00053

Draft Final Work Plan Revision 1

for

Study Area Screening Evaluation

Gould Island Electroplating Shop
Naval Education and Training Center
Newport, Rhode Island

Northern Division
Naval Facilities Engineering Command

Contract Number N62472-90-D-1298
Contract Task Order 0286

March 1998

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Brown & Root Environmental

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Brown & Root Services

55 Jonspin Road / Wilmington, MA 01887-1020 / 978-658-7899 / Fax: 978-658-7870

C-NAVY-3-98-1136W

COPY

March 26, 1998

Project Number 7574

Mr. James Shafer
Remedial Project Manager
Northern Division, Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop 82
Lester, Pennsylvania 19113

Reference: CLEAN Contract No. N62472-90-D-1298
Contract Task Order No. 0286

Subject: Revised Draft Final Work Plan, Gould Island Overhaul Shop

Dear Mr. Shafer:

Enclosed are three copies of the revised Draft Final Work Plan for SASE at the Gould Island Overhaul Shop (Building 32), which is part of the U.S. Naval Complex at Newport Rhode Island. This work plan has been submitted to regulatory review parties as described on the distribution list.

This submittal includes the text (Sections 1-6), additional photos for Section 7, and additional historical material for Appendix D (including one oversize figure showing the floor plan of building 32). Please insert this new material into the binders you originally received with the draft in 1997. Other Appendices have not been revised.

Regarding RