one other manhole.

Based on the round of water level and product thickness measurements, it was determined that groundwater in this area flows in a radial arc from the south to the northwest, north and northeast. At the time of these measurements, free-phase petroleum hydrocarbons were observed on top of the water table in the following four monitoring wells: MW-104 (thickness of 0.31 feet), MW-107 (thickness of 0.03 feet), MW-108 (thickness of 0.08 feet), SD-8 (product at bottom of well, no water present; thickness estimated at 0.55 feet). During the groundwater sampling program, free-product was sampled from MW-109 (thickness of 0.20 feet at time of sampling). This well was inaccessible during the round of water level and product thickness measurements.

The results of the TPH analyses for product, and groundwater analyses for TPH, VOC and SVOC confirm the results of previous investigations that a release of petroleum hydrocarbons has occurred in the vicinity of Structure 74. Dissolved concentrations of TPH, VOC, SVOC and metals in groundwater do not trigger any federal or state MCLs at this time, however the presence of free-phase hydrocarbons on top of the water table indicates that a significant release has occurred over time. The plume of free-phase hydrocarbons extends beneath Porter Avenue and has reached MW-108. The northern extent of the plume has not been determined.

The GC fingerprint analysis of TPH was reported by the laboratory as most closely matching diesel fuel at all locations where it was detected, except MW-101 where it most closely matches motor oil. As

discussed in Section 2.8 and due to the similarities between standard chromatograms, the TPH identified as diesel fuel is most likely No. 4 fuel oil. The trace detection of motor oil raises the possibility that a small, separate release of petroleum hydrocarbons has occurred in the vicinity of MW-101.

5.3.2 Recommendations for Further Investigation and/or Corrective Action

The Navy (through its subcontractor GZA), has installed an interim free product recovery system to the north of Structure 74 (GZA, 1994). The system was brought on-line in the spring of 1995 and is designed to use a groundwater depression pump in MW-103 (near MW-109 on Figure 4.3-6) to create a groundwater capture zone. The separate-phase floating product that accumulates in the recovery well is collected and containerized using a belt-driven product recovery device. The groundwater pumped from the recovery well is collected and treated using a prefilter and a 55-gallon drum of granular activated carbon, and then is discharged under permit to the sanitary sewer system.

The GZA report referenced above also includes recommendations for the installation of five additional monitoring wells, four of which would be located north of Porter Avenue in the area of Structure 29, and the fifth located south of Porter Avenue approximately 100 feet west of SD-8. Groundwater samples collected from the new monitoring wells would be analyzed for VOC and TPH (GC/FID). The wells would be monitored for the possible presence of floating petroleum product. Based on the results of this additional investigation, two additional recovery wells may be recommended, one approximately 30 feet east of MW-108, the other approximately 30 feet northwest of SD-8. Groundwater extraction and treatment, and product recovery in the two additional recovery systems would be similar to the system presently operating. Once both recovery wells are brought on-line, routine monitoring of the effectiveness of the system will include measurements of groundwater flow rates, total flow readings, and product thickness. Regular inspection of the system components will be required as part of system operation and maintenance.

6.0 REFERENCES

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APPENDIX A

LIST OF ACRONYMS/ABBREVIATIONS

APPENDIX A
LIST OF ABBREVIATIONS/ACRONYMS

bgs	below ground surface
BOA	Basic Ordering Agreement
CGI	combustible gas indicator
CHI	Coasters Harbor Island
CLEAN	Comprehensive Long-Term Environmental Action Navy program
COC	Chain-of-custody
CTO	Contract Task Order
DQO	data quality objectives
FFTA	Fire Fighter Training Area
FID	flame-ionized detector
FSP	Field Sampling Plan
FTL	Field Team Leader
GC/FID	Gas chromatograph/Fingerprint Identification
GZA	GZA GeoEnvironmental, Inc.
HASP	Health and Safety Plan
i.d.	inside diameter
IDW	investigation derived wastes
IRP	Installation Restoration Program
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
ml	milliliter
NETC	Naval Education and Training Center
NFESC	Naval Facilities Engineering Service Center
NGVD	National Geodetic Vertical Datum
NORTHDIV	Navy Northern Division
NOTC	Naval Officer Training Center
NVLAP	National Voluntary Laboratory Accreditation Program
NWC	Naval War College
o.d.	outside diameter
OVA	Organic Vapor Analyzer
PARCC	precision, accuracy, representativeness, completeness, and comparability
PEL	Permissible Exposure Limit
PM	Project Manager
POC	Point of Contact
PPE	personal protective equipment
ppm	parts per million
PVC	polyvinyl chloride
QA/QC	Quality Assurance/Quality Assurance
RCRA	Resource Conservation Recovery Act

RIDEM	Rhode Island Department of Environmental Management
RPD	relative percent difference
RPM	Rem dial Project Manager
SER	Shore Establishment Realignment program
SOP	standard operating procedure
SVOC	semi-volatile organic compounds
TAL	target analyte list
TCL	target compound list
TCLP	toxicity characteristic leaching procedure
TMR	Task Modification Request
TPH	Total Petroleum Hydrocarbons
TRC	TRC Environmental Consultants, Inc.
u/L	micrograms per liter
UST	underground storage tank
UST RI	underground storage tank remedial investigation
VOC	volatile organic compounds

APPENDIX B
SOIL BORING LOGS

Project No. 5060-045 Date - Start 7/28/94 Finish 7/28/94 Boring SB-1
 Project Name Newport UST RI Drilling Co. New England Boring Contractors
 Location Taylor Drive, CHI Drilling Method 4 1/4" HSA
 Total Depth 14' Inspector J. Junod Reviewer L. Pannell
 Remarks Sample S-4 (BB01AA) was submitted to laboratory for TPH (GC/FID) analysis.

Depth Feet	Sample				OVA (ppm)	Lithologic Description	Generalized Stratigraphy	
	Type & No.	Blows per 6 in.	Depth Range	Rec.				
1	S-1	19-13-8	0.5-2'	5"	0	3" Asphalt Dark brown to black f-m SAND, tr silt, f-m gravel, dry.	SAND WITH SILT & GRAVEL	
3	S-2	7-6-10-16	2- 4'	4"	1	Tan to gray f-m SAND, some silt, rock fragments in tip, dry.		
5	S-3	10-22-24-11	4- 6'	10"	40	Light to dark brown f-m SAND, some silt, some f-m rounded and angular shaped gravel, slightly moist.		
7	S-4	7-16-19-8	6- 8'	12"	150	Brownish-gray f-m SAND, some silt, f-m gravel, rock fragments, split-spoon wet at 6.5-7' b.g.s.		
9	S-5	6-7-6-5	8-10'	12"	0	Brownish-gray f-SAND & SILT, some brown f-m sand, f-m gravel, tr. clay, some silt at top of spoon.		SAND, SILT & GRAVEL
11	S-6	5-10-10-8	10-12'	14"	0	Brownish-gray c-SAND, some m-sand at bottom of spoon, and a lens of m-sand above it, layer of gray f-sand & silt, some clay at top of spoon.		SAND & SILT
13	S-7	8-10-15-38	12-14'	20"	1	WEATHERED BEDROCK at bottom of spoon, f-m SAND, some silt, tr. clay above it, oxidation staining, lens of dense silt, tr. clay and tr. f-sand at ~13' b.g.s.		WEATHERED BEDROCK
						END OF BORING AT 14'		
						Cobbles brought up by augers at 0.5-5' b.g.s.		



BORING LOG

Sheet 1 of 1

Project No. 5060-045 Date - Start 7/28/94 Finish 7/28/94 Boring SB-2 (ENSR-1)
 Project Name Newport UST RI Drilling Co. New England Boring Contractors
 Location Taylor Drive, CHI Drilling Method 4 1/4" HSA
 Total Depth 12.5' Inspector J. Junod Reviewer L. Pannell
 Remarks Sample S-4 (BB02AA) was submitted to laboratory for TPH (GC/FID) analysis.

Depth Feet	Sample				OVA (ppm)	Lithologic Description	Generalized Stratigraphy
	Type & No.	Blows per 6 In.	Depth Range	Rec.			
1	S-1	11-11-10-9	0.5-2.5'	2"	2	2" Asphalt Gray f-m SAND & f-m GRAVEL, rock fragments in tip, dry.	SAND, SILT & GRAVEL
3	S-2	9-7-5-7	2.5-4.5'	10"	100	Gray SILT & f-SAND with f-m GRAVEL, dense, black petroleum staining and odor at bottom of spoon.	
5	S-3	9-10-15	4.5-6'	2"	400	Gray SILT & f- SAND, some f-m gravel, black petroleum staining and odor.	
7	S-4	6-4-3-7	6-8'	14"	1000	Gray f-m SAND & PEAT, some roots, organics, and f-m gravel, wet at ~6' b.g.s., petroleum staining and odor.	SANDY PEAT
9	S-5	7-16-15-14	8-10'	10"	610	Gray SILT and f- SAND, some f-m gravel, lens of m-sand, petroleum odor.	SAND, SILT & GRAVEL
11	S-6	4-5-7-8	10-12'	12"	40	Gray SILT and f- SAND and f-m GRAVEL, dense (TILL), slight petroleum odor.	
						Augers extended to 12.5' b.g.s. to set monitoring well.	
						END OF BORING AT 12.5'	

Project No. 5060-045 Date - Start 7/29/94 Finish 7/29/94 Boring SB-3 (ENSR-2)
 Proj ct Name Newport UST RI Drilling Co. New England Boring Contractors
 Location Taylor Drive, CHI Drilling Method 4 1/4" HSA
 Total Depth 12.25' Inspector J. Junod Reviewer L. Pannell
 Remarks Sample S-4 (BB03AA) was submitted to laboratory for TPH (GC/FID) analysis.

Depth Feet	Sample				OVA (ppm)	Lithologic Description	Generalized Stratigraphy
	Type & No.	Blows per 6 In.	Depth Range	Rec.			
1	S-1	8-11-16	0.5-2'	0"	--	4" Asphalt No recovery, cobbles blocking split-spoon.	
3	S-2	8-14-18-22	2-4'	20"	3	Dark gray SILT & f- SAND, some f-m gravel, dense, slightly moist.	
5	S-3	12-15-22-16	4-6'	8"	4	Dark gray SILT & f- SAND, some f-m gravel, loose, moist.	SAND, SILT & GRAVEL
7	S-4	12-20-31-45	6-8'	5"	41	Dark gray SILT & f- SAND, some f-m gravel, tr. c - gravel, petroleum staining & odor, moist.	
9	S-5	7-12-21-61	8-10'	20"	20	Brownish-gray SILT & f-SAND, some f-m gravel, tr. clay, dense, moist, slight petroleum odor.	
11	S-6	62-50/1"	10-10' 7"	6"	22	Brownish-gray SILT & f-SAND, some clay, rock fragments in tip, wet.	
	S-7	100	12'3"	0"	--	Split-spoon did not advance; assumed bedrock (augers extended to 12.25' b.g.s.).	BEDROCK
END OF BORING AT 12.25'							

Project No. 5060-045 Date - Start 7/29/94 Finish 7/29/94 Boring SB-4
 Project Name Newport UST RI Drilling Co. New England Boring Contractors
 Location East side of Structure 143, CHI Drilling Method 4" SSA
 Total Depth 14' Inspector J. Junod Reviewer L. Pannell
 Remarks Sample S-4 (BB04AA) was submitted to laboratory for TPH (GC/FID) analysis.

Depth Feet	Sample				OVA (ppm)	Lithologic Description	Generalized Stratigraphy
	Type & No.	Blows per 6 In.	Depth Range	Rec.			
1	S-1	7-11-12	0.5-2'	1"	1.2	3" Asphalt Dark brown SILT & f-m SAND, tr. f-gravel, rock fragments in tip, loose, dry.	
3	S-2	13-16-14-13	2-4'	11"	10.5	Dark brown SILT & f-m SAND, some f-m gravel, and rock fragments, loose, slightly moist.	SAND, SILT & GRAVEL
5	S-3	5-4-3-3	4-6'	3"	110	Dark brown SILT, f-m SAND, f-m ROCK FRAGMENTS, wet.	
7	S-4	3-3-3-3	6-8'	10"	1000	Brown f-m SAND, some organics and tr. clay at top of spoon, dark brown f-m SAND at bottom of spoon, wet.	SAND & ORGANICS
9	S-5	2-3-12-16	8-10'	12"	700	Brownish-gray SILT & f- SAND, some f-m gravel, layer of f-m sand at top of spoon, wet.	
11	S-6	4-6-9-12	10-12'	12"	10	Brownish-gray SILT & f- SAND, some rounded f-m gravel, some angular rock fragments, dense, wet.	SAND, SILT & GRAVEL
13	S-7	6-12-14-17	12-14'	6"	95	Same as above.	
END OF BORING AT 14'							



BORING LOG

Sheet 1 of 1

Project No. 5060-045 Date - Start 7/29/94 Finish 8/1/94 Boring SB-5

Project Name Newport UST RI Drilling Co. New England Boring Contractors

Location Taylor Drive CHI Drilling Method 4" SSA

Total Depth 24.75' Inspector J. Junod Reviewer L. Pannell

Remarks Sample S-4 (BB05AA) was submitted to laboratory for TPH (GC/FID) analysis.

Depth Feet	Sample				OVA (ppm)	Lithologic Description	Generalized Stratigraphy
	Type & No.	Blows per 6 in.	Depth Range	Rec.			
1	S-1	8-11-8-6	0.5-2.5'	2"	0	3.5" Asphalt Brown f-m SAND, some f-m gravel, cobble in tip.	SAND, SILT & GRAVEL
3	S-2	3-3-13	2.5-4'	4"	0	Brown SILT & f-m SAND, f-m gravel, loose, dry.	
5	S-3	7-9-4-2	4-6'	3"	0	Same as above, cobble in tip.	
7	S-4	2-3-7-13	6-8'	18"	150	Grayish-brown SILT & f-m SAND, some f-m gravel, tr. clay, dense (TILL), lens of sand at bottom of spoon, some organics near top of spoon, moist to wet.	SAND, SILT & ORGANICS
9	S-5	11-16-18-14	8-10'	6"	20	Brownish-gray SILT & f-SAND, some f-m gravel, some m-sand, dense (TILL), wet.	SAND, SILT & GRAVEL
11	S-6	7-10-14-16	10-12'	5"	25	Same as above.	
13	S-7	6-10-12-15	12-14'	8"	15	Same as above.	
15	S-8	14-44-17-19	14-16'	1"	7	Same as above, c-cobbles blocking spoon.	
17	S-9	7-16-20-32	16-18'	6"	5	Brownish-gray SILT & f-SAND, some f-m gravel, some m-sand, dense (TILL), rock fragments in spoon and tip, wet.	
19	S-10	8-8-22-100	18-20'	12"	4	Brownish-gray SILT & f-SAND, some f-m gravel, some m-sand, dense (TILL), cobble at end of spoon, wet.	
21	S-11	35-105	21-22'	10"	0	Grayish-brown SILT & f-SAND, f-m gravel, tr. clay, rock fragments in tip, lens of c-sand and f-gravel at top of spoon.	WEATHERED BEDROCK
23	S-12 S-13	69-105 100/5"	23-24' 24'4" -24'9"	0" 5"	-- .75	No recovery. WEATHERED BEDROCK-- silt with some clay, shaley, crumbles when handled	
						END OF BORING AT 24.75'	
						Auger refusal at 24'4". Assumed Bedrock.	

Project No. 5060-045 Date - Start 8/1/94 Finish 8/1/94 Boring SB-6 (ENSR - 3)
 Project Name Newport UST RI Drilling Co. N w England Boring Contractors
 Location Taylor Drive, CHI Drilling Method 4 1/4" HSA
 Total Depth 12' Inspector J. Junod Reviewer L. Pannell
 Remarks Samples S-4 and S-5 (BB06AA) were composited and submitted to laboratory for TPH (GC/FID) analysis.

Depth Feet	Sample				OVA (ppm)	Lithologic Description	Generalized Stratigraphy
	Type & No.	Blows per 6 In.	Depth Range	Rec.			
1	S-1	6-8-7	0.5-2'	6"	0	2" Asphalt 2" TAR, 4" brownish-gray SILT & f-SAND, some f-m gravel, loose, slightly moist.	
3	S-2	8-5-9-7	2-4'	0"	-	No recovery; cobble in tip.	SAND, SILT & GRAVEL
5	S-3	6-5-4-3	4-6'	3"	.10	Brown SILT & f-SAND, some f-m gravel, tr. clay, loose, moist.	
7	S-4	4-10-10-9	6-8'	2"	2.5	ROCK FRAGMENTS and some black SILT & f-SAND, moist.	ROCK FRAGMENTS
9	S-5	5-7-7-9	8-10'	11"	0.6	Brownish-gray SILT & f-SAND, some f-m gravel, tr. clay, dense (TILL), lens of m-sand, wet at ~7.5'.	SAND, SILT & GRAVEL
11	S-6	5-7-5-9	10-12'	12"	0	Gray SILT & f-SAND, some f-m gravel, dense (TILL), wet.	
						END OF BORING AT 12'	
						Cobbles brought up by augers at ~3-5' b.g.s.	



BORING LOG

Sheet 1 of 1

Project No. 5060-045 Date - Start 8/12/94 Finish 8/12/94 Boring SB-21

Project Name Newport UST RI Drilling Co. New England Boring Contractors

Location Along roadway South of Building 149, CHI Drilling Method 4" SSA

Total Depth 10.25' Inspector J. Junod Reviewer L. Pannell

Remarks Sample S-5 (AB21AA) was submitted to laboratory for TPH (GC/FID) analysis.

Depth Feet	Sample				OVA (ppm)	Lithologic Description	Generalized Stratigraphy
	Type & No.	Blows per 6 in.	Depth Range	Rec.			
1	S-1	9-15-12-12	0.5-2.5'	20"	0	3" Asphalt Brownish- gray SILT & f- SAND, some f-m gravel, rock fragments, dense (TILL), moist.	SANDY TILL
3	S-2	21-24-23-13	2.5-4.5'	18"	.75	Same as above (TILL).	
5	S-3	21-31-26-47	4.5- 6.5'	24"	2	Same as above (TILL), with some tan m-sand, very dense.	
7	S-4	53-72-50/1"	6'6"-77"	12"	1.5	Broken pieces of gray SILT & f-SAND, some f-m gravel, dense (TILL), some black silt & f- sand, f-m gravel, rock fragments.	
9	S-5	20-73-68-100/3"	8'6"-10'3"	12"	3	Dense TILL (as above) grading to WEATHERED BEDROCK (silt & f-sand) near bottom of spoon, rock fragments.	
						END OF BORING AT 10.25'	WEATHERED BEDROCK

Project No. 5060-045 Date - Start 8/12/94 Finish 8/12/94 Boring SB-22
 Project Name Newport UST RI Drilling Co. New England Boring Contractors
 Location Along roadway south of Building 149, CHI Drilling Method 4" SSA
 Total Depth 9.9' Inspector J. Junod Reviewer L. Pannell
 Remarks Sample S-4 (AB22AA) was submitted to laboratory for TPH (GC/FID) analysis.

Depth Feet	Sample				OVA (ppm)	Lithologic Description	Generalized Stratigraphy
	Type & No.	Blows per 6 In.	Depth Range	Rec.			
1	S-1	8-11-10-14	0.5-2.5'	12"	60	3" Asphalt	SAND & GRAVEL
3	S-2	17-21-40-100/3"	2'6"-4'3"	14"	5	Tan f-m SAND & f-m GRAVEL at top of spoon, brownish-gray SILT & f-SAND and some f-m gravel (loose) below, SILT & f-SAND, some f-m gravel, dense (TILL) at bottom of spoon, wet.	SANDY TILL
5	S-3	5-8-14-27	4.5 - 6.5'	23"	15	Tan- gray SILT & f-SAND, some f-m gravel, tr. clay (TILL), orange oxidation staining.	
7	S-4	27-55-60-71	6.5- 8.5'	18"	15	TILL as above at top of spoon, very dense SILT & f-SAND at bottom of spoon, crumbles easily (WEATHERED BEDROCK).	WEATHERED BEDROCK
9	S-5	30-54-100/5"	8'6"-9'11"	14"	1	Very dense SILT & f- SAND, crumbles easily (WEATHERED BEDROCK).	
END OF BORING AT 9.9'							

Project No. 5060-045 Date - Start 8/12/94 Finish 8/12/94 Boring SB-23
 Project Name Newport UST RI Drilling Co. New England Boring Contractors
 Location Along roadway South of Building 149, CHI Drilling Method 4" SSA
 Total Depth 10.5' Inspector J. Junod Reviewer L. Pannell
 Remarks Sample S-2 (AB23AA) was submitted to laboratory for TPH (GC/FID) analysis.

Depth Feet	Sample				OVA (ppm)	Lithologic Description	Generalized Stratigraphy
	Type & No.	Blows per 6 In.	Depth Range	Rec.			
1	S-1	8-6-4-9	0.5-2.5'	12"	1000	Brownish-gray SILT & f- SAND, some f-m gravel (TILL), some m-sand, wet.	SANDY TILL
3	S-2	5-5-10-16	2.5-4.5'	16"	900	Browinish-gray SILT & f- SAND, some f-m gravel, and rock fragments (TILL), some f-m sand, wet.	
5	S-3	10-12-9-9	4.5-6.5'	20"	50	Same as above, moderately dense, wet.	
7	S-4	12-12-11-12	6.5-8.5'	16"	35	Brown SILT & f-SAND, some f-m gravel (SANDY TILL)	
9	S-5	12-14-12-17	8.5-10.5'	12"	10	Grey SILT & f-SAND, some f-m gravel, rock fragments, dense (TILL).	
						END OF BORING AT 10.5'	

Project No. 5060-045 Date - Start 8/15/94 Finish 8/15/94 Boring SB-24
 Project Name Newport UST RI Drilling Co. New England Boring Contract rs
 Location Along roadway South of Building 149, CHI Drilling Method 4" SSA
 Total Depth 10.5' Inspector J. Junod Reviewer L. Pannell
 Remarks Sample S-3 (AB24AA) was submitted to laboratory for TPH (GC/FID) analysis.

Depth Feet	Sample				OVA (ppm)	Lithologic Description	Generalized Stratigraphy
	Type & No.	Blows per 6 in.	Depth Range	Rec.			
1	S-1	10-16-9-9	0.5-2.5'	14"	1.5	1" Asphalt Brown f-m SAND, some c-sand and f-m gravel at top of spoon, brownish-gray SILT & f- SAND, some f-m gravel (TILL) below, moist.	SAND & GRAVEL
3	S-2	4-2-7-8	2.5-4.5'	14"	0.8	Grayish-brown SILT & f- SAND, some clay and f-m gravel, moderately dense (TILL), moist.	SANDY TILL
5	S-3	3-2-7-20	4.5-6.5'	6"	2.6	Same as above, not as dense, cobble in tip.	
7	S-4	17-13-11-20	6.5-8.5'	24"	1.4	Brownish-gray SILT & f-SAND, some clay and f-m gravel (TILL), lens of m-sand, moderately dense, orange oxidation staining, wet at ~6.5'	
9	S-5	7-12-13-13	8.5-10.5'	10"	1.8	Brownish-gray SILT & f-m SAND, orange oxidation staining, wet.	
						END OF BORING AT 10.5'	



BORING LOG

Sheet 1 of 1

Project No. 5060-045 Date - Start 8/15/94 Finish 8/15/94 Boring SB-25

Project Name Newport UST RI Drilling Co. New England Boring Contractors

Location Along roadway South of Building 149, CHI Drilling Method 4" SSA

Total Depth 8.5' Inspector J. Junod Reviewer L. Pannell

Remarks Sample S-3 (AB25AA) was submitted to laboratory for TPH (GC/FID) analysis.

Depth Feet	Sample				OVA (ppm)	Lithologic Description	Generalized Stratigraphy
	Type & No.	Blows per 6 in.	Depth Range	Rec.			
1	S-1	7-7-8-9	0.5-2.5'	6"	0.2	2" Asphalt Brown f-c SAND & f-m GRAVEL (loose), over 2" grayish-brown SILT & f-SAND, some f-m gravel (TILL), moist.	SAND & GRAVEL
3	S-2	7-7-8-13	2.5-4.5'	24"	0.2	Grayish-brown SILT & f-SAND, some f-m gravel (SANDY TILL), moist.	SANDY TILL
5	S-3	10-22-21-17	4.5-6.5'	6"	1.6	Grayish-brown SILT & f-SAND, some f-m gravel, loose, moist.	
7	S-4	17-48-90	6.5-8'	12"	0.4	Brownish-gray SILT & f-SAND, some f-m gravel, moderately dense, moist. Piece of SLATE in tip of spoon.	
						END OF BORING AT 8.5'	



BORING LOG

Sheet 1 of 1

Project No. 5060-045 Date - Start 8/15/94 Finish 8/15/94 Boring SB-26
 Project Name Newport UST RI Drilling Co. New England Boring Contractors
 Location Along roadway South of Building 149, CHI Drilling Method 4" SSA
 Total Depth 8.5' Inspector J. Junod Reviewer L. Pannell
 Remarks Sample S-3 (AB26AA) was submitted to laboratory for TPH (GC/FID) analysis.

Depth Feet	Sample				OVA (ppm)	Lithologic Description	Generalized Stratigraphy
	Type & No.	Blows per 6 In.	Depth Range	Rec.			
1	S-1	8-7-7-6	0.5-2.5'	12"	0.6	1" Asphalt	FILL
3	S-2	4-5-9-11	2.5-4.5'	16"	0.6	Grayish-brown SILT & f-SAND, some f-m gravel, lens of m-sand at bottom of spoon, moderately dense, moist.	SANDY TILL
5	S-3	12-8-4-13	4.5-6.5'	8"	1.6	Grayish-brown SILT & f-SAND, some f-m gravel, loose (SANDY TILL), tr. cobbles & rock fragments, moist.	
7	S-4	19-15-13-11	6.5-8.5'	22"	0.6	Brownish-gray SILT & f-SAND, some f-m gravel, orange oxidation staining, bottom of spoon slightly wet.	
						END OF BORING AT 8.5'	

Project No. 5060-045 Date - Start 8/15/94 Finish 8/15/94 Boring SB-27
 Project Name Newport UST RI Drilling Co. New England Boring Contractors
 Location Along roadway South of Building 149, CHI Drilling Method 4" SSA
 Total Depth 8.5' Inspector J. Junod Reviewer L. Pannell
 Remarks Sample S-3 (AB27AA) was submitted to laboratory for TPH (GC/FID) analysis.

Depth Feet	Sample				OVA (ppm)	Lithologic Description	Generalized Stratigraphy
	Type & No.	Blows per 6 In.	Depth Range	Rec.			
1	S-1	7-11-9-7	0.5-2.5'	10"	0.5	3" Asphalt Grayish-brown SILT & f- SAND and some f-m gravel at bottom of spoon, and brown SILT & f-m SAND, some f-m gravel above, loose, dry.	SAND & GRAVEL
3	S-2	4-3-4-6	2.5-4.5'	14"	0.6	Grayish-brown SILT & f-SAND, some f-m gravel, moderately dense (TILL), moist.	SANDY TILL
5	S-3	3-4-3-3	4.5-6.5'	18"	620	Gray SILT & f-m SAND at bottom of spoon, brownish- gray SILT & f- SAND, some f-m gravel above, wet.	
7	S-4	5-6-8-4	6.5-8.5'	12"	120	Gray SILT & f-m SAND, tr. clay at top of spoon, brown SILT & f-m SAND with orange oxidation staining below, wet.	
						END OF BORING AT 8.5'	

BORING Co. <u>D.L. MAHER DRILLING, INC.</u> FOREMAN <u>JOHN BOWEN</u> GZA ENGINEER <u>MARK DALPE</u>	BORING LOCATION <u>SEE LOCATION PLAN</u> GROUND SURFACE ELEVATION <u>DATUM</u> DATE START <u>10/22/93</u> DATE END <u>10/22/93</u>
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SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 LB. HAMMER FALLING 30 in.

CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb. HAMMER FALLING 24 in.

CASING SIZE: 8" OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER	CASING	STABILIZATION TIME
10/25/93	0930	24.8	OW	42 HOURS
11/05/93	---	21.5	WELL	14 DAYS

DEPTH	C B A S E L O W S	SAMPLE			SAMPLE DESCRIPTION <u>Burmister CLASSIFICATION</u>	STRATUM DESCRIPTION	EQUIPMENT INSTALLED		FIELD HNU TESTING	REMARKS
		No.	PEN./REC.	DEPTH (Ft.)			BLOWS/6"			
5						COARSE TO FINE SAND 0.5'+ SHALE/ CONGLOMERATE (BEDROCK)	PVC RISER	Grout	NO (0-10')	
							6'	Bent. Seal		
10							8'		NO (10-25')	
15								10'		
20										
25										
30										
35									NO (25-35')	

REMARKS:

1. Stratum description based on visual inspection of drill cuttings.
2. No petroleum odors or discoloration observed.
3. Eight inch hole advanced using Barber Dual air-rotary system.
4. Bit air pressure was approximately 100 psi.
5. Forty feet of .02" slotted, 4.0" diameter, Sch 40, PVC wellscreen was placed from 50' to 10' and topped with 10' of solid PVC riser tube. Filter sand was poured up to 8' and a bentonite seal placed from 8' to 6'. The well head was secured with a 4' long steel guard pipe with locking cover, grouted into the surface with concrete.

NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
 2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED. FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

GZA BORING No. MW-102

DEPTH H	C B A S E S N G S	SAMPLE			SAMPLE DESCRIPTION <u>Burmister CLASSIFICATION</u>	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD TESTING	REMARKS
		No.	PEN./ REC.	DEPTH (Ft.)					
45						SHALE/ CONGLOMERATE (BEDROCK)	FILTER SAND	ND (35-50')	1. 2. 3. 4. 5.
50					End of Exploration at 50'+				
55									
60									
65									
70									
75									
80									
85									

REMARKS:

NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
 2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED. FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

GZA

BORING No. MW-102

BORING Co. D.L. MAHER DRILLING, INC.
FOREMAN JOHN BOWEN
GZA ENGINEER MARK DALPE

BORING LOCATION SEE LOCATION PLAN
GROUND SURFACE ELEVATION DATUM
DATE START 10/26/93 DATE END 10/26/93

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.
CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb. HAMMER FALLING 24 in.
CASING SIZE: 8" OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER	CASING	STABILIZATION TIME
11/05/93	---	14.4	WELL	10 DAYS

DEPTH	C A S I N G S	SAMPLE				SAMPLE DESCRIPTION <u>Burmister CLASSIFICATION</u>	STRATUM DESCRIPTION	EQUIPMENT INSTALLED		FIELD HNU TESTING	REMARKS
		No.	PEN./REC.	DEPTH (Ft.)	BLOWS/6"						
5						TAN/BROWN COARSE TO FINE SAND 3'+	1'	PVC RISER Grout Bent. Seal	ND (0-10')	232507	
						SHALE/ CONGLOMERATE (BEDROCK)	3'		ND (10-20')		
									ND (20-30')		
35						End of Exploration 35'±					

REMARKS: 1. Stratum description based on visual inspection of drill cuttings.
2. No petroleum odor/discoloration observed.
3. Eight inch hole advanced using Barber Dual air-rotary system.
4. Bit "air pressure" approximately 100 psi.
5. Borehole developed using compressed air.
6. Thirty feet of .02" slotted, 4.0" diameter, Sch 40, PVC wellscreen was placed from 35'+ up to 5'+ and topped with 5' of solid PVC riser tube. Filter sand was poured up to 3'+ and a bentonite seal placed from 3'+ up to 1'+. The wellhead was secured with a 4' long steel guard pipe with locking cover grouted into the surface with concrete.
7. The contractor steam cleaned casing and tools used at MW-105 prior to leaving site.

NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED. FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

BORING Co. GZA DRILLING, INC.
 FOREMAN DAVID ANDERSEN
 GZA ENGINEER WILLIAM FORTUNE

BORING LOCATION SEE LOCATION PLAN
 GROUND SURFACE ELEVATION DATUM
 DATE START 5/9/94 DATE END 5/9/94

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 LB. HAMMER FALLING 30 IN.
 CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 LB. HAMMER FALLING 24 IN.
 CASING SIZE: 3" TO 10 FEET OTHER: NX CORE BARREL TO 15.5 FT

GROUNDWATER READINGS				
DATE	TIME	WATER	CASING	STABILIZATION TIME
5/9/94	1300	7.2	WELL	2.5 HOURS
6/3/94	---	7.8	WELL	4 WEEKS

DEPTH	CASSING	SAMPLE				SAMPLE DESCRIPTION <u>Burmister</u> CLASSIFICATION	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD TESTING	REMARKS
		No.	PEN./REC.	DEPTH (FT.)	BLOWS/6"					
5						OVERBURDEN SOIL	Flush mounted curb box set in cement surface seal			
						3'+	2" PVC riser pipe to 5.5'			1
						GRAY CONDOMERATE BEDROCK	Bentonite seal 2-2.5'			
							Filter sand 4 - 15.5'			
10		C-1	66/6	10-15.5	RQD=0% REC=9%	Conglomerate (Poor Recovery)	2" PVC well screen 5.5-15.5'			2 3
15										4
						BOTTOM OF BORING AT 15.5' FT				
20										
25										
30										
35										

REMARKS:
 1. Apparent top of conglomerate at 3 feet (based on change in drilling penetration rate). Drilling penetration in bedrock was approximately 3 minutes per foot.
 2. Spun 3" casing to a depth of 10 feet (using drilling water).
 3. Used NX type core barrel from 10 to 15.5 feet.
 4. Approximately 50 gallons of drilling water entered the formation during drilling.
 5. 10 feet of 0.01 inch slotted, 2" diameter, PVC well screen was placed from 5.5 to 15.5 feet and topped with 5.5 feet of PVC riser pipe. Filter sand was backfilled around the well screen to a depth of 4 feet and a bentonite seal was placed between a depth of 2 to 2.5 feet. The wellhead was secured with a 1 foot long aluminum curb box, grouted into place using concrete.
 6. No odors of visual signs of contamination were observed.

NOTES:
 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
 2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED. FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

BORING Co. GZA DRILLING, INC.
FOREMAN DAVID ANDERSEN
GZA ENGINEER WILLIAM FORTUNE

BORING LOCATION SEE LOCATION PLAN
GROUND SURFACE ELEVATION DATUM
DATE START 5/9/94 DATE END 5/9/94

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.
CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb. HAMMER FALLING 24 in.
CASING SIZE: 3" TO 5 FEET OTHER: NX CORE BARREL TO 15 FEET

GROUNDWATER READINGS				
DATE	TIME	WATER	CASING	STABILIZATION TIME
5/9/94	---	7.2	WELL	0.5 HOURS
6/3/94	---	8.7	WELL	4 WEEKS

DEPTH	C A L S O W S	SAMPLE				SAMPLE DESCRIPTION <u>Burmister</u> CLASSIFICATION	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD TESTING	REMARKS
		No.	PEN./REC.	DEPTH (Ft.)	BLOWS/6"					
5		C-1	60/6	5-10	RQD=0% REC=10%	Conglomerate (Poor Recovery)	OVERBURDEN SOIL	Flush mounted curb box set in cement surface seal 2" PVC riser pipe to 5' Bentonite seal 1-1.5' Filter sand 2-15' 2" PVC well screen 5'-15'		1 2
							4.8'+ GRAY CONGLOMERATE BEDROCK			
10		C-2	60/6	10-15	RQD=0% REC=10%	Conglomerate (Poor Recovery)				3 4
15						BOTTOM OF BORING AT 15' FT				5
20										
25										
30										
35										

REMARKS:

1. Apparent top of conglomerate at 4.8 feet (based on change in drilling penetration rate). Drilling penetration in bedrock was approximately 3 minutes per foot.
2. Spun 3" casing to a depth of 5 feet (using drilling water) then used NX type core barrel for remainder of borehole.
3. Approximately 60 gallons of drilling water entered the formation during drilling.
4. 10 feet of 0.01 inch slotted, 2" diameter, PVC well screen was placed from 5.0 to 15.0 feet and topped with 5.0 feet of PVC riser pipe. Filter sand was backfilled around the well screen to a depth of 2 feet and a bentonite seal was placed between a depth of 1 to 1.5 feet. The wellhead was secured with a 1 foot long aluminum curb box, grouted into place using concrete.
5. After the well stabilized, the groundwater had a petroleum-like odor.

NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED. FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

BORING Co. GZA DRILLING, INC.
FOREMAN DAVID ANDERSEN
GZA ENGINEER MARK DALPE

BORING LOCATION SEE LOCATION PLAN
GROUND SURFACE ELEVATION DATUM
DATE START 5/10/94 DATE END 5/10/94

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.

CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb. HAMMER FALLING 24 in.

CASING SIZE: 3" TO 9 FEET OTHER: ROLLER BIT TO 17 FEET

GROUNDWATER READINGS				
DATE	TIME	WATER	CASING	STABILIZATION TIME
5/10/94	1000	6.3	WELL	1 HOUR
6/3/94	---	8.4	WELL	4 WEEKS

DEPTH (FEET)	CLOGS	SAMPLE				SAMPLE DESCRIPTION <u>Burmister</u> CLASSIFICATION	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD TESTING	REMARKS
		No.	PEN./REC.	DEPTH (Ft.)	BLOWS/6"					
0-5		S-1	24/13	0.2-2.2	3-4 4-5	Loose black/brown, coarse to fine SAND and Slag, little Ash, trace Silt (FILL)	ASPHALT 0.2'	Grout	ND	1 2
5-10		S-2	24/10	5-7	25-25 38-28	Very dense, gray GRAVEL (SHALE) little Silt, little coarse to fine Sand (GLACIAL TILL)	5' GLACIAL TILL	PVC SCREEN	ND	3 4
10-17		S-3	8/8	8-8.7	33-100/2"	Very dense, gray, coarse to fine SAND and Silt, little Gravel (GLACIAL TILL)	9'+ APPARENT BEDROCK	Filter Sand	28	5 6
17-35						BOTTOM OF BORING AT 17' FT				

REMARKS:

- Field photoionization detector readings were obtained using an HNU meter equipped with a 10.2 electron volt lamp. Readings are in parts per million (ppm). ND indicates less than detection limit of 0.1 ppm.
- 3" flush-joint casing advanced to 9'; roller bit advanced to 17'.
- Apparent top of bedrock at 9 feet (based on change in drilling penetration rate). 17 to 2'
- Petroleum odors and visual signs of contamination observed.
- 15' of .01" slotted, 2.0" diam., sch 40, PVC well screen was placed from 17 to 21 feet and topped with 2' of solid PVC riser tube. Filter sand was poured up to 1'. The wellhead was secured with a 1' long aluminum curb box grouted into the surface with concrete.
- Approximately 40 gallons of drill water entered the formation during drilling.

NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED. FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

BORING Co. <u>GZA DRILLING, INC.</u> FOREMAN <u>CHRIS LENLING</u> GZA ENGINEER <u>MARK DALPE</u>	BORING LOCATION <u>SEE LOCATION PLAN</u> GROUND SURFACE ELEVATION <u> </u> DATE START <u>10/22/93</u> DATE END <u>10/22/93</u>
--	---

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.

CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb. HAMMER FALLING 24 in.

CASING SIZE: 3" OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER	CASING	STABILIZATION TIME
10-22-93	0930	13.20	OW	
10-26-93	1000	13.19	OW	1 DAY
11-05-93	---	11.40	OW	11 DAYS

DEPTH	C B A S W S	SAMPLE			SAMPLE DESCRIPTION <u>Burmister CLASSIFICATION</u>	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD HNU TESTING	REMARKS
		No.	PEN./REC.	DEPTH (Ft.)					
5		S-1	24/9	0-2	2-2	SILTY GRAVELLY SAND	1' Grout 3' Bent. Seal PVC RISER 5'	ND	1.
					3-4				
10		S-2	24/15	5-7	10-11	SHALE OR CONGLOMERATE BEDROCK	8.5'+ PVC RISER FILTER SAND	ND	2.
					15-26				
30					End of Exploration at 30'+				

REMARKS:

1. Roller bit through bedrock from 8.5 to 30 feet.
2. Twenty five feet of .02" slotted 2.0" diameter, Sch 40, PVC well screen was placed from 30.0'+ up to 5.0'+ and topped with 5.0' of solid PVC riser tube, Filter sand was poured up to 3.0'+ and a bentonite seal placed from 3.0'+ up to 1.0'+. The wellhead was secured with a 1' long flush mounted curb box grouted into the surface with concrete.
3. No oily odors or discoloration observed.
4. Approximately 40 gallons of drill water entered the formation during drilling.

NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
 2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED. FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

GZA BORING No. MW-103

APPENDIX C

WELL CONSTRUCTION DIAGRAMS

Project No: 5060-045 Client: Navy/HNUS Site: CHI, Newport, RI

WELL No: **ENSR-1**

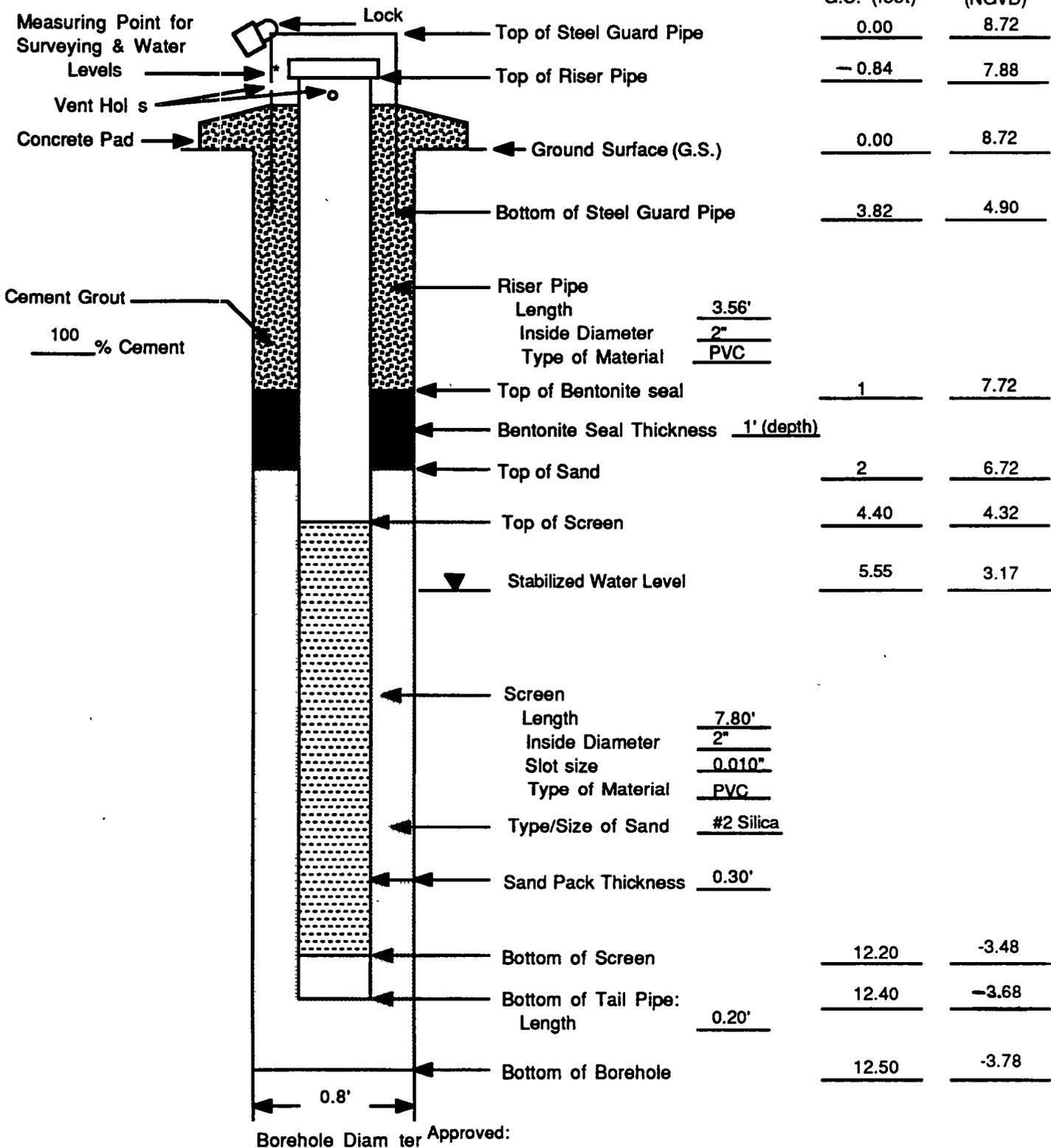
Location: Taylor Driv

Date Installed 7/28/94

Contractor: New England Boring Contractors Method: 4 1/4" HSA

Inspector: J. Junod

MONITORING WELL CONSTRUCTION DETAIL



* Describe Measuring Point:
Highest point of riser pipe

Approved: _____
Signature Date



Project No: 5060-045 Client: Navy/HNUS Site: CHI, Newport, RI

WELL No: ENSR-2

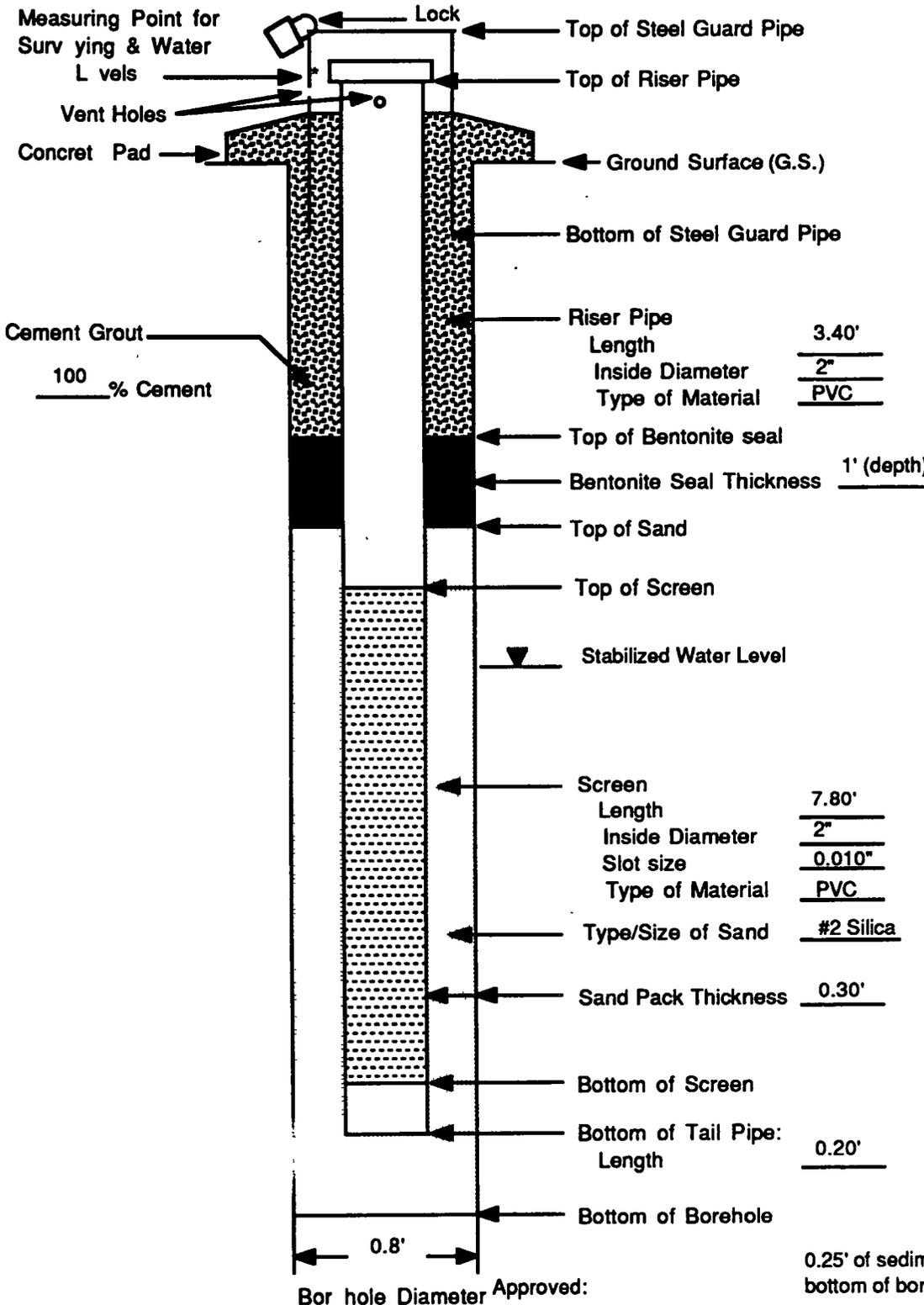
Location: Taylor Drive, west of ENSR-1

Date Installed: 7/29/94

Contractor: New England Boring Contractors Method: 4 1/4" HSA

Inspector: J. Junod

MONITORING WELL CONSTRUCTION DETAIL



Depth from G.S. (feet)	Elevation (NGVD)
0.00	6.99
-0.70	6.29
0.00	6.99
3.82	3.17
1	5.99
2	4.99
4.10	2.89
5.59	1.40
11.90	-4.91
12.10	-5.11
12.25	-5.26

Riser Pipe Length: 3.40'
 Inside Diameter: 2"
 Type of Material: PVC
 Top of Bentonite seal: 1
 Bentonite Seal Thickness: 1' (depth)
 Top of Sand: 2
 Top of Screen: 4.10
 Stabilized Water Level: 5.59
 Screen Length: 7.80'
 Inside Diameter: 2"
 Slot size: 0.010"
 Type of Material: PVC
 Type/Size of Sand: #2 Silica
 Sand Pack Thickness: 0.30'
 Bottom of Screen: 11.90
 Bottom of Tail Pipe: 12.10
 Length: 0.20'
 Bottom of Borehole: 12.25

** Describe Measuring Point:
Highest point of riser pipe

Signature _____ Date _____



Project No: 5060-045 Client: Navy/HNUS Site: CHI, Newport, RI

WELL No: ENSR-3

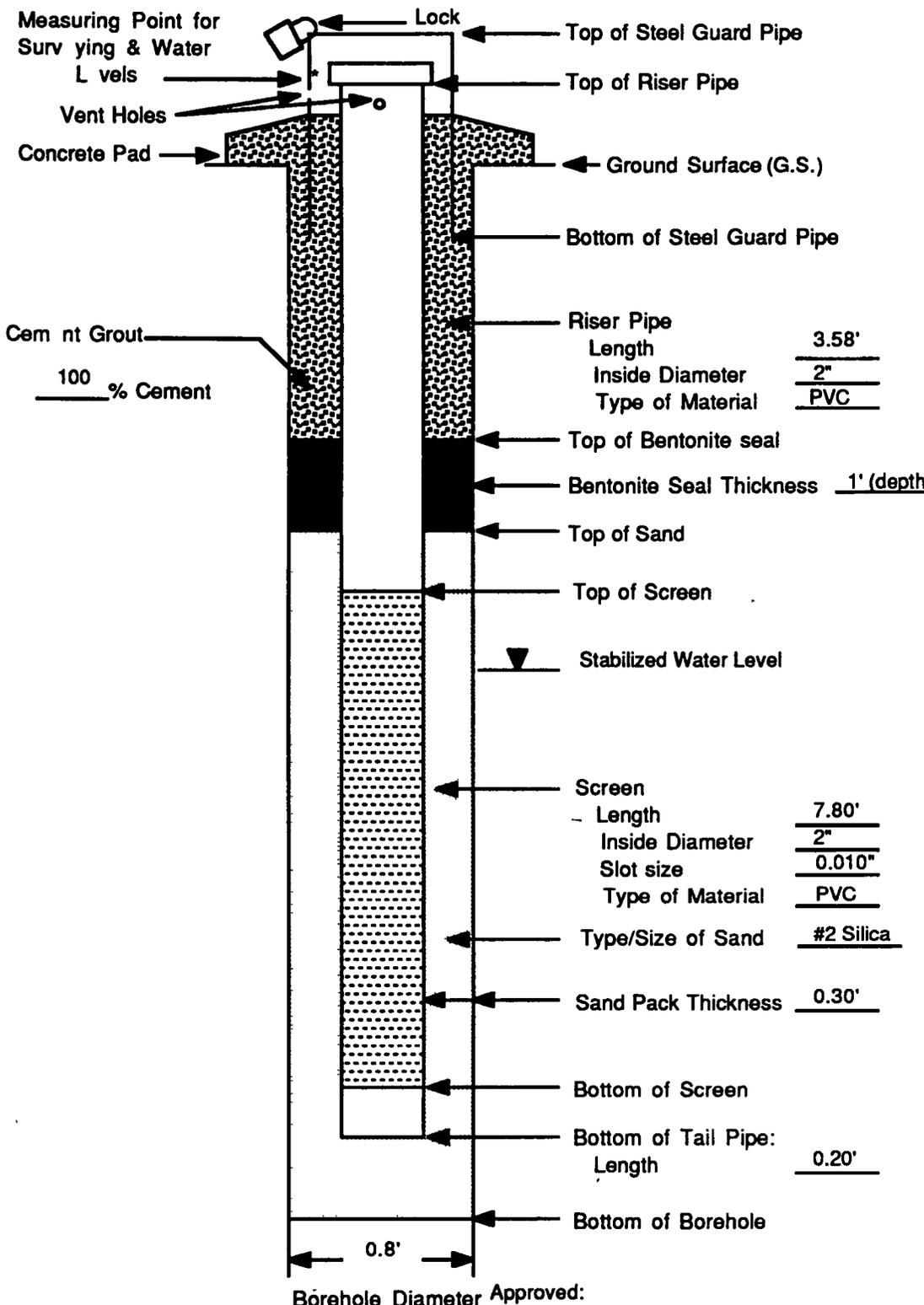
Location: Taylor Drive, west of ENSR-1 and ENSR-2

Date Installed 8/1/94

Contractor: New England Boring Contractors Method: 4 1/4" HSA

Insp ctor: J. Junod

MONITORING WELL CONSTRUCTION DETAIL



Depth from G.S. (feet)	Elevation (NGVD)
0.00	6.37
-0.42	5.95
0.00	6.37
3.82	2.55
1	5.37
2	4.37
4.00	2.37
5.44	0.93
11.80	-5.43
12.00	-5.63
12.00	-5.63

* Describe Measuring Point:
Highest point of riser pipe

Signature _____ Date _____



Project No: 5060-045 Client: HNUS/Navy Site: CHI, Newport, RI

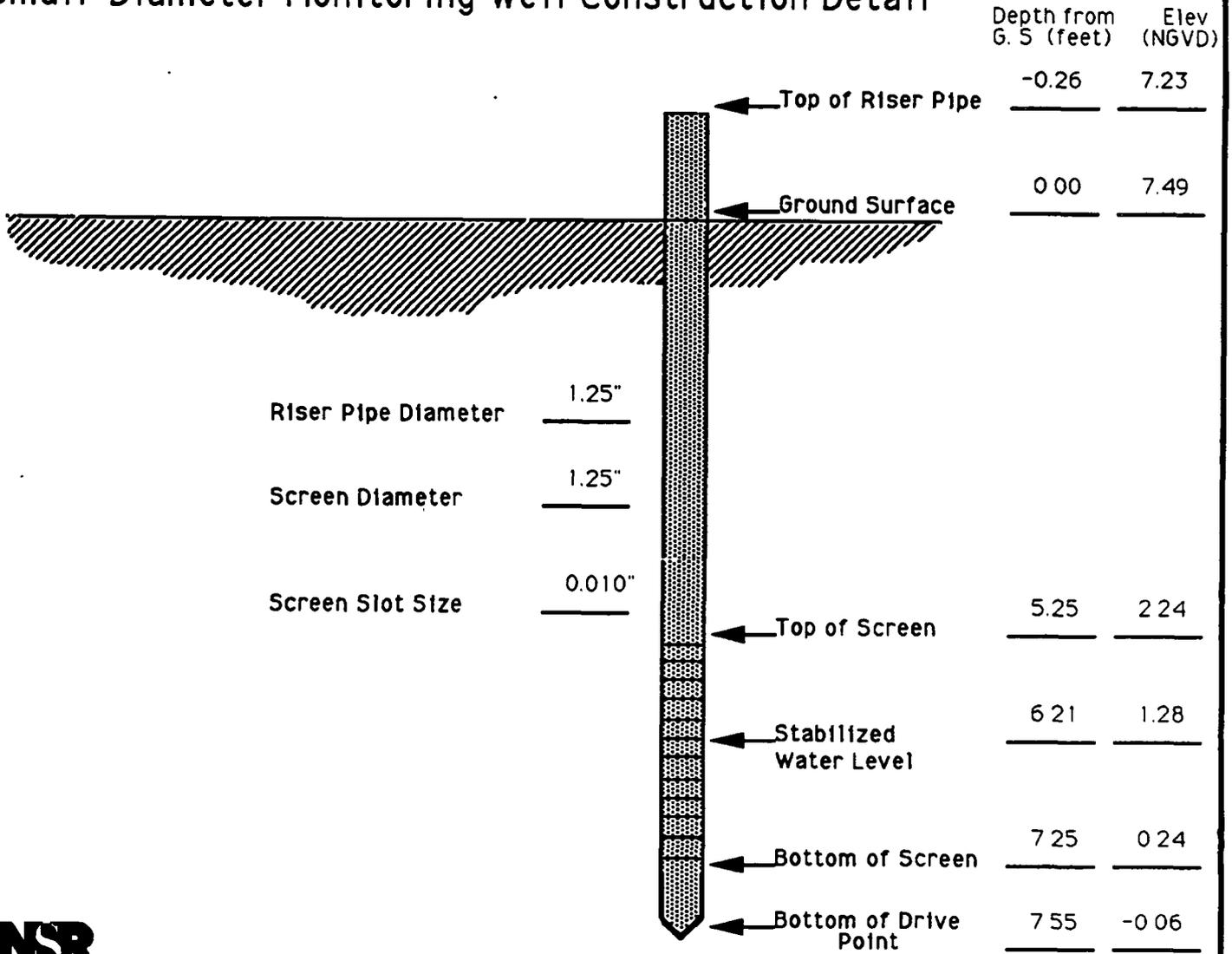
WELL No: SD-1

Well Location: Abandoned fuel oil line between Building 86 and vicinity of Structure 143

Remarks: Well material constructed of galvanized steel Date Installed: 8/1/94

Contractor: New England Boring Contractors Method: 4" Solid Stem Auger Inspector: J. Junod

Small-Diameter Monitoring Well Construction Detail



ENSR

Project No: 5060-045 Client: HNUS/Navy Site: CHI, Newport, RI

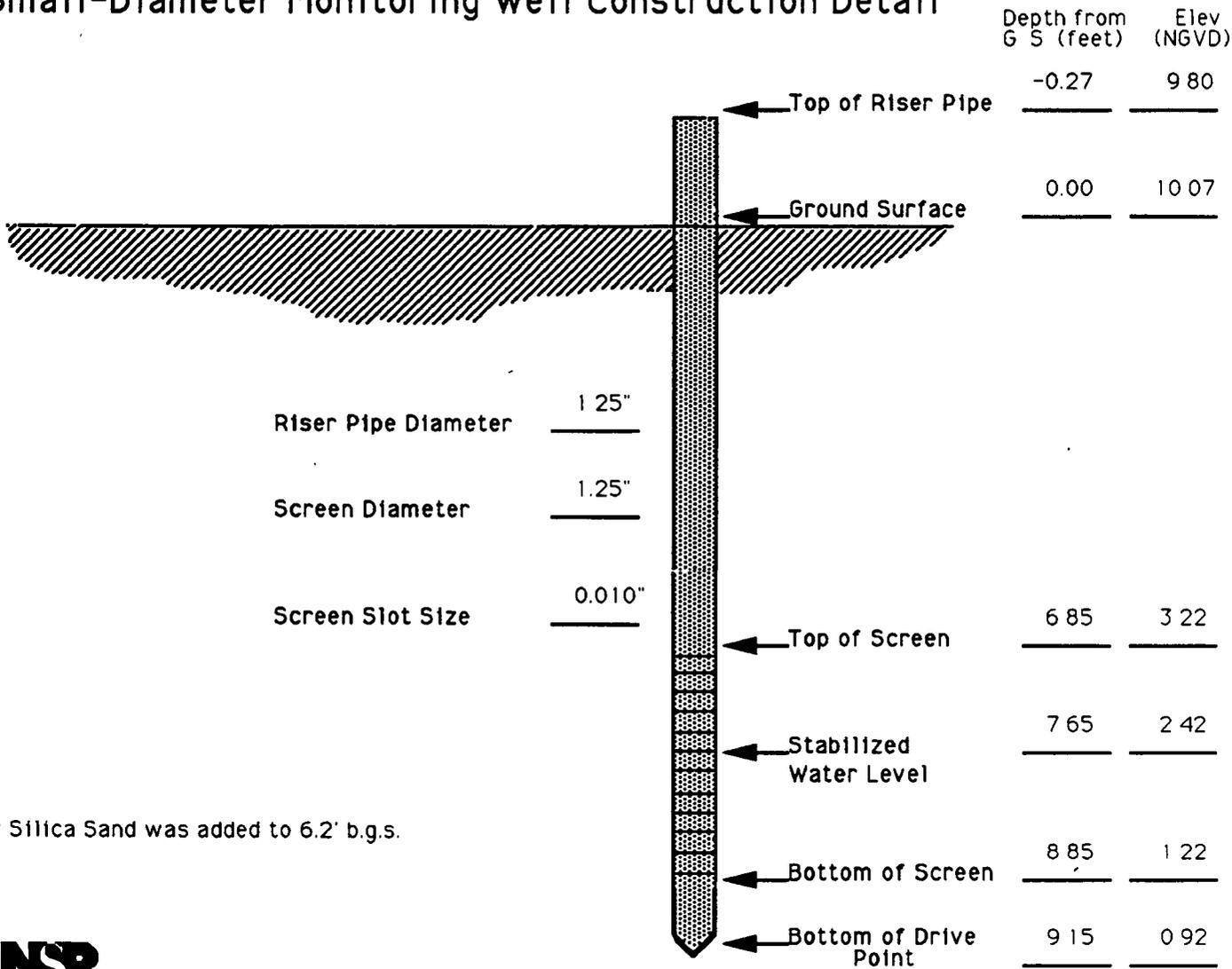
WELL No: SD-2

Well Location: Abandoned fuel oil line between Building 86 and vicinity of Structure 143

Remarks: Well material constructed of galvanized steel Date Installed: 8/2/94

Contractor: New England Boring Contractors Method: 4" Solid Stem Auger Inspector: J. Junod

Small-Diameter Monitoring Well Construction Detail



Project No: 5060-045 Client: HNUS/Navy Site: CHI, Newport, RI

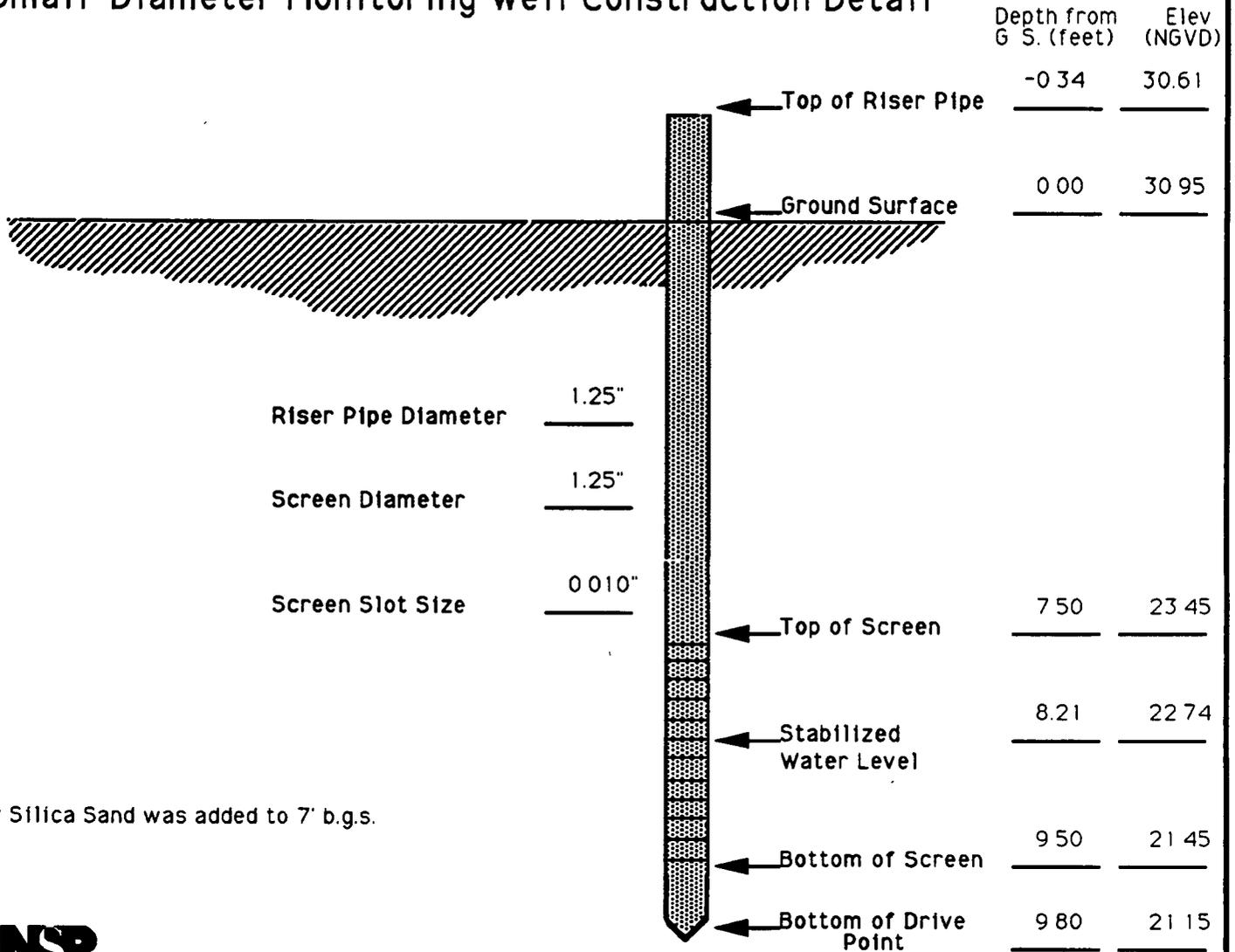
WELL No: SD-7

Well Location: Fuel oil line from Structure 74 to Porter Avenue

Remarks: Well material constructed of galvanized steel Date Installed: 8/2/94

Contractor: New England Boring Contractors Method: 4" Solid Stem Auger Inspector: J. Junod

Small-Diameter Monitoring Well Construction Detail



Project No: 5060-045 Client: HNUS/Navy Site: CHI, Newport, RI

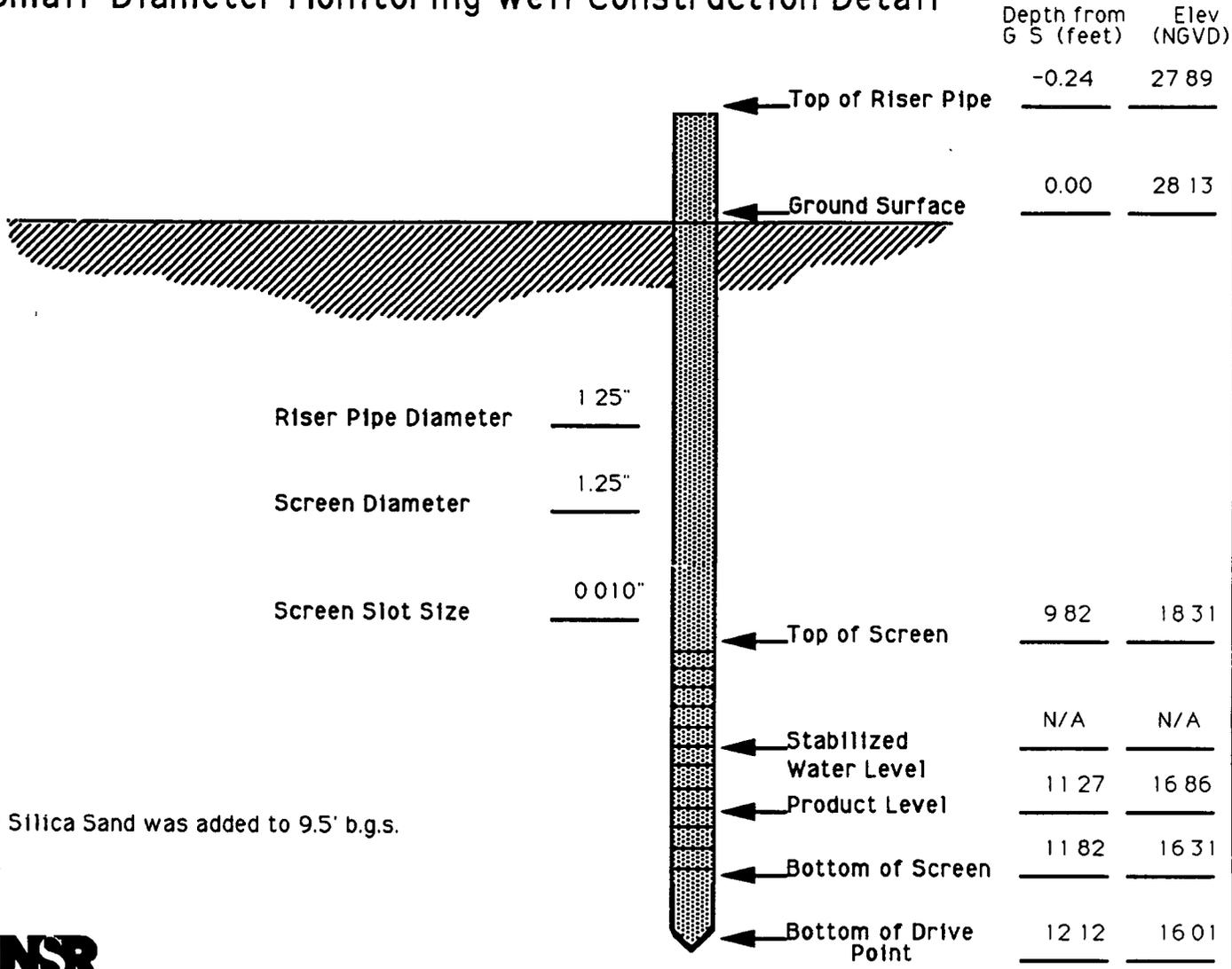
WELL No: SD-8

Well Location: Fuel oil line from Structure 74 to Porter Avenue

Remarks: Well material constructed of galvanized steel Date Installed: 8/2/94

Contractor: New England Boring Contractors Method: 4" Solid Stem Auger Inspector: J Junod

Small-Diameter Monitoring Well Construction Detail



*#2 Silica Sand was added to 9.5' b.g.s.



Project No: 5060-045 Client: HNUS/Navy Site: CHI, Newport, RI

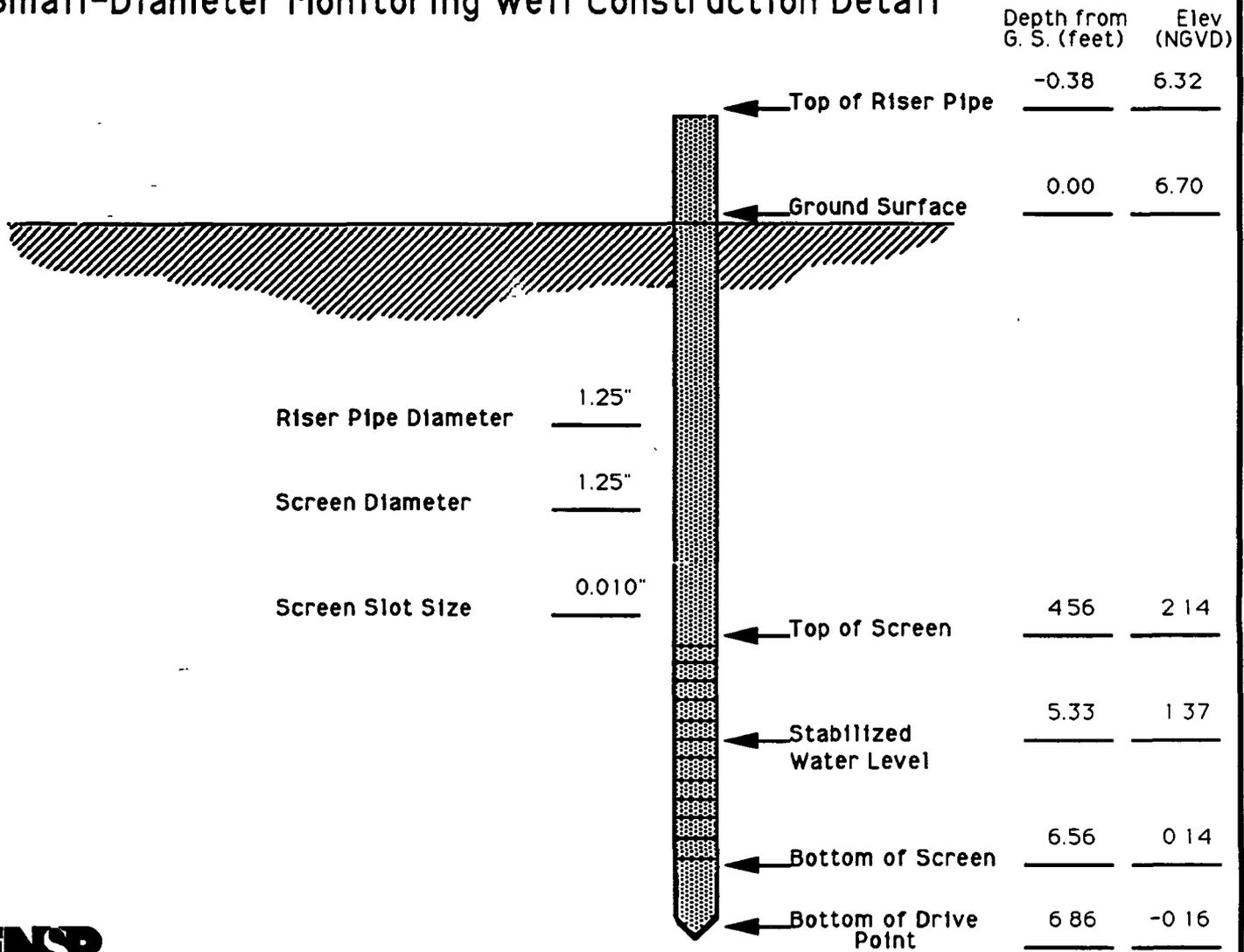
WELL No: SD-17

Well Location: Storm drain line east of Structure 143

Remarks: Well material constructed of galvanized steel Date Installed: 8/9/94

Contractor: New England Boring Contractors Method: 4" Solid Stem Auger Inspector: J. Junod

Small-Diameter Monitoring Well Construction Detail



ENSR

Project No: 5060-045 Client: HNUS/Navy Site: CHI, Newport, RI

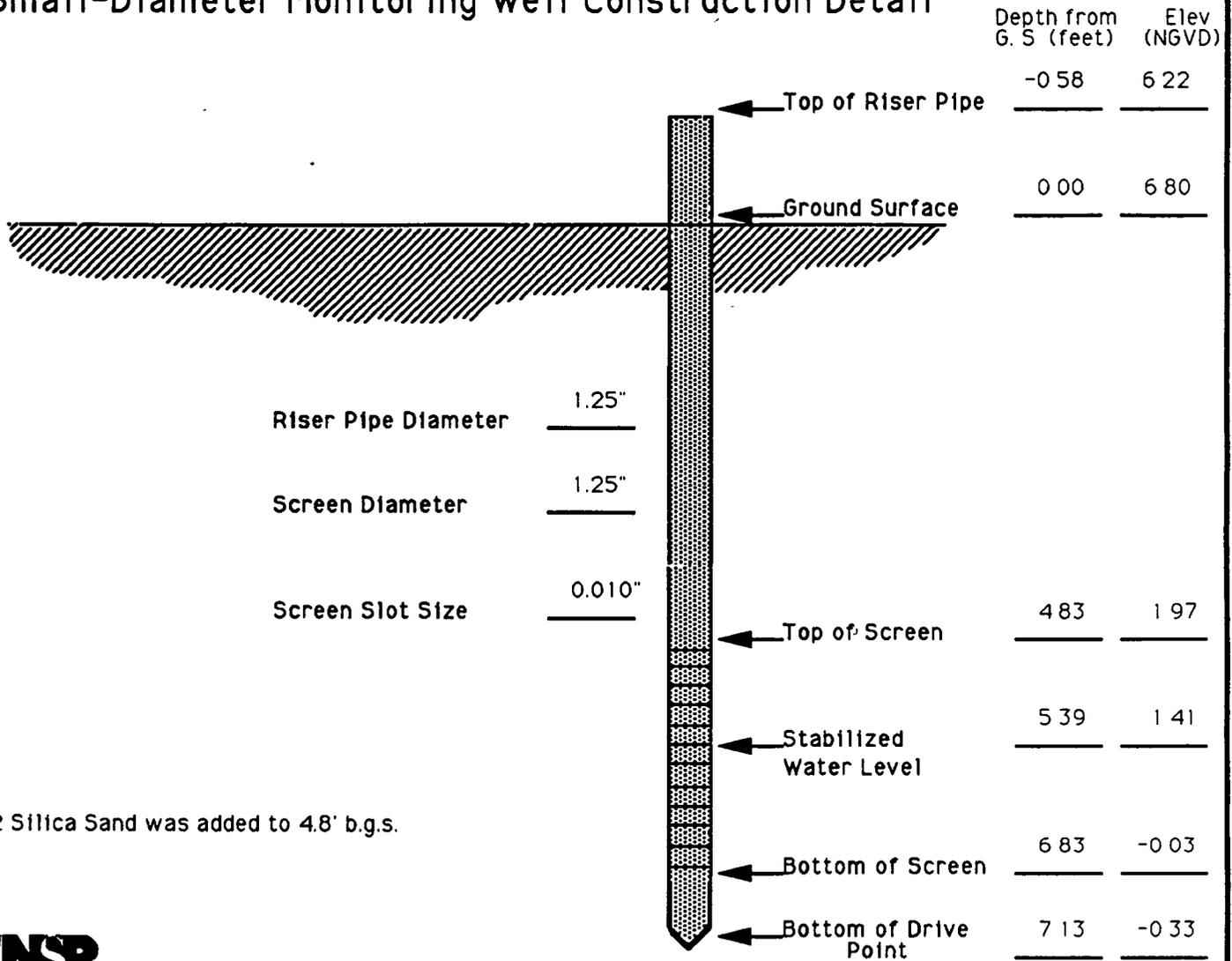
WELL No: SD-18

Well Location: Storm drain line east of Structure 143

Remarks: Well material constructed of galvanized steel Date Installed: 8/9/94

Contractor: New England Boring Contractors Method: 4" Solid Stem Auger Inspector: J Junod

Small-Diameter Monitoring Well Construction Detail



Project No: 5060-045 Client: HNUS/Navy Site: CHI, Newport, RI

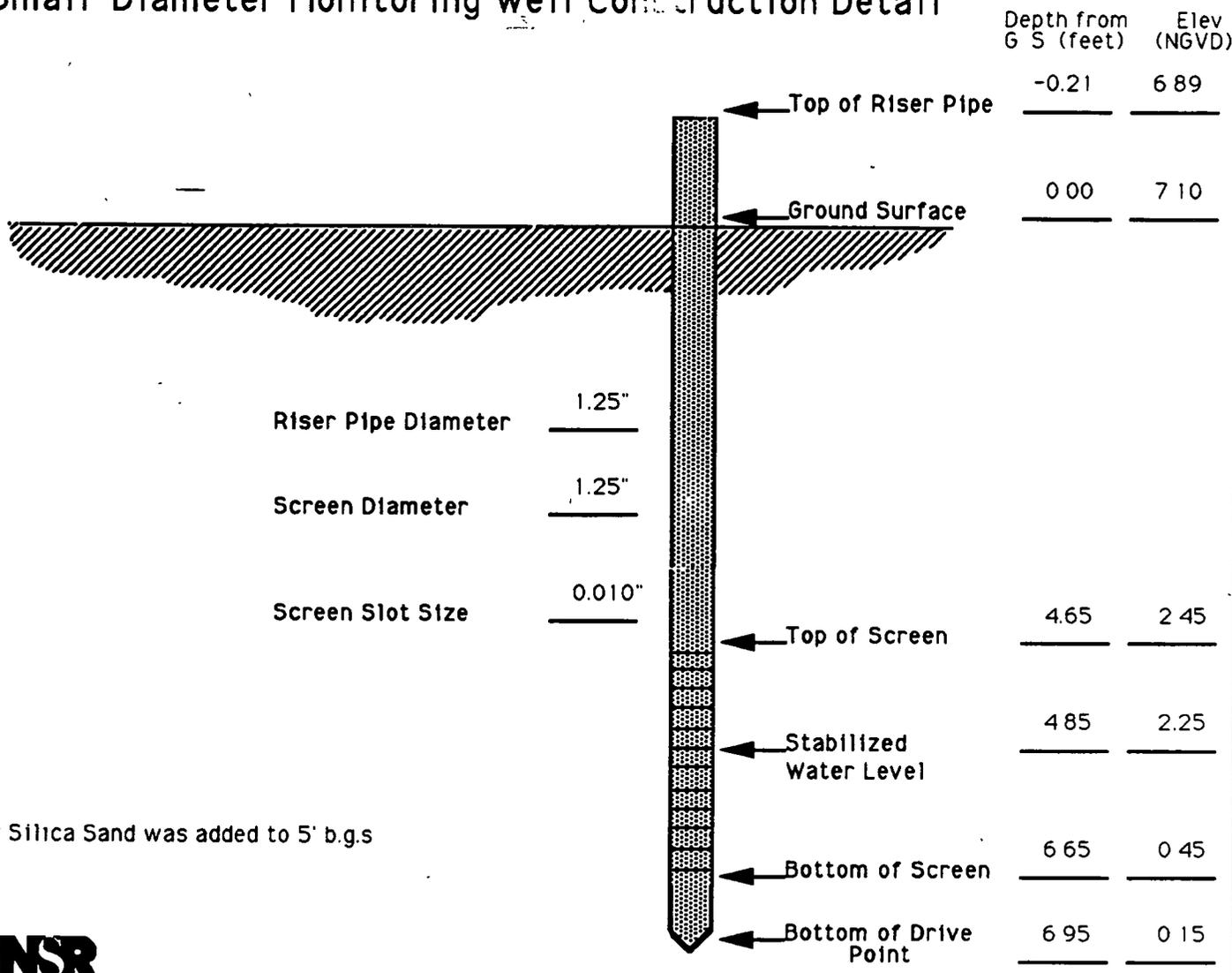
WELL No: SD-20

Well Location: Storm drain line east of Structure 143

Remarks: Well material constructed of galvanized steel Date Installed: 8/9/94

Contractor: New England Boring Contractors Method: 4" Solid Stem Auger Inspector: J Junod

Small-Diameter Monitoring Well Construction Detail



Riser Pipe Diameter 1.25"
 Screen Diameter 1.25"
 Screen Slot Size 0.010"

#2 Silica Sand was added to 5' b.g.s



Project No: 5060-045 Client: HNUS/Navy Site: CHI, Newport, RI

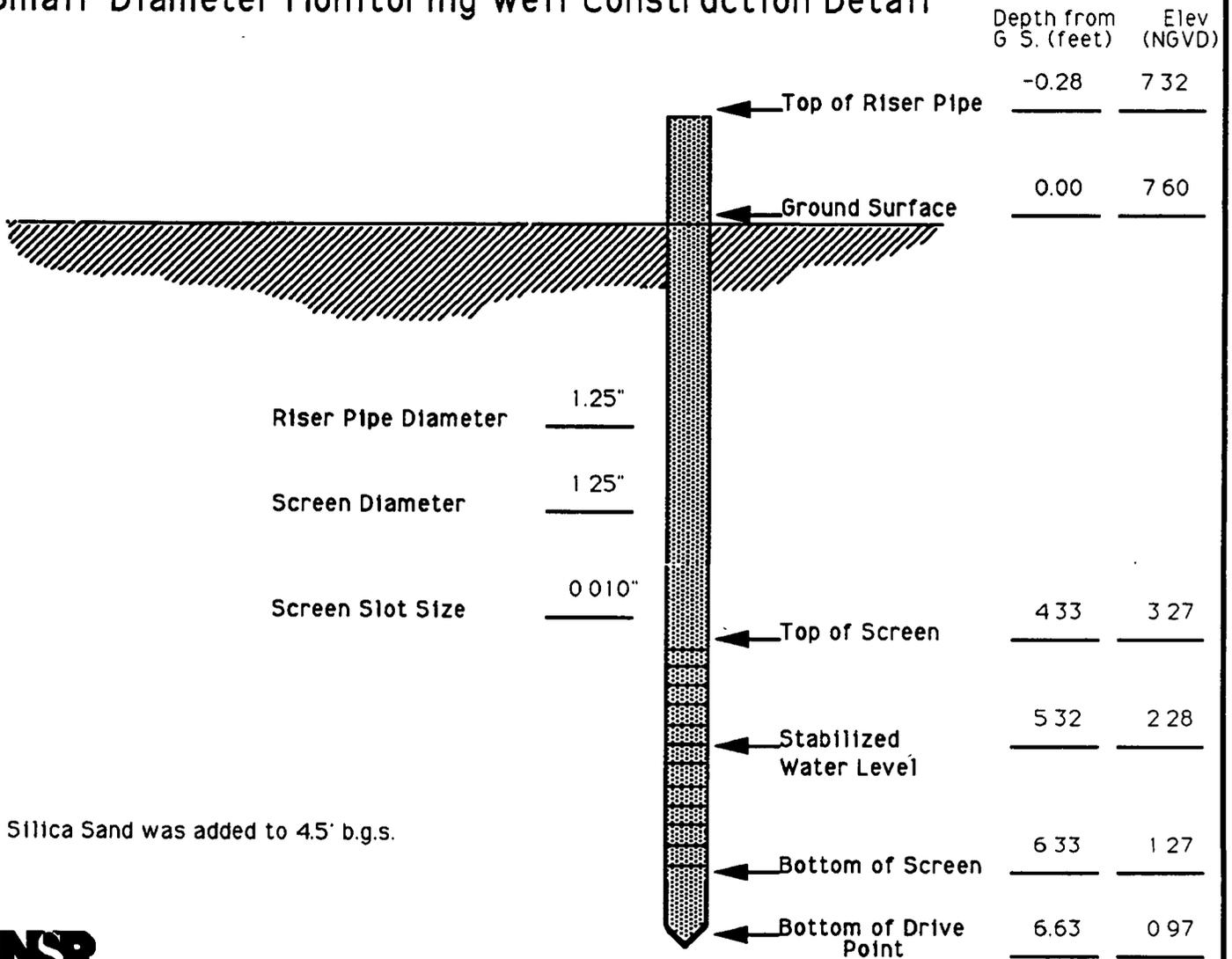
WELL No: SD-21

Well Location: Storm drain line east of Structure 143

Remarks: Well material constructed of galvanized steel Date Installed: 8/10/94

Contractor: New England Boring Contractors Method: 4" Solid Stem Auger Inspector: J Junod

Small-Diameter Monitoring Well Construction Detail



BORING NO.:	MW-5	CONTRACTOR:	CDS	DATE STARTED:	4/25/90
PROJECT NO.:	6760-MB1	DRILLERS:	GAYLORD/QUINN	DATE COMPLETED:	4/25/90
PROJECT:	U.S. NAVY-NETC	TRC INSPECTOR:	GLEZEN/MCMORROW	WATER TABLE LEVEL:	12 FT.
LOCATION:	WEMPORT, RI	DRILLING METHOD:	4 1/4" HOLLOW STEM AUGERS	LOCATION:	N 10.148 E 4.551
SITE:	09-FIREFIGHTER	GROUND ELEVATION:	12.47		
BORING DEPTH:	18 FT.	CASING ELEVATION:	12.30		

DEPTH (FT)	BLOWS	MNU (PPM)	SOIL DESCRIPTION (RECOVERY)	LITHOLOGY	WELL CONSTRUCTION
0 - 0.5			ASPHALT		
0.5 - 2.5	13 11 15 5	0.6	FINE SAND AND SILT, SOME GRAVEL, BROWN (24")	0.0	FLUSH MOUNT CEMENT/BENTONITE GROUT
2.5 - 4	4 14 5	0.4	F - M SAND, SOME GRAVEL, BLACK (6")		2.0 BENTONITE SEAL TOP OF SAND
4 - 6	3 2 2 9	0.4	SILT AND FINE SAND, LITTLE CLAY, BROWN, MOIST (8")		4.0 TOP OF SCREEN
6 - 8	8 14 14 15	0.4	SILT, SOME FINE SAND, LITTLE GRAVEL, GRAY, MOIST (18")		6.0 TOP OF SCREEN
8 - 10	15 13 20 32	0.4	SILT, SOME FINE SAND, LITTLE CLAY, GRAY, MOIST (18")		8.0 TOP OF SCREEN
10 - 12	1 6 10 18	0.4	SAME AS ABOVE (14")		
12 - 14	13 16 16 10	0.4	SILT AND FINE SAND, TRACE M. SAND, BLACK, PETROL ODOR, WET (3") SILT AND FINE SAND, BROWN, SLIGHT ODOR, WET (15")		2" PVC SCREEN 10 SLOT
14 - 16	28 73 100/6"	0.5	SILT AND FINE SAND, TRACE GRAVEL, BROWN, DENSE (14")		
16 - 18	31 91 100/4"	0.4	SILT AND FINE SAND, SOME ROCK FRAGMENTS, BROWN (6") WEATHERED SHALE, GRAY (4")	18.0	SAND PACK (NO. 2) BOTTOM OF WELL

END OF BORING - 18 FT

VERY SLIGHT PETROLEUM ODOR AT 12 FT

SAMPLE FF-MWS1-425 TAKEN FROM 8-10 FT.

SAMPLE FF-MWS2-425 TAKEN FROM 12-14 FT.

Monitoring Well: MW-7S
 Site 09 - Old Fire Fighting Training Area
 NETC - Newport
 Well Depth: 13 Feet

Drilling Company: Hardin-Huber, Inc.
 Drillers: M. Stawas
 TRC Inspector: B. Reilly & J. Breen
 Monitoring Well Coordinates:
 N 156781.40
 E 547262.98

Date Started: November 29, 1993
 Date Completed: November 29, 1993
 Depth to Water: 3.85 Feet (01/04/94)
 Monitoring Well Elevations:
 Top of PVC = 10.34 Feet (mlw)
 Ground Elevation = 10.91 Feet (mlw)

Depth (feet)	Blow Counts	Field Measurements		Soil Description	Lithology	Monitoring Well Construction
		OVA (ppm)	HNu (ppm)			
0-2	3 44	22	ND	ND	0-12" Brown F SAND, little cobbles, trace silt. 12-16" COBBLES. 16-20" Brown F SAND, trace gravel, dry, no odor.	
2-4	9 9	9	ND	ND	0-3" ROCK fragments. 3-15" Grey F SAND & SILT, trace gravel, dry, no odor.	
4-6	8 8	12 13	7	6	0-8" Brown F SAND, some silt. 8-11" Black F SAND & GRAVEL, petroleum odor. 11-17" Brown F SAND, little silt, wet.	
6-8	3 3	3	ND	ND	Gray F SAND, some silt, wet, slight petroleum odor. Recovery = 6".	
8-10	6 10	8 22	700	ND	Grey F SAND, some silt, wet, slight petroleum odor. Recovery = 20".	
10-12	28 14	15 8	ND	ND	Grey F SAND, some silt, trace gravel, wet, no odor. Recovery = 22".	
12-14	4 7	6 8	ND	ND	Grey F SAND, some silt, trace gravel, wet, no odor. Recovery = 20".	

Sample FF-M71-112993 collected from 0-2'.
 Sample FF-M72-112993 collected from 2-4'.

Notes: ND = Not Detected
 Depth to Water Measured From Top of PVC.

GZA GEOTECHNICAL, INC.
 140 BROADWAY, PROVIDENCE, RHODE ISLAND
 GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

PROJECT
 NETC STRUCTURE 74
 NEWPORT, RHODE ISLAND

REPORT OF BORING No. MW-101
 SHEET 1 OF 2
 FILE No. 51329
 CHKD. BY ABU

BORING Co. D.L. MAHER DRILLING, INC.
 FOREMAN JOHN BOWEN
 GZA ENGINEER MARK DALPE

BORING LOCATION SEE LOCATION PLAN
 GROUND SURFACE ELEVATION DATUM
 DATE START 10/21/93 DATE END 10/22/93

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.
 CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb. HAMMER FALLING 24 in.
 CASING SIZE: 8" OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER	CASING	STABILIZATION TIME
10/22/93	0745	36'	20'	16 HOURS
10/25/93	0930	21.7	OW	73 HOURS
11/05/93	---	19.1	WELL	14 DAYS

DEPTH	C A S I N G S	SAMPLE			SAMPLE DESCRIPTION <u>Burmister CLASSIFICATION</u>	STRATUM- DESCRIPTION	EQUIPMENT INSTALLED		FIELD HNU TESTING	REMARKS
		No.	PEN./ REC.	DEPTH (Ft.)			BLOWS/6"			
						BROWN COARSE TO FINE SAND		P V C R I S T E R		1.
5						2'+ SHALE/ CONGLO- MERATE (BEDROCK)	6'	Bent. Seal	ND (0-6')	
10							8'		ND (10-15')	
15										
20									ND (15-25')	
25										
30								P V C S C R E E N		
35								F I L T E R S A N D	ND (35-40')	4.

REMARKS: 1. Stratum description based on visual inspection of drill cuttings.
 2. Eight inch hole advanced using Barber Dual air-rotary system.
 3. Bit "downpressure" approximately 100 psi.
 4. Change in rock cutting color from light gray to dark gray at 37'+.
 5. No petroleum odors or discoloration/sheen observed.

NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED. FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

DEPTH	CASING	BLOWS	SAMPLE			SAMPLE DESCRIPTION <u>Burmister CLASSIFICATION</u>	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD TESTING	REMARKS
			No.	PEN./REC.	DEPTH (FT.)					
45								PVC FILTER SAND		5-6.
50						End of Exploration at 50'+				
55										
60										
65										
70										
75										
80										
85										

REMARKS: 6. Forty feet of 0.02" slotted, 4.0" diameter, Sch 40, PVC well screen was placed from 50' to 10'+ topped with 10'+ of solid PVC riser tube. Filter sand was poured up to 8'+ and a bentonite seal placed from 8' to 6'+. The wellhead was secured with a 4' long steel guard pipe with locking cover grouted 2.0 into the surface with concrete.

NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED. FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

GZA GEOTECHNICAL INC.
140 BROADWAY, PROVIDENCE, RHODE ISLAND
GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

PROJECT
NETC STRUCTURE 74
NEWPORT, RHODE ISLAND

REPORT OF BORING No. MW-102
SHEET 1 OF 2
FILE No. 37329
CHKD. BY ABU

BORING Co. D.L. MAHER DRILLING, INC.
FOREMAN JOHN BOWEN
GZA ENGINEER MARK DALPE

BORING LOCATION SEE LOCATION PLAN
GROUND SURFACE ELEVATION DATUM
DATE START 10/22/93 DATE END 10/22/93

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.
CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb. HAMMER FALLING 24 in.
CASING SIZE: 8" OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER	CASING	STABILIZATION TIME
10/25/93	0930	24.8	OW	42 HOURS
11/05/93	---	21.5	WELL	14 DAYS

DEPTH	C A S I N G	B L O W S	SAMPLE		SAMPLE DESCRIPTION <u>Burmister</u> CLASSIFICATION	STRATUM DESCRIPTION	EQUIPMENT INSTALLED		FIELD HNU TESTING	REMARKS
			No.	PEN./REC.			DEPTH (Ft.)	BLOWS/6"		
5						COARSE TO FINE SAND 0.5'+ SHALE/ CONGLOMERATE (BEDROCK)	PVC RISER	Grout	ND (0-10')	
							6'	Bent. Seal		
10							8'		ND (10-25')	
15										
20										
25										
30										
35									ND (25-35')	

REMARKS: 1. Stratrum description based on visual inspection of drill cuttings.
2. No petroleum odors or discoloration observed.
3. Eight inch hole advanced using Barber Dual air-rotary system.
4. Bit air pressure was approximately 100 psi.
5. Forty feet of .02" slotted, 4.0" diameter, Sch 40, PVC wellscreen was placed from 50' to 10' and topped with 10' of solid PVC riser tube. Filter sand was poured up to 8'+ and a bentonite seal placed from 8' to 6'+. The well head was secured with a 4' long steel guard pipe with locking cover, grouted into the surface with concrete.

NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED. FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

GZA

BORING No. MW-102

GZA GEONVIRONMENTAL INC.
 140 BROADWAY, PROVIDENCE, RHODE ISLAND
 GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

PROJECT
 NETC STRUCTURE 74
 NEWPORT, RHODE ISLAND

REPORT OF BORING No. MW-104
 SHEET 1 OF 1
 FILE No. 31329
 CHKD. BY ABU

BORING Co. D.L. MAHER DRILLING, INC.
 FOREMAN JOHN BOWEN
 GZA ENGINEER MARK DALPE

BORING LOCATION SEE LOCATION PLAN
 GROUND SURFACE ELEVATION DATUM
 DATE START 10/25/93 DATE END 10/25/93

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.
 CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb. HAMMER FALLING 24 in.
 CASING SIZE: 8" OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER	CASING	STABILIZATION TIME
10/26/93	0730	8.4	OW	16 HOURS
11/05/93	---	7.7	WELL	11 DAYS

DEPTH	C A S I N G	B L O W S	SAMPLE		SAMPLE DESCRIPTION <u>Burmister CLASSIFICATION</u>	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD HNU TESTING	REMARKS
			No.	PEN./REC.					
5					TAN/BROWN COARSE TO FINE SAND		PVC RISER Grout Bent. Seal	2.0 PPM (0-10')	1.
10					6'+ SHALE/ CONGLOMERATE (BEDROCK)		PVC RISER Submersible	3.0 PPM (10-26')	2. 3. 4. 5. 6.
25							FILTER SAND	NO (20-30')	7. 8.
35					End of Exploration at 35'+				

REMARKS:

- Stratum description based on visual inspection of drill cuttings.
- Petroleum-like odor noted.
- Eight inch hole advanced using Barber Dual air-rotary system.
- Bit "air pressure" approximately 100 psi.
- Borehole developed using compressed air.
- Seen observed; no "greasy" consistency or odor.
- Thirty feet of .02" slotted, 4.0" diameter, Sch 40, PVC wellscreen was placed from 35'+ up to 5'+ and topped with 5' of solid PVC riser tube. Filter sand was poured up to 3'+ and a bentonite seal placed from 3'+ up to 1'+. The wellhead was secured with a 4' long steel guard pipe with locking cover grouted into the surface with concrete.
- The contractor steam cleaned casing and tools prior to initiating MW-105.

NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
 2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

BORING Co. D.L. MAHER DRILLING, INC.
 FOREMAN JOHN BOWEN
 GZA ENGINEER MARK DALPE

BORING LOCATION SEE LOCATION PLAN
 GROUND SURFACE ELEVATION DATUM
 DATE START 10/26/93 DATE END 10/26/93

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.
 CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb. HAMMER FALLING 24 in.
 CASING SIZE: 8" OTHER:

GROUNDWATER READINGS				
DATE	TIME	WATER	CASING	STABILIZATION TIME
11/05/93	---	14.4	WELL	10 DAYS

DEPTH	C B L O W S A S N G S	SAMPLE			SAMPLE DESCRIPTION <u>Burmister</u> CLASSIFICATION	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD HNU TESTING	REMARKS
		No.	PEN./REC.	DEPTH (Ft.)					
5						TAN/BROWN COARSE TO FINE SAND 3'+	1' PVC RISER TUBE Grout Bent. Seal	ND (0-10')	1.
10						SHALE/ CONGLOMERATE (BEDROCK)	3' PVC RISER TUBE 5' FILTER SAND	ND (10-20')	2. 3. 4. 5. 6.
15									
20									
25								ND (20-30')	
30									
35					End of Exploration 35'±				

REMARKS: 1. Stratrum description based on visual inspection of drill cuttings.
 2. No petroleum odor/dicoloration observed.
 3. Eight inch hole advanced using Barber Dual air-rotary system.
 4. Bit "air pressure" approximately 100 psi.
 5. Borehole developed using compressed air.
 6. Thirty feet of .02" slotted, 4.0" diameter, Sch 40, PVC wellscreen was placed from 35'+ up to 5'+ and topped with 5' of solid PVC riser tube. Filter sand was poured up to 3'+ and a bentonite seal placed from 3'+ up to 1'+. The wellhead was secured with a 4' long steel guard pipe with locking cover grouted into the surface with concrete.
 7. The contractor steam cleaned casing and tools used at MW-105 prior to leaving site.

NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED. FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

BORING Co. GZA DRILLING, INC.
 FOREMAN DAVID ANDERSEN
 GZA ENGINEER WILLIAM FORTUNE

BORING LOCATION SEE LOCATION PLAN
 GROUND SURFACE ELEVATION DATUM
 DATE START 5/9/94 DATE END 5/9/94

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.
 CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb. HAMMER FALLING 24 in.
 CASING SIZE: 3" TO 10 FEET OTHER: NX CORE BARREL TO 15.5 FT

GROUNDWATER READINGS				
DATE	TIME	WATER	CASING	STABILIZATION TIME
5/9/94	1300	7.2	WELL	2.5 HOURS
6/3/94	---	7.8	WELL	4 WEEKS

DEPTH	CBL ASNGS	SAMPLE				SAMPLE DESCRIPTION <u>Burmister</u> CLASSIFICATION	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD TESTING	REMARKS
		No.	PEN./ REC.	DEPTH (Ft.)	BLOWS/6"					
5						OVERBURDEN SOIL	Flush mounted curb box set in cement surface seal			
						3'+ GRAY CONDOMERATE BEDROCK	2" PVC riser pipe to 5.5'			1
							Bentonite seal 2-2.5'			
							Filter sand 4 - 15.5'			
10		C-1	66/6	10-15.5	RQD=0% REC=9%	Conglomerate (Poor Recovery)	2" PVC well screen 5.5-15.5'			2 3
15										4
20						BOTTOM OF BORING AT 15.5' FT				
25										
30										
35										

REMARKS:
 1. Apparent top of conglomerate at 3 feet (based on change in drilling penetration rate). Drilling penetration in bedrock was approximately 3 minutes per foot.
 2. Spun 3" casing to a depth of 10 feet (using drilling water).
 3. Used NX type core barrel from 10 to 15.5 feet.
 4. Approximately 50 gallons of drilling water entered the formation during drilling.
 5. 10 feet of 0.01 inch slotted, 2" diameter, PVC well screen was placed from 5.5 to 15.5 feet and topped with 5.5 feet of PVC riser pipe. Filter sand was backfilled around the well screen to a depth of 4 feet and a bentonite seal was placed between a depth of 2 to 2.5 feet. The wellhead was secured with a 1 foot long aluminum curb box, grouted into place using concrete.
 6. No odors of visual signs of contamination were observed.

NOTES:
 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED. FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

GZA GEOTECHNICAL INC.
 140 BROADWAY, PROVIDENCE, RHODE ISLAND
 GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

PROJECT
 NETC STRUCTURE 74
 NEWPORT, RHODE ISLAND

REPORT OF BORING No. MW-107
 SHEET 1 OF 1
 FILE No. 31329.2
 CHKD. BY ABU

BORING Co. GZA DRILLING, INC.
 FOREMAN DAVID ANDERSEN
 GZA ENGINEER WILLIAM FORTUNE

BORING LOCATION SEE LOCATION PLAN
 GROUND SURFACE ELEVATION _____ DATUM _____
 DATE START 5/9/94 DATE END 5/9/94

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.
 CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb. HAMMER FALLING 24 in.
 CASING SIZE: 3" TO 5 FEET OTHER: NX CORE BARREL TO 15 FEET

GROUNDWATER READINGS				
DATE	TIME	WATER	CASING	STABILIZATION TIME
5/9/94	---	7.2	WELL	0.5 HOURS
6/3/94	---	8.7	WELL	4 WEEKS

DEPTH	C A S I N G S	B L O W S	SAMPLE			SAMPLE DESCRIPTION Burmister CLASSIFICATION	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD TESTING	R E M A R K S
			No.	PEN./ REC.	DEPTH (Ft.)					
5			C-1	60/6	5-10	RQD=0% REC=10%	Conglomerate (Poor Recovery)	OVERBURDEN SOIL 4.8'+ GRAY CONGLOMERATE BEDROCK	Flush mounted curb box set in cement surface seal 2" PVC riser pipe to 5' Bentonite seal 1-1.5'	1 2
10			C-2	60/6	10-15	RQD=0% REC=10%	Conglomerate (Poor Recovery)	Filter sand 2-15' 2" PVC well screen 5' - 15'		3 4
15							BOTTOM OF BORING AT 15' FT			5
20										
25										
30										
35										

REMARKS:
 1. Apparent top of conglomerate at 4.8 feet (based on change in drilling penetration rate). Drilling penetration in bedrock was approximately 3 minutes per foot.
 2. Spun 3" casing to a depth of 5 feet (using drilling water) then used NX type core barrel for remainder of borehole.
 3. Approximately 60 gallons of drilling water entered the formation during drilling.
 4. 10 feet of 0.01 inch slotted, 2" diameter, PVC well screen was placed from 5.0 to 15.0 feet and topped with 5.0 feet of PVC riser pipe. Filter sand was backfilled around the well screen to a depth of 2 feet and a bentonite seal was placed between a depth of 1 to 1.5 feet. The wellhead was secured with a 1 foot long aluminum curb box, grouted into place using concrete.
 5. After the well stabilized, the groundwater had a petroleum-like odor.

NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITIONS MAY BE GRADUAL.
 2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED. FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

BORING Co. GZA DRILLING, INC.
 FOREMAN DAVID ANDERSEN
 GZA ENGINEER MARK DALPE

BORING LOCATION SEE LOCATION PLAN
 GROUND SURFACE ELEVATION DATUM
 DATE START 5/10/94 DATE END 5/10/94

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 LB. HAMMER FALLING 30 IN.
 CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 LB. HAMMER FALLING 24 IN.
 CASING SIZE: 3" TO 9 FEET OTHER: ROLLER BIT TO 17 FEET

GROUNDWATER READINGS				
DATE	TIME	WATER	CASING	STABILIZATION TIME
5/10/94	1000	6.3	WELL	1 HOUR
6/3/94	---	8.4	WELL	4 WEEKS

DEPTH	CBL SNGS	SAMPLE				SAMPLE DESCRIPTION <u>Burmister CLASSIFICATION</u>	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD TESTING	REMARKS
		No.	PEN./ REC.	DEPTH (Ft.)	BLOWS/6"					
5		S-1	24/13	0.2-2.2	3-4 4-5	Loose, black/brown, coarse to fine SAND and Slag, little Ash, trace Silt (FILL)	ASPHALT	Grout	ND	1 2
							0.2'			
10		S-2	24/10	5-7	25-25 38-28	Very dense, gray, GRAVEL (SHALE) little Silt, little coarse to fine Sand (GLACIAL TILL)	5'	PVC SCREEN	ND	3 4
							GLACIAL TILL			
15		S-3	8/8	8-8.7	33-100/2"	Very dense, gray, coarse to fine SAND and Silt, little Gravel (GLACIAL TILL)	9'+	Filter Sand	28	4
							APPARENT BEDROCK			
20										5
										6
BOTTOM OF BORING AT 17' FT										

REMARKS:
 1. Field photoionization detector readings were obtained using an HNU meter equipped with a 10.2 electron volt lamp. Readings are in parts per million (ppm). ND indicates less than detection limit of 0.1 ppm.
 2. 3" flush-joint casing advanced to 9'+; roller bit advanced to 17'+.
 3. Apparent top of bedrock at 9 feet (based on change in drilling penetration rate). 17 to 2'
 4. Petroleum odors and visual signs of contamination observed.
 5. 15' of .01" slotted, 2.0" diam., sch 40, PVC well screen was placed from 17 to 21 feet and topped with 2' of solid PVC riser tube. Filter sand was poured up to 1'. The wellhead was secured with a 1' long aluminum curb box grouted into the surface with concrete.
 6. Approximately 40 gallons of drill water entered the formation during drilling.

NOTES:
 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
 2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

GZA GEOENVIRONMENTAL INC.
140 BROADWAY, PROVIDENCE, RHODE ISLAND
GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

PROJECT
NETC STRUCTURE 74
NEWPORT, RHODE ISLAND

REPORT OF BORING No. MW-109
SHEET 1 OF 1
FILE No. 31529.2
CHKD. BY ABU

BORING Co. GZA DRILLING, INC.
FOREMAN DAVID ANDERSEN
GZA ENGINEER MARK DALPE

BORING LOCATION SEE LOCATION PLAN
GROUND SURFACE ELEVATION DATUM
DATE START 5/10/94 DATE END 5/10/94

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.
CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb. HAMMER FALLING 24 in.
CASING SIZE: 3" TO 2.5 FEET OTHER: NX CORE BARREL TO 17.5 FT

GROUNDWATER READINGS				
DATE	TIME	WATER	CASING	STABILIZATION TIME
6/3/94	---	14.0	WELL	3 WEEKS

DEPTH	C B A L L O W S	SAMPLE				SAMPLE DESCRIPTION <u>Burmister CLASSIFICATION</u>	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD TESTING	REMARKS
		No.	PEN./ REC.	DEPTH (Ft.)	BLOWS/6"					
5		C-1	60/3	2.5-7.5	RQD=0% REC=5%	Hard, slightly weathered moderately fractured, gray conglomerate. Few inclusions, slight manganese staining on fracture surfaces. Fracture $\leq 90^{\circ}-45^{\circ}$ (inconsistent) 3mm thick QTZ vein	TOPSOIL	Grout .5' Bent. 1.5' 2.5' Filter Sand		1 2 3
							1' TILL			
							2.5' APPARENT BEDROCK CONGLOMERATE			
10		C-2	60/3	7.5-12.5	RQD=0% REC=5%					
15		C-3	60/3	12.5-17.5	RQD=0% REC=5%					
20						BOTTOM OF BORING AT 17.5 FT				
25										
30										
35										

REMARKS:

- No odors or evidence of contamination observed.
- 15' of .01" slotted, 2.0" diam., sch 40, PVC well screen was placed from 17.5 to 2.5'+ and topped with 2.5' of solid PVC riser tube. Filter sand was poured up to 1.5'+ and a bentonite seal placed from 1.5'+ up to .5'+. The wellhead was secured with a 5' long steel guard pipe with locking cover, grouted into the surface with concrete.
- Approximately 50 gallons of drill water entered the formation during drilling.

NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED. FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

GZA

BORING No. MW-109

GZA GEOENVIRONMENTAL, INC.
140 BROADWAY, PROVIDENCE, RHODE ISLAND
GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

PROJECT
NETC LIBRARY ADDITION
NEWPORT, RHODE ISLAND

REPORT OF BORING No. GZ-1
SHEET 1 OF 1
FILE No. 51330
CHKD. BY ABU

BORING CO. GZA DRILLING, INC.
FOREMAN CHRIS LENCING
GZA ENGINEER MARK DALPE

BORING LOCATION SEE LOCATION PLAN
GROUND SURFACE ELEVATION _____ DATUM _____
DATE START 10/20/93 DATE END 10/20/93

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 LB HAMMER FALLING 30 in. CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb. HAMMER FALLING 24 in. CASING SIZE: 3" OTHER:	10-20-93	1230	11.5'	10'	.5 HOURS
	10-21-93	1030	15.2'	OW	22 HOURS
	10-22-93	0800	16.35	OW	38 HOURS
	10-25-93	0930	17.30	OW	5 DAYS
	11-05-93	---	16.5	OW	16 DAYS

DEPTH	CASING	BLOWNS	SAMPLE			SAMPLE DESCRIPTION <u>Burmister CLASSIFICATION</u>	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD HNU TESTING	REMARKS	
			No.	PEN./REC.	DEPTH (Ft.)						BLOWS/6"
5			S-1	24/23	0-2	3-11	SILTY GRAVELLY SAND AND SILTY SAND	1' PVC RISER 2' Bent. Seal 4' FILTER SAND	ND		
						20-92					
10			S-2	24/19	5-7	40-19	SHALE (BEDROCK)		ND	1-2-6.	
						20-31					
15			Core Time (min/ft)						ND		
			1	C-1	36/4	10-13					RQD=0
			1								REC=11%
20			S-3	9/9	13-13.7	59-57/3"	Moderately hard, slightly weathered (minimal staining on fracture surfaces), very fractured gray, aphanitic SHALE		ND		
			2.0	C-2	60/20	14.5-19.5					RQD=0
			3.0								REC=33%
25			1.5				Moderately hard, slightly weathered very fractured 80-90° fracture, dark gray, aphanitic SHALE		ND	3.	
			2.0								
			1.5	C-2	60/30	19.5-24.5					RQD=17%
30			2.0						ND	4-5.	
			3.0								
			2.5								
35			3.0				End of Exploration at 25'+				

REMARKS:

- Casing span to 10 feet.
- Core down pressure approximately 1000 psi at approximately 240 RPM; NX core.
- Approximately 400 gallons of drill water entered the formation during drilling.
- Twenty feet of 0.02" slotted 2.0" diameter, Sch 40, PVC well screen was placed from 24.0' to 4.0' and topped with 4.0'+ of solid PVC riser tube. Filter sand was poured up to 2.0'+ and a bentonite seal placed from 2.0' to 1'+. The wellhead was secured with a 1' long flush mounted curb box grouted into the surface with concrete.
- No odors or sheen/discoloration (petroleum) observed.
- RQD indicated rock quality designation and REC indicated recovery from bedrock core.

NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED, FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

GZA BORING No. MW-101

GZA GEOENVIRONMENTAL, INC.
140 BROADWAY, PROVIDENCE, RHODE ISLAND
GEOTECHNICAL/GEOHYDROLOGICAL CONSULTANTS

PROJECT
NETC LIBRARY ADDITION
NEWPORT, RHODE ISLAND

REPORT OF BORING No. GZ-2
SHEET 1 OF 1
FILE No. 31330
CHKD. BY ABU

BORING Co. GZA DRILLING, INC.
FOREMAN CHRIS LENLING
GZA ENGINEER MARK DALPE

BORING LOCATION SEE LOCATION PLAN
GROUND SURFACE ELEVATION _____ DATUM _____
DATE START 10/21/93 DATE END 10/21/93

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.

CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb. HAMMER FALLING 24 in.

CASING SIZE: 3" OTHER:

GROUNDWATER READINGS

DATE	TIME	WATER	CASING	STABILIZATION TIME
10-22-93	0800	15.00	OW	16 HOURS
10-25-93	0930	16.40	OW	3 DAYS
11-05-93	---	12.90	OW	14 DAYS

DEPTH	C A S I N G S	SAMPLE			SAMPLE DESCRIPTION <u>Burmister CLASSIFICATION</u>	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD MW TESTING	REMARKS
		No.	PEN./REC.	DEPTH (FT.)					
		S-1	24/16	0-2	3-4 7-7	SILTY GRAVELLY SAND 4.5'	.5' 1.5' PVC RISER Bent Seal 2.5'	ND	
		S-2	6/1	4-4.5	111/6"				
10		C-1	60/16	10-15	RQD=0 REC=27%	CONGLOMERATE (BEDROCK)	FILTER SAND 27.5'	ND	1. 2. 3. 4. 7.
30					End of Exploration at 30'+				

- REMARKS:
1. Apparent bedrock at 4.5'+ split spoon refusal.
 2. Roller-bit advanced to 10'+ due to poor rock quality.
 3. Roller-bit advanced from 15' to 30' due to poor rock quality.
 4. No odors or evidence of fuel-oil contamination observed.
 5. Twenty five feet of .02" slotted 2.0" diameter, Sch 40, PVC well screen was placed from 27.5'+ up to 2.5'+ and topped with 2.5' of solid PVC riser tube. Filter sand was poured up to 1.5'+ and a bentonite seal placed from 1.5'+ up to 0.5'+. The wellhead was secured with a 1' long flush mounted curb box grouted into the surface with concrete.
 6. Approximately 20 gallons of drill water entered the formation during drilling.
 7. RQD indicated rock quality designation and REC indicated recovery from bedrock core.

NOTES: 1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL.
2) WATER LEVEL READINGS HAVE BEEN MADE AT TIMES AND UNDER CONDITIONS STATED. FLUCTUATIONS OF GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE

GZA

BORING No. MW-102

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 in.

CASING: UNLESS OTHERWISE NOTED, CASING DRIVEN USING A 300 lb. HAMMER FALLING 24 in.

CASING SIZE: 3" **OTHER:**

GROUNDWATER READINGS				
DATE	TIME	WATER	CASING	STABILIZATION TIME
10-22-93	0930	13.20	OW	
10-26-93	1000	13.19	OW	1 DAY
11-05-93	---	11.40	OW	11 DAYS

DEPTH	C B A S O W S	SAMPLE			SAMPLE DESCRIPTION <u>Burmister CLASSIFICATION</u>	STRATUM DESCRIPTION	EQUIPMENT INSTALLED	FIELD HNU TESTING	REMARKS
		No.	PEN./REC.	DEPTH (Ft.)					
5		S-1	24/9	0-2	2-2	SILTY GRAVELLY SAND	PVC RISER 1' Grout 3' Bent. Seal 5' PVC 5' SUBMERGED FILTER SAND	ND	1.
					3-4				
10		S-2	24/15	5-7	10-11	SHALE OR CONGLOMERATE BEDROCK			
					15-26				
30					End of Exploration at 30'+				2. 3. 4.

REMARKS:

1. Roller bit through bedrock from 8.5 to 30 feet.
2. Twenty five feet of .02" slotted 2.0" diameter, Sch 40, PVC well screen was placed from 30.0'+ up to 5.0'+ and topped with 5.0' of solid PVC riser tube. Filter sand was poured up to 3.0'+ and a bentonite seal placed from 3.0'+ up to 1.0'+. The wellhead was secured with a 1' long flush mounted curb box grouted into the surface with concrete.
3. No oily odors or discoloration observed.
4. Approximately 40 gallons of drill water entered the formation during drilling.

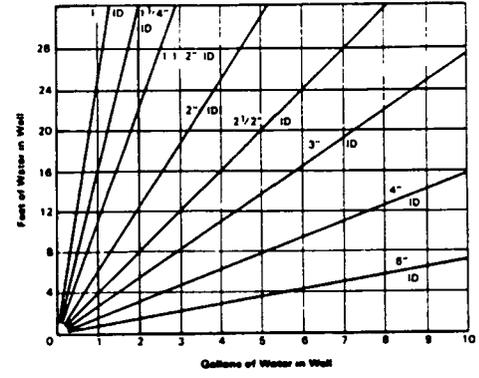
APPENDIX D
GROUNDWATER SAMPLE
COLLECTION RECORDS

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8/29/94 Time: Start 1450 am/pm
 Project Name NEWPORT UST RI Finish 1640 am/pm
 Location TAYLOR DRIVE
 Weather Conds.: PARTLY CLOUDY, 65° Collector J. JUNOD, J. KIDD

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 12.43 Well Casing Type PVC
- b. Water Table Depth 5.21' Casing Diameter 2"
- c. Length of Water Column 7.14' (a-b)
- d. Calculated Purgeable Volume 1.25 gal



2. WELL PURGEABLE DATA

- a. Purge Method WHALE PUMP
- b. Required Purge Volume (@ 3 well volumes) 3.75 GALLONS
- c. Field Testing: Equipment Used HYDAC CONDUCTIVITY / TEMP / PH TESTER

Volume Removed	T°	PH	Spec. Cond.	Color	Other
1 gal	64.9	6.53	835	LC TAN	small SHEEN
2 gal	66.4	6.48	857	"	"
3 gal	70.6	6.48	974	"	"
4 gal	72.1	6.48	971	"	"
6 gal	72.9	6.49	1001	less CLOUDY	"
7 gal	73.2	6.50	1008	"	"
9 gal	71.2	6.48	1008	"	"

3. SAMPLE COLLECTION:

Container Type	Preservation	Analysis Req	BWO1A	BWO1B
2- 1L AMBER	4°C	TPH	1545	1550
"	4°C	SVOC	1555	1600
1- PLASTIC	HNO ₃	METALS	1535	1540
3- 40 ml VOA	HCL	VOC	1525	1530

Comments _____

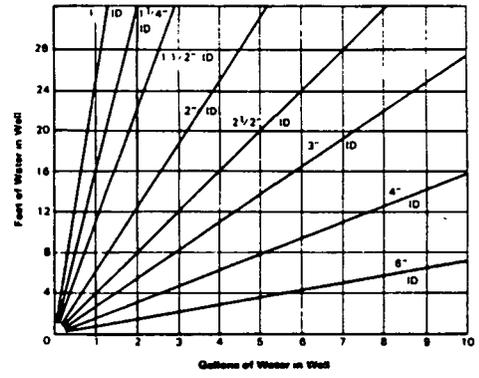
SAMPLE IDS: BWO1AA + BWO1AB

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8 29 Time: Start 1400 am/pm
 Project Name NEWPORT UST R1 Finish 1445 am/pm
 Location TAYLOR DRIVE
 Weather Conds.: CLOUDY Collector J. JUNOD, J. KIDD

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 12.1 Well Casing Type PVC
- b. Water Table Depth 5.16 Casing Diameter 2"
- c. Length of Water Column 6.94 (a-b)
- d. Calculated Purgeable Volume 1.25 gal.



2. WELL PURGEABLE DATA

- a. Purge Method WHALE PUMP
- b. Required Purge Volume (@ 3 well volumes) 3.75
- c. Field Testing: Equipment Used HYDAC CONDUCTIVITY/TEMP/pH TESTER

Volume Removed	T°	PH	Spec. Cond	Color	Other
1 gal	65.8	6.52	529	CLOUDY-TAN	ODOR
2 gal	67.6	6.23	689	"	"
3 gal	68.0	6.15	679	"	"
5.5 gal.	68.4	6.14	683	"	"
7 gal	68.2	6.04	598	"	"
8 gal	68.0	6.07	592	"	"

3. SAMPLE COLLECTION:

Method DISPOSABLE BAILER

1430
1435
1440
1450

Container Type	Preservation	Analysis Req
2 1L AMBER	COOL	TPH
3-40 ml VOA	HCl	VOC
2 1L AMBER	COOL	SUOC
1- PLASTIC	HNO ₃	METALS

Comments

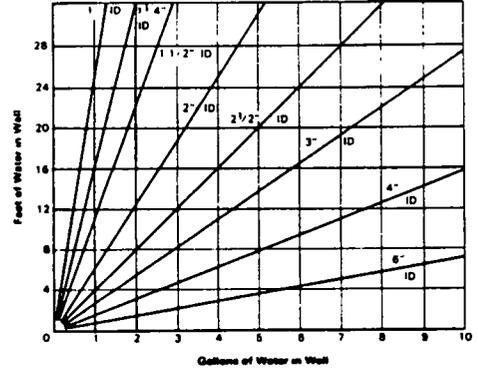
Sample ID: BW02AA

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8 29-94 Time: Start 1100 am/pm
 Project Name NEWPORT UST RI Finish 1230 am/pm
 Location TAYLOR DRIVE
 Weather Conds.: RAINY, 60° Collector J. JUNOD, J. KIDD

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 11.95' Well Casing Type PVC
- b. Water Table Depth 5.45 Casing Diameter 2"
- c. Length of Water Column 6.5 (a-b)
- d. Calculated Purgeable Volume 1.25



2. WELL PURGEABLE DATA

- a. Purge Method WHALE PUMP
- b. Required Purge Volume (@ 3 well volumes) 3.75 gal.
- c. Field Testing: Equipment Used HYDAC CONDUCTIVITY / TEMPERATURE / PH TEST

Volume Removed	T°	PH	Spec. Cond.	Color	Other
<u>1 gal</u>	<u>68.6</u>	<u>6.78</u>	<u>19230</u>	<u>GREY/TAN</u>	<u>1 gal REMOVED</u>
<u>2 gal</u>	<u>69.4</u>	<u>6.76</u>	<u>> 20000</u> <u>> INSTR CAPABLE</u>	<u>" > TURBIDITY</u>	
<u>6 gal</u>	<u>68.1</u>	<u>6.63</u>	<u>18750</u>	<u>GREY/TAN</u>	
<u>8.5 gal</u>	<u>68.6</u>	<u>6.77</u>	<u>> 20000</u>	<u>" > TURBIDITY</u>	

3. SAMPLE COLLECTION:

Method DISPOSABLE BAILER

1200
1100
1120
1150

Container Type	Preservation	Analysis Req.
<u>2 - 1L AMBER</u>	<u>4°C</u>	<u>TPH</u>
<u>2 - 1L AMBER</u>	<u>4°C</u>	<u>SVOC</u>
<u>1 - PLASTIC</u>	<u>HNO₃</u>	<u>METALS</u>
<u>3-40 ml VOA</u>	<u>HCL</u>	<u>VOC</u>

Comments

SAMPLE ID: BW03AA

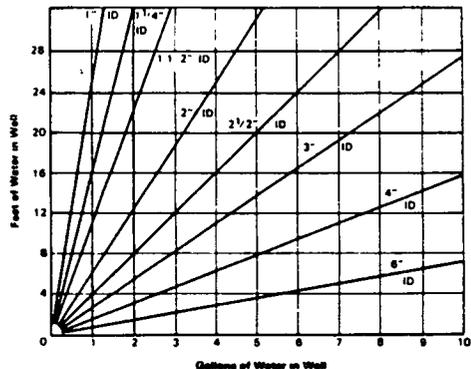
WELL DRY @ 5 gal, 8 gal, 10 gal

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8/30/94 Time: Start 0910 am/pm
 Project Name NEWPORT UST RI Finish 1010 am/pm
 Location FLUSH MOUNT, IN GRASS, EAST OF Bldg 991
 Weather Conds.: SUNNY, 80's Collector JUNOD, KIDD

1. WATER LEVEL DATA: (measured from ToC)

- a Total Well Length 23 74 Well Casing Type PVC
- b Water Table Depth 15 43 Casing Diameter 2"
- c Length of Water Column 8.26 (a-b)
- d Calculated Purgeable Volume 1.5



2. WELL PURGEABLE DATA

- a Purge Method WHALE PUMPS
- b Required Purge Volume (@ 3 well volumes) 4.5 gal
- c Field Testing: Equipment Used HYDAC CONDUCTIVITY / TEMPERATURE / pH TESTER

Volume Removed	T°	PH	Spec Cond.	Color	Other
<u>1.5 gal</u>	<u>68.8</u>	<u>6.33</u>	<u>581</u>	<u>lt grey</u>	<u>DRY @ 1.5 gal</u>
<u>2 gal</u>	<u>68.8</u>	<u>6.74</u>	<u>629</u>	<u>dl</u>	<u>STILL DRY / SLOW RECHARGE</u>

3. SAMPLE COLLECTION:

Method DISPOSABLE BAILER

Container Type	Preservation	Analysis Req
<u>3-40 ml VOA</u>	<u>HCl</u>	<u>VOC</u>
<u>1- 1l PLASTIC</u>	<u>HNO₃</u>	<u>Metals</u>
<u>2- 1l AMBER</u>	<u>4°C</u>	<u>TPH</u>
<u>2- 1l AMBER</u>	<u>4°C</u>	<u>SVOC</u>

Comments SAMPLE ID: AWG1AA.
SLOW RECHARGE

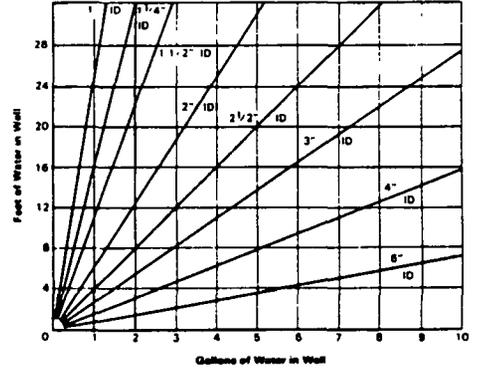
Well dry at 1.5 gallons, started sampling after purging 2 gallons.

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8.30.94 Time: Start 1030 am/pm
 Project Name NEWPORT UST R1 Finish 1130 am/pm
 Location FLUSH MOUNT, IN GRASS, EAST OF GZ-1
 Weather Conds.: SUNNY 80'S Collector JUNOO, KIDD

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 29.35 Well Casing Type PVC
- b. Water Table Depth 13.03 Casing Diameter 2"
- c. Length of Water Column 15.59 (a-b)
- d. Calculated Purgeable Volume 2.5 gal.



2. WELL PURGEABLE DATA

- a. Purge Method WHALE PUMPS
- b. Required Purge Volume (@ 3 well volumes) 7.5 gal.
- c. Field Testing: Equipment Used HYDAC CONDUCTIVITY / TEMPERATURE / PH TESTER.

Volume Removed	T°	PH	Spec. Cond.	Color	Other
<u>2.5 gal.</u>	<u>71.8</u>	<u>7.15</u>	<u>933</u>	<u>GREY/CLOUDY</u>	} HIGH TURBIDITY
<u>4 gal.</u>	<u>66.8</u>	<u>7.02</u>	<u>918</u>	<u>"</u>	
<u>5 gal.</u>	<u>70.0</u>	<u>7.19</u>	<u>924</u>	<u>"</u>	

3. SAMPLE COLLECTION:

Method DISPOSABLE BAILER

	Container Type	Preservation	Analysis Req
<u>1100</u>	<u>3 40 ml VOA</u>	<u>HCL</u>	<u>VOC</u>
<u>1110</u>	<u>1-1L PLASTIC</u>	<u>HNO3</u>	<u>METALS</u>
<u>1120</u>	<u>2-1L AMBER</u>	<u>4°C</u>	<u>TPH</u>
<u>1130</u>	<u>2-1L AMBER</u>	<u>4°C</u>	<u>SUOC</u>

Comments _____

SAMPLE ID: AWG2AA

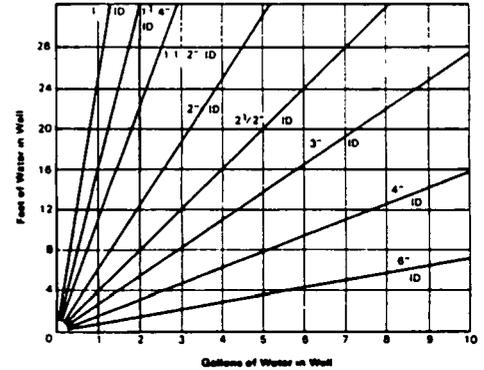
WELL DRY @ 5 gal.

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8/30/94 Time: Start 1115 am/pm
 Project Name NEWPORT UST R1 Finish 1245 am/pm
 Location FLUSH MOUNT IN GRASS, NORTH OF GZ-2
 Weather Conds.: SUNNY, 80's Collector JUNOD, KIDD

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 30.00 Well Casing Type PVC
- b. Water Table Depth 12.05 Casing Diameter 2"
- c. Length of Water Column 17.9 (a-b)
- d. Calculated Purgeable Volume 2.75



2. WELL PURGEABLE DATA

- a. Purge Method WHALE PUMPS
- b. Required Purge Volume (@ 3 well volumes) 8.25 gal.
- c. Field Testing: Equipment Used HYDAC CONDUCTIVITY / TEMPERATURE / pH TESTER

Volume Removed	T°	PH	Spec. Cond.	Color	Other
<u>3 gal.</u>	<u>73.3</u>	<u>7.01</u>	<u>873</u>	<u>GREY/CLOUDY</u>	
<u>4.5 gal.</u>	<u>68.2</u>	<u>7.04</u>	<u>862</u>	<u>"</u>	
<u>6 gal.</u>	<u>71.5</u>	<u>7.05</u>	<u>900</u>	<u>"</u>	
<u>9 gal.</u>	<u>68.1</u>	<u>7.03</u>	<u>886</u>	<u>GREY/CLOUDY BUT LESS CLOUDY</u>	
<u>12 gal.</u>	<u>66.5</u>	<u>7.04</u>	<u>919</u>	<u>ALMOST CLEAR</u>	

3. SAMPLE COLLECTION:

Method DISPOSABLE BAILER

	Container Type	Preservation	Analysis Req.
<u>1200</u>	<u>3-40ml VOA</u>	<u>HCl</u>	<u>VOC</u>
<u>1210</u>	<u>1-1L PLASTIC</u>	<u>HNO₃</u>	<u>METALS</u>
<u>1220</u>	<u>2-1L AMBER</u>	<u>4°C</u>	<u>TPH</u>
<u>1230</u>	<u>2-1L AMBER</u>	<u>4°C</u>	<u>SUOC</u>

Comments

SAMPLE ID: AW63AA

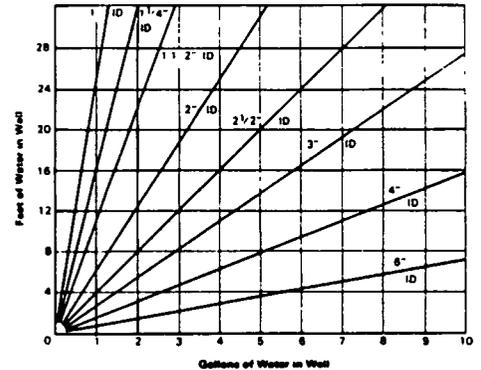
GOOD RECHARGE

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8-29-94 Time: Start 1645 am/pm
 Project Name NEWPORT, RI UST RI Finish 1800 am/pm
 Location ADJACENT TO Bldg 158
 Weather Conds.: SUNNY, HIGH 70's Collector J. JUNOD, J. KIDD

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 18.25 Well Casing Type PVC
- b. Water Table Depth 7.09 Casing Diameter 2"
- c. Length of Water Column 11.16 (a-b)
- d. Calculated Purgeable Volume 1.75



2. WELL PURGEABLE DATA

- a. Purge Method WHALE PUMPS
- b. Required Purge Volume (@ 3 well volumes) 5.25 gal
- c. Field Testing: Equipment Used HYDAL CONDUCTIVITY / TEMPERATURE / PH TESTER

Volume Removed	T°	PH	Spec. Cond.	Color	Other
<u>2 gal.</u>	<u>76.5</u>	<u>6.56</u>	<u>671</u>	<u>Lt. BROWN / CLOUDY</u>	
<u>4 gal</u>	<u>72.6</u>	<u>6.50</u>	<u>726</u>	<u>"</u>	
<u>6 gal</u>	<u>71.7</u>	<u>6.54</u>	<u>725</u>	<u>"</u>	
<u>8 gal</u>	<u>70.0</u>	<u>6.48</u>	<u>706</u>	<u>Lt BROWN / LESS CLOUDY</u>	
<u>10 gal</u>	<u>67.9</u>	<u>6.48</u>	<u>730</u>	<u>CLEAR / some Lt BROWN</u>	

3. SAMPLE COLLECTION:

Method DISPOSABLE BAILER

	Container Type	Preservation	Analysis Req.
<u>1710</u>	<u>3-40 ml VOA</u>	<u>HCL</u>	<u>VOC</u>
<u>1720</u>	<u>1-1l PLASTIC</u>	<u>HNO3</u>	<u>METALS</u>
<u>1730</u>	<u>2-1l AMBER</u>	<u>4°C</u>	<u>TPH</u>
<u>1740</u>	<u>2-1l AMBER</u>	<u>4°C</u>	<u>SVOC</u>

Comments _____

SAMPLE ID: BWMSAA

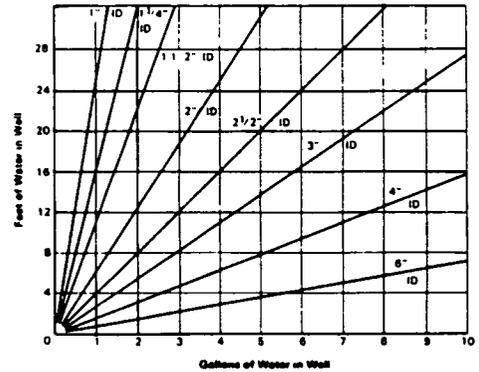
well dry at 6 gal.

GROUND WATER SAMPLE COLLECTION RECORD

Project No. J060-045 Date 8.30.94 Time: Start 745 am/pm
 Project Name NEWPORT UST RI Finish 845 am/pm
 Location NEAR BAILFIELD, IN GRASS, NORTH OF TAYLOR DRIVE (FLUSH MOUNT)
 Weather Conds.: SUNNY, WINDY, 70's Collector JUNOD, KIDD

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 13.35 Well Casing Type PVC
- b. Water Table Depth 5.97 Casing Diameter 2"
- c. Length of Water Column 7.33 (a-b)
- d. Calculated Purgeable Volume 1.25



2. WELL PURGEABLE DATA

- a. Purge Method WHALE PUMPS
- b. Required Purge Volume (@ 3 well volumes) 3.75
- c. Field Testing Equipment Used HYDAC CONDUCTIVITY / TEMPERATURE / PH TESTER

Volume Removed	T°	PH	Spec. Cond.	Color	Other
<u>1 gal</u>	<u>64.1</u>	<u>5.55</u>	<u>1726</u>	<u>RED/TAN</u>	
<u>2 gal</u>	<u>64.0</u>	<u>5.65</u>	<u>1453</u>	<u>"</u>	
<u>3 gal</u>	<u>63.7</u>	<u>5.62</u>	<u>1423</u>	<u>GREY / LESS CLOUDY</u>	
<u>4 gal</u>	<u>63.1</u>	<u>5.28</u>	<u>1355</u>	<u>CLEAR</u>	
<u>4.5 gal</u>	<u>62.6</u>	<u>5.21</u>	<u>1362</u>	<u>"</u>	

3. SAMPLE COLLECTION:

Method DISPOSABLE BAILER

	Container Type	Preservation	Analysis Req
<u>0815</u>	<u>3-40ml VOA</u>	<u>HCL</u>	<u>VOC</u>
<u>0825</u>	<u>1-1L PLASTIC</u>	<u>HNO₃</u>	<u>METALS</u>
<u>0835</u>	<u>2-1L AMBER</u>	<u>4°C</u>	<u>TPH</u>
<u>0845</u>	<u>2-1L AMBER</u>	<u>4°C</u>	<u>SUOC</u>

Comments _____

SAMPLE ID: BWBFAA

DRY @ 4 gal.

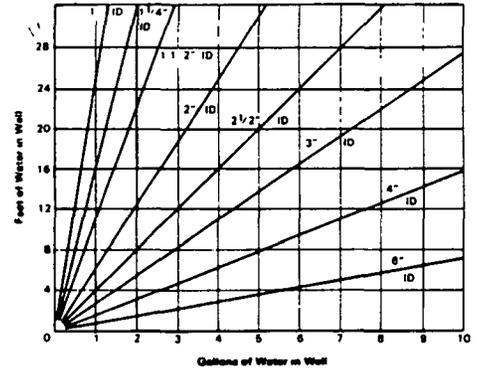
BF = BAILFIELD. The correct well ID (MW-7S) was not known when the well was sampled.

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8.30.94 Time: Start 1400 am/pm
 Project Name NEWPORT UST R1 Finish 1845 am/pm
 Location SOUTH OF STRUCT. 74 (OPERAD.)
 Weather Conds.: SUNNY 75° Collector JUNOD, KIDD

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 50.20 Well Casing Type PVC
- b. Water Table Depth 18.91 Casing Diameter 4"
- c. Length of Water Column 31.19 (a-b)
- d. Calculated Purgeable Volume ~ 20 gal



2. WELL PURGEABLE DATA

- a. Purge Method WHALE PUMPS
- b. Required Purge Volume (@ 3 well volumes) 60 gal
- c. Field Testing: Equipment Used HYDAC CONDUCTIVITY / TEMPERATURE / PH TESTER

Volume Removed	T°	PH	Spec. Cond.	Color	Other
<u>20 gal</u>	<u>71.6°F</u>	<u>6.14</u>	<u>620</u>	<u>CLEAR</u>	
<u>40 gal</u>	<u>67.7</u>	<u>6.63</u>	<u>925</u>	<u>CLEAR</u>	
<u>53 gal</u>					

3. SAMPLE COLLECTION:

Method DISPOSABLE DRAILER

Container Type	Preservation	Analysis Req
<u>3-40 ml VOA</u>	<u>HCL</u>	<u>VOC</u>
<u>1-1L PLASTIC</u>	<u>HNO₃</u>	<u>METALS</u>
<u>2-1L AMBER</u>	<u>4°C</u>	<u>TPH</u>
<u>2-1L AMBER</u>	<u>4°C</u>	<u>SVOC</u>

Comments _____

WELL DRY @ 53 gal.

STARTED SAMPLING @ 55 gal.

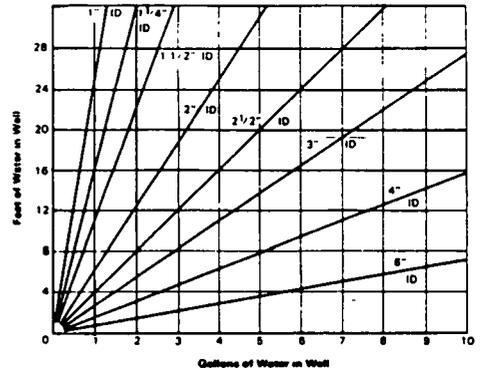
SAMPLE ID: AW101A

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8-30-94 Time: Start 1325 am/pm
 Project Name NEWART UST RI Finish 1800 am/pm
 Location UP GRADIENT OF STRUCTURE 74
 Weather Conds.: SUNNY 70° Collector JUNOD, KIDD

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 50.37 Well Casing Type PK
- b. Water Table Depth 22.12 Casing Diameter 4"
- c. Length of Water Column 28.25 (a-b)
- d. Calculated Purgeable Volume 17 gal



2. WELL PURGEABLE DATA

- a. Purge Method WHALE PUMPS
- b. Required Purge Volume (@ 3 well volumes) 51 gal
- c. Field Testing: Equipment Used HYDAC CONDUCTIVITY / TEMPERATURE / pH TESTER

Volume Removed	T°	PH	Spec. Cond.	Color	Other
<u>17 gal</u>	<u>* 83.2</u>	<u>7.08</u>	<u>269</u>	<u>CLEAR</u>	
<u>34 gal</u>	<u>65.4</u>	<u>7.25</u>	<u>305</u>	<u>"</u>	
<u>51 gal</u>	<u>65.3</u>	<u>7.44</u>	<u>302</u>	<u>"</u>	

* SUSPECTED TOO HIGH TEMP.

3. SAMPLE COLLECTION:

Method DISPOSABLE BAILER

Container Type	Preservation	Analysis Req	
<u>9-40 ml VOA</u>	<u>HCL</u>	<u>VOC</u>	<u>MS/MSD</u>
<u>3-1L PLASTIC</u>	<u>4/NO₃</u>	<u>METALS</u>	<u>"</u>
<u>6-1L AMBER</u>	<u>4°C</u>	<u>TPH</u>	<u>"</u>
<u>6-1L AMBER</u>	<u>4°C</u>	<u>SVOC</u>	<u>"</u>

Comments

SAMPLE ID: AW102A

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8/31/94 Time: Start 0745 am/pm
 Project Name Newport OST RI Finish 0900 am/pm
 Location West (down gradient) of Struc. 74, north of MW-105.
 Weather Conds.: partly cloudy, 70's Collector J. Junod, L. Pannell

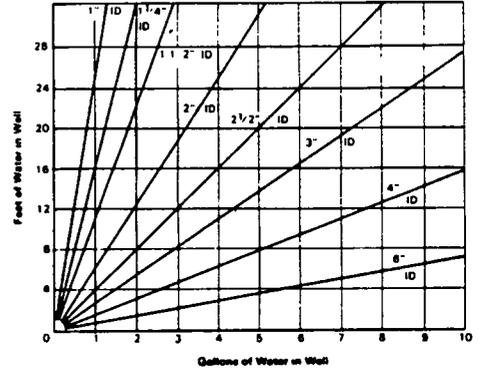
1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length _____ Well Casing Type PVC
- b. Water Table Depth 6.85 Casing Diameter 4"
- c. Length of Water Column _____ (a-b)
- d. Calculated Purgeable Volume _____

Product 6.76'

2. WELL PURGEABLE DATA

- a. Purge Method Product in well - did not purge
- b. Required Purge Volume (@ _____ well volumes) _____
- c. Field Testing: Equipment Used _____



Volume Removed	T°	PH	Spec. Cond.	Color	Other

3. SAMPLE COLLECTION:

Method peristaltic pump

Container Type 2-40ml VOA Preservation cool Analysis Req. TPH

Sample ID: AW104A

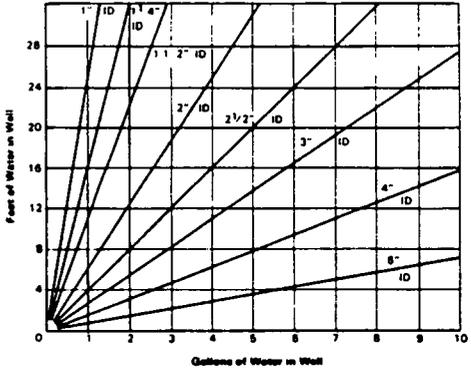
Comments Approx. .09' of product in well.

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8/31/94 Time: Start 730 am/pm
 Project Name NEWPORT UST RI Finish 940 am/pm
 Location WEST OF STRUCT. 74 (DOWN GRAD.)
 Weather Conds.: PARTLY CLOUDY, 70'S Collector JUNOIS, KIDD

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 36.60 Well Casing Type PVC
- b. Water Table Depth 13.66 Casing Diameter 4"
- c. Length of Water Column 22.94 (a-b)
- d. Calculated Purgeable Volume 14 gal.



2. WELL PURGEABLE DATA

- a. Purge Method WHALE PUMPS
- b. Required Purge Volume (@ 3 well volumes) 42 gal
- c. Field Testing: Equipment Used HYDAC CONDUCTIVITY / TEMPERATURE / PH TESTER

Volume Removed	T°	PH	Spec. Cond.	Color	Other
<u>15 gal.</u>	<u>66.5°</u>	<u>6.76</u>	<u>435</u>	<u>CLEAR</u>	
<u>28 gal.</u>	<u>64.8°</u>	<u>7.08</u>	<u>414</u>	<u>"</u>	
<u>42 gal.</u>	<u>70.2°</u>	<u>6.88</u>	<u>464</u>	<u>"</u>	

3. SAMPLE COLLECTION:

Method DISPOSABLE FAILER

	Container Type	Preservation	Analysis Req.
<u>8/31/94</u>	<u>3-40 ml VOA</u>	<u>HCl</u>	<u>VOC</u>
<u>10/10/95</u>	<u>1- 500ml PLASTIC</u>	<u>HNO₃</u>	<u>METALS</u>
<u>10/10/95</u>	<u>2- 1l AMBER</u>	<u>4°C</u>	<u>TPH</u>
<u>10/20/95</u>	<u>2- 1l AMBER</u>	<u>4°C</u>	<u>SVOC</u>

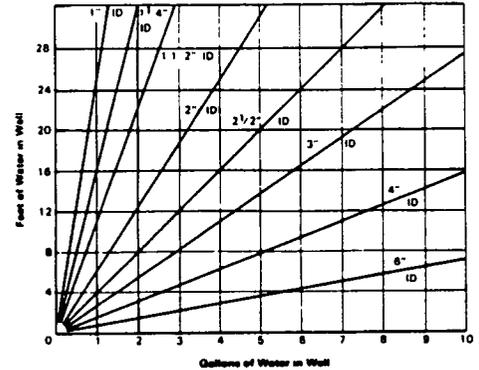
Comments SAMPLE ID: AW105A & AW105B
PURGED 45 gal. TOTAL.

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8/31/94 Time: Start 0915 am/pm
 Project Name Newport OST RI Finish 1000 am/pm
 Location Structure 74
 Weather Conds.: cloudy, 70's Collector L. Pannell

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 15.90 Well Casing Type PVC
- b. Water Table Depth 6.99 Casing Diameter 2"
- c. Length of Water Column 8.91 (a-b)
- d. Calculated Purgeable Volume 1.50 gal



2. WELL PURGEABLE DATA

- a. Purge Method Whale pumps
- b. Required Purge Volume (@ 3 well volumes) 4.50 gal
- c. Field Testing: Equipment Used Hydac Conductivity/temp/pH Tester

Volume Removed	T°	PH	Spec. Cond	Color	Other
<u>2.5 gal</u>	<u>68.6</u>	<u>6.79</u>	<u>210</u>	<u>clear</u>	
<u>3.8</u>	<u>68.4</u>	<u>6.64</u>	<u>180</u>	<u>clear</u>	

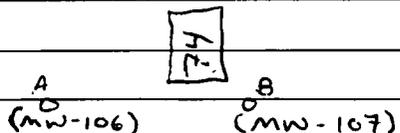
3. SAMPLE COLLECTION:

Method disposable bailer

Container Type	Preservation	Analysis Req.
<u>1000 2-1 l Amber</u>	<u>cool</u>	<u>TPH</u>
<u>2-1 l Amber</u>	<u>cool</u>	<u>SVOC</u>
<u>1-500ml plastic</u>	<u>HNO₃</u>	<u>metals</u>
<u>3-40ml VOA</u>	<u>HCl</u>	<u>VOC</u>

Comments

Well dry at 2.5 gal, 2.8, 3.0, 3.5, 3.8
 Sample ID: AGZAAA (GZA-A). The correct well IDs for MW-106, MW-107 + MW-108 were not known when the wells were sampled

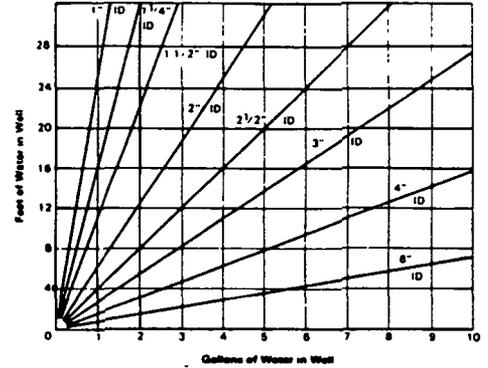


GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8-31-94 Time: Start 915 am/pm
 Project Name NEWPORT UST RI Finish 1030 am/pm
 Location NORTH OF MW-1 IN GRASS (FLUSH-MOUNT)
 Weather Conds.: P. CLOUDY, 70's Collector JUNOD, KIDD

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 15.14 Well Casing Type PVC
- b. Water Table Depth 8.77 Casing Diameter 2"
- c. Length of Water Column 6.37 (a-b)
- d. Calculated Purgeable Volume 1 gal.



2. WELL PURGEABLE DATA

- a. Purge Method WHALE PUMPS
- b. Required Purge Volume (@ ? well volumes) 3 gal
- c. Field Testing: Equipment Used HYDAC CONDUCTIVITY / TEMP / PH TESTER

Volume Removed	T°	PH	Spec. Cond	Color	Other
<u>1 gal</u>	<u>76.8</u>	<u>6.24</u>	<u>179</u>	<u>SL. TURBID</u>	<u>OIL & SHEEN</u>
<u>2 gal.</u>	<u>69.1</u>	<u>6.29</u>	<u>207</u>	<u>"</u>	<u>"</u>
<u>3 gal.</u>	<u>68.7</u>	<u>6.33</u>	<u>217</u>	<u>"</u>	<u>"</u>
<u>4 gal</u>	<u>68.4</u>	<u>6.44</u>	<u>243</u>	<u>"</u>	<u>"</u>

3. SAMPLE COLLECTION:

Method PERISTALTIC Pump

950
000
010
020

Container Type	Preservation	Analysis Req
<u>2 - 40ml VOA</u>	<u>HCL</u>	<u>VOC</u>
<u>1 - 1L PLASTIC</u>	<u>HNO₃</u>	<u>METALS</u>
<u>2 - 1L AMBER</u>	<u>4°C</u>	<u>TPH</u>
<u>2 - 1L AMBER</u>	<u>4°C</u>	<u>SUOC</u>

Comments

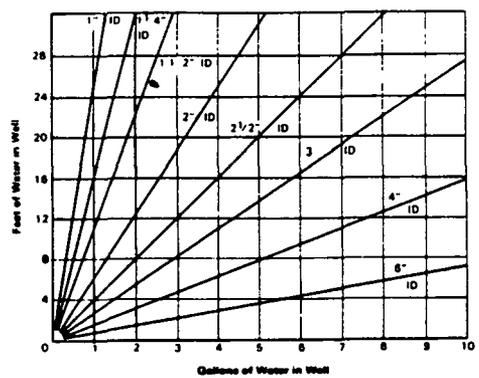
SAMPLE ID. 4GZABA (GZA-B)
DRY @ 3.5 gal.
TRACE FLOATING PRODUCT OBSERVED; INSUFFICIENT TO MEASURE.
BOTTOM OF WHALE PUMPS & TUBING OBSERVED TO
BE COATED W/OIL WHEN WITHDRAWN FROM WELL.

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8/31/94 Time: Start 1020 am/pm
 Project Name Newport CST RI 9/1/94 Finish 1735 am/pm
 Location Structure 74, north of Taylor Drive
 Weather Conds.: cloudy, 70's Collector L. Pannell, J. Kidd

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 17.48 Well Casing Type PVC
- b. Water Table Depth 8.15 Casing Diameter 2"
- c. Length of Water Column 9.33 (a-b)
- d. Calculated Purgeable Volume ~1.5 gal



2. WELL PURGEABLE DATA

- a. Purge Method whale pumps
- b. Required Purge Volume (@ 3 well volumes) 4.5 gal
- c. Field Testing Equipment Used Hydac conductivity/temp/pH Tester

Volume Removed	T°	PH	Spec. Cond.	Color	Other
<u>2.5 gal</u>	<u>80.6</u>	<u>6.36</u>	<u>868</u>	<u>clear</u>	

3. SAMPLE COLLECTION:

Method disposable bailer

	Container Type	Preservation	Analysis Req.
<u>11/1530</u>	<u>2-1 l Amber</u>	<u>cool</u>	<u>SVOC</u>
<u>11/1530</u>	<u>2-1 l Amber</u>	<u>cool</u>	<u>TPH</u>
<u>1/31/1730</u>	<u>1-500ml plastic</u>	<u>HNO₃</u>	<u>metals</u>
<u>1/1730</u>	<u>3-40ml VOA</u>	<u>HCl</u>	<u>VOC</u>

Comments Sample ID: AWGZACA (GZA-C)

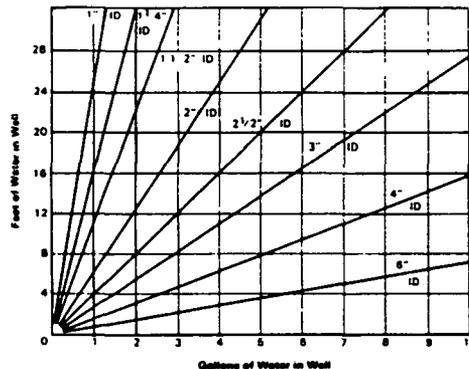
Well dry at 2.8 gal. Extremely slow recharge.
Floating product in bailer. Not observed at time of
initial water level measurement.

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5000-045 Date 9/2/94 Time: Start 0840 am/pm
 Project Name Newport CST RI Finish 1030 am/pm
 Location Structure 74, outside of pumping house
 Weather Conds.: Sunny, 60's Collector J. Junod, J. Kidd

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length _____ Well Casing Type pvc
- b. Water Table Depth 10.70 Casing Diameter 2"
- c. Length of Water Column _____ (a-b)
- d. Calculated Purgeable Volume _____
Product 10.50



2. WELL PURGEABLE DATA

- a. Purge Method Product in well - did not purge.
- b. Required Purge Volume (@ _____ well volumes) _____
- c. Field Testing: Equipment Used _____

Volume Removed	T°	PH	Spec. Cond.	Color	Other

3. SAMPLE COLLECTION:

Method Peristaltic pump

Container Type	Preservation	Analysis Req.
<u>1015 2-40ml VOA</u>	<u>Cool</u>	<u>TPH</u>

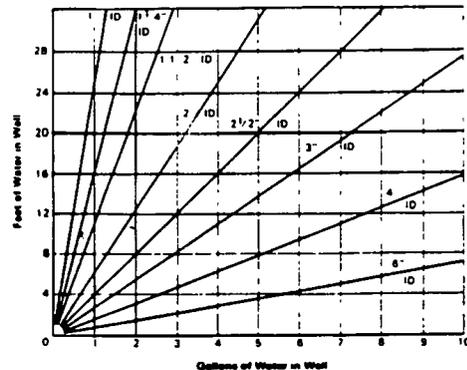
Comments Sample ID: AW103A. Monitoring well MW-109 was mistakenly labelled MW-103 during sampling. Approx 0.2' of product in well. Collected sample with peristaltic pump.

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8/30/94 Time: Start 14:00 am/pm
 Project Name Newport UST RI Finish 16:00 am/pm
 Location Path of Abandoned fuel oil line
 Weather Conds.: clear, 70° Collector L. Pannell

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 7.17 Well Casing Type steel
- b. Water Table Depth 6.14 Casing Diameter 1.25"
- c. Length of Water Column 1.03 (a-b)
- d. Calculated Purgeable Volume ~ 1/16 gal



2. WELL PURGEABLE DATA

- a. Purge Method peristaltic pump
- b. Required Purge Volume (@ 3 well volumes) ~ 1/4 gallon
- c. Field Testing: Equipment Used HyDAC Conductivity, pH, Temp meter

Volume Removed	T°	PH	Spec Cond.	Color	Other
<u>~ 1/8 gal</u>	<u>78</u>	<u>6.16</u>	<u>1670</u>	<u>Silty brown</u>	
<u>~ 3/8 gal</u>	<u>80</u>	<u>6.20</u>	<u>1690</u>	<u>clear</u>	

3. SAMPLE COLLECTION:

Method peristaltic pump

Container Type (2) 1L amber Preservation cool Analysis Req TPH

sample ID = CWSØ1A

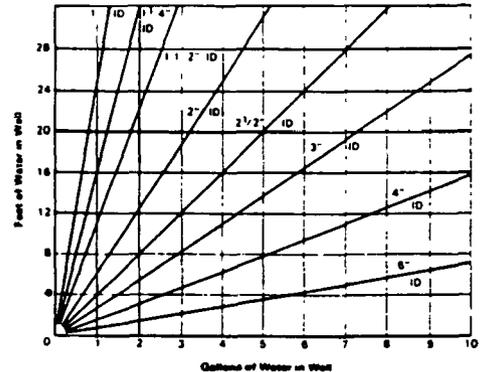
Comments no product observed, No odors.
extremely slow recharge well pumped dry numerous times

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8/30/94 Time: Start 13:45 am/pm
 Project Name Newport UST RI Finish 14:30 am/pm
 Location Path of Abandoned Fuel-oil Line
 Weather Conds.: Clear, 70° Collector L. Pannell

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 8.80 Well Casing Type steel
- b. Water Table Depth 6.55 Casing Diameter 1.25"
- c. Length of Water Column 2.25 (a-b)
- d. Calculated Purgeable Volume ~0.2 gal



2. WELL PURGEABLE DATA

- a. Purge Method peristaltic pump
- b. Required Purge Volume (@ 3 well volumes) ~0.6 gal
- c. Field Testing: Equipment Used HyDAC Conductivity, pH, Temp meter

Volume Removed	T°	PH	Spec Cond.	Color	Other
<u>3.7 gal</u>	<u>78</u>	<u>6.52</u>	<u>650</u>	<u>clear</u>	

3. SAMPLE COLLECTION:

Method peristaltic pump

Container Type

430 (2) 12 amber

Preservation

cool

Analysis Req

TPH

Sample ID = CWS02A

Comments

excellent recharge

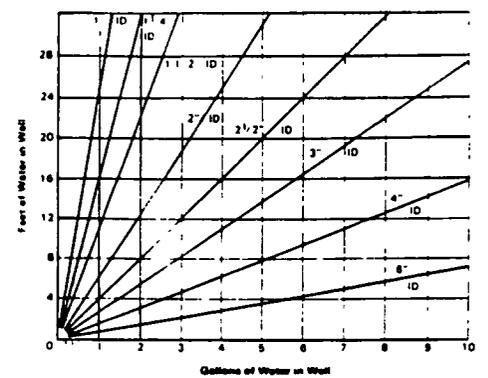
No product observed. No odors

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8/30/94 Time: Start 11:00 am/pm
 Project Name Newport VST RI Finish 1315 am/pm
 Location Structure 74
 Weather Conds.: clear, 70° Collector L. Pannell

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 9.42 Well Casing Type steel
- b. Water Table Depth 7.46 Casing Diameter 1.25"
- c. Length of Water Column 1.96 (a-b)
- d. Calculated Purgeable Volume ~0.1 gal



2. WELL PURGEABLE DATA

- a. Purge Method peristaltic pump
- b. Required Purge Volume (@ 3 well volumes) ~0.3 gal
- c. Field Testing: Equipment Used HyDAC Conductivity, Temp, pH Tester

Volume Removed	T°	PH	Spec. Cond	Color	Other
<u>~1/2 gal</u>	<u>66.0</u>	<u>6.38</u>	<u>858</u>	<u>clear</u>	<u>slight fuel-oil odor</u>
<u>~.75 gal</u>	<u>75.4</u>	<u>6.43</u>	<u>696</u>	<u>clear</u>	<u>"</u>

3. SAMPLE COLLECTION:

Method peristaltic pump

Container Type	Preservation	Analysis Req
<u>(2) 1L amber</u>	<u>cool</u>	<u>TPH</u>

Sample ID = AW507A

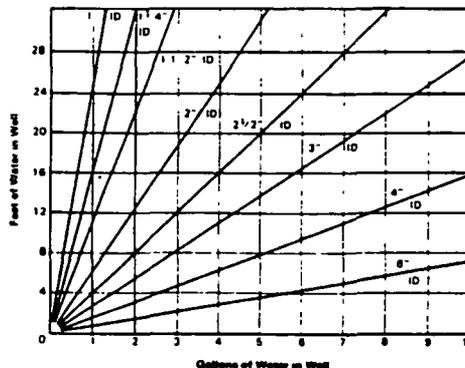
Comments no product evident
well dry at 0.5 gal, .75 gal
Due to very slow recharge (~8oz/5min), well was so low even though
pameters had not stabilized.

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8/30/94 Time: Start 11:20 am/pm
 Project Name Newport UST RI Finish 13:00 am/pm
 Location STRUCTURE 74
 Weather Conds.: clear, 70^s Collector L. Pannell

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 11.77 Well Casing Type Steel
- b. Water Table Depth 10.46 Casing Diameter 1.25"
- c. Length of Water Column 1.31' (a-b)
- d. Calculated Purgeable Volume 20.1 gal



2. WELL PURGEABLE DATA

- a. Purge Method peristaltic pump
- b. Required Purge Volume (@ 3 well volumes) ~0.25 gal
- c. Field Testing: Equipment Used HYDAC Conductivity, Temp, pH Tester

Volume Removed	T°	PH	Spec. Cond	Color	Other
<u>~1/3 gal</u>	<u>74.7</u>	<u>6.23</u>	<u>1100</u>	<u>clear</u>	<u>slight sheen, strong</u>
<u>~1/2 gal</u>	<u>80</u>	<u>6.29</u>	<u>1114</u>	<u>"</u>	<u>fuel-oil odor</u>

3. SAMPLE COLLECTION:

Method peristaltic pump

Container Type

Preservation

Analysis Req

1245 (2) 1 liter amber

cool

TPH

Sample ID: AWS08A

Comments

dry at 1/3 gal, 0.5 gal

Very slow recharge

trace floating product observed; insufficient to measure

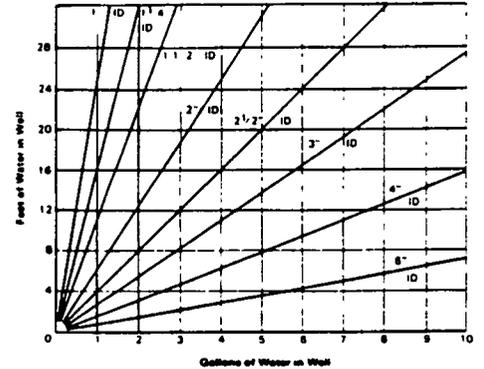
Bottom of pump tubing was observed to be coated in thick oil when withdrawn from well.

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8/30/94 Time: Start 1630 am/pm
 Project Name Newport UST RI Finish 20:00 am/pm
 Location Taylor Drive
 Weather Conds.: Clear 70s Collector L. Pannell

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 6.51 Well Casing Type steel
- b. Water Table Depth 4.92 Casing Diameter 1.25"
- c. Length of Water Column 1.59 (a-b)
- d. Calculated Purgeable Volume ~0.1 gal



2. WELL PURGEABLE DATA

- a. Purge Method Peristaltic pump
- b. Required Purge Volume (@ 3 well volumes) 0.3 gal
- c. Field Testing: Equipment Used HyDAC Conductivity, pH, Temp meter

Volume Removed	T°	PH	Spec. Cond.	Color	Other
<u>0.7 liters</u>	<u>71.7</u>	<u>7.29</u>	<u>770</u>	<u>Clear</u>	

3. SAMPLE COLLECTION:

Method peristaltic pump

Container Type 1-liter amber Preservation cool Analysis Req. TPH

Sample ID: BWS17A

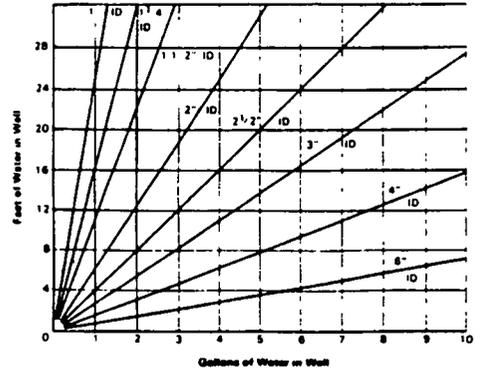
Comments well dry at 0.4, 0.5, 0.7 liters
extremely slow recharge

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8/30/94 Time: Start 16:45 am/pm
 Project Name ~~5060-045~~ Newport UST RI Finish 16:00 am/pm
 Location Taylor Drive
 Weather Conds.: clear, 70^s Collector L. Pannell

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 6.78 Well Casing Type steel
- b. Water Table Depth 5.03 Casing Diameter 1.25"
- c. Length of Water Column 1.75 (a-b)
- d. Calculated Purgeable Volume ~0.12 gal



2. WELL PURGEABLE DATA

- a. Purge Method peristaltic pump
- b. Required Purge Volume (@ 3 well volumes) ~0.36 gal
- c. Field Testing: Equipment Used HYDAC conductivity, pH, temp.

Volume Removed	T°	PH	Spec. Cond.	Color	Other
<u>1.5 liters</u>	<u>74.7</u>	<u>6.33</u>	<u>800</u>	<u>Clear</u>	

3. SAMPLE COLLECTION:

Method peristaltic pump

Container Type	Preservation	Analysis Req
<u>1745 (2) 1-liter amber</u>	<u>cool</u>	<u>TPH</u>
<u>sample ID = BWS18A</u>		

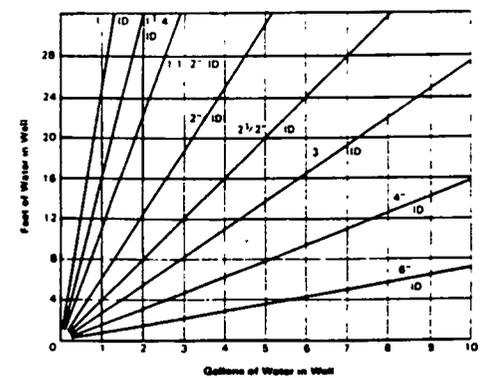
Comments well dry at 0.6, 0.9, 1.0 liters, 1.2 liters, 1.5 liters

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8/30/94 Time: Start 17:30 am/pm
 Project Name Newport UST RI Finish 19:30 am/pm
 Location Taylor Dr.
 Weather Conds.: clear, 70° Collector L. Pannell

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 6.60 Well Casing Type steel
- b. Water Table Depth 4.20 Casing Diameter 1.25"
- c. Length of Water Column 2.40 (a-b)
- d. Calculated Purgeable Volume 0.15 gal



2. WELL PURGEABLE DATA

- a. Purge Method peristaltic pump
- b. Required Purge Volume (@ 3 well volumes) 0.45 gal
- c. Field Testing: Equipment Used HyDAC Conductivity, pH, temperature meter

Volume Removed	T°	PH	Spec Cond.	Color	Other
<u>3.0 liter</u>	<u>85.4</u>	<u>5.89</u>	<u>930</u>	<u>Clear</u>	

3. SAMPLE COLLECTION:

Method peristaltic pump

Container Type	Preservation	Analysis Req
<u>1345(4) 1-liter amber (dup)</u>	<u>cool</u>	<u>TPH</u>
<u>Sample ID: BWS20A + B</u>		

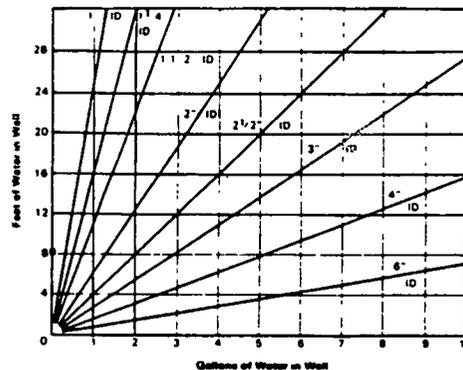
Comments dry at 2.5 liter, 3.0 liter collected duplicate field sample

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8/30/94 Time: Start 17:30 am/pm
 Project Name Newport UST RI Finish 19:30 am/pm
 Location Taylor Drive
 Weather Conds.: clear, 70° Collector L. Pannell

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 5.28 Well Casing Type steel
- b. Water Table Depth 4.42 Casing Diameter 1.25"
- c. Length of Water Column 1.86 (a-b)
- d. Calculated Purgeable Volume ~0.11 gal



2. WELL PURGEABLE DATA

- a. Purge Method peristaltic pump
- b. Required Purge Volume (@ 3 well volumes) ~0.33 gal
- c. Field Testing: Equipment Used HyDAC conductivity, pH, temperature meter

Volume Removed	T°	PH	Spec. Cond.	Color	Other
<u>2.0 liter</u>	<u>88.9</u>	<u>6.31</u>	<u>810</u>	<u>clear</u>	

3. SAMPLE COLLECTION:

Method peristaltic pump

Container Type

Preservation

Analysis Req.

1900 (2) 1-liter amber

cool

TPH

Sample ID: BWS21A

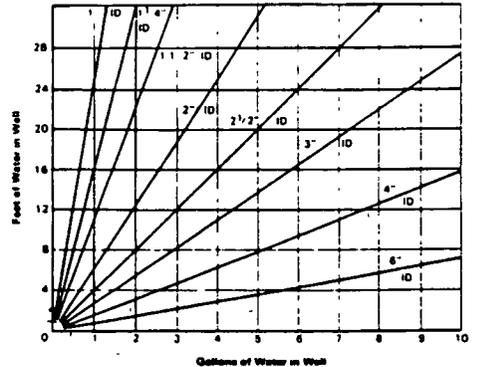
Comments dry at 1.5 liter, 2.0 liter
slow recharge

GROUND WATER SAMPLE COLLECTION RECORD

Project No. 5060-045 Date 8/31/94 Time: Start 7:25 am/pm
 Project Name Newport UST RI Finish 8:45 am/pm
 Location Sump at Bldg 114
 Weather Conds.: cloudy, 60° Collector L. Pannell

1. WATER LEVEL DATA: (measured from ToC)

- a. Total Well Length 1.32 Well Casing Type concrete
- b. Water Table Depth 1.05 Casing Diameter 1.0'
- c. Length of Water Column 0.27 (a-b)
- d. Calculated Purgeable Volume ~2 gal



2. WELL PURGEABLE DATA

- a. Purge Method peristaltic pump
- b. Required Purge Volume (@ 3 well volumes) ~6 gal
- c. Field Testing: Equipment Used HyDAC Conductivity, pH, Temperature meter

Volume Removed	T°	PH	Spec. Cond.	Color	Other
<u>2.5 gal</u>	<u>66.5</u>	<u>7.50</u>	<u>528</u>	<u>clear</u>	

3. SAMPLE COLLECTION:

Method peristaltic pump

Container Type	Preservation	Analysis Req
<u>2) 1-liter amber</u>	<u>cool</u>	<u>TPH</u>

sample ID = ASU 01A

Comments No odors or sheen observed.
dry at 3 gal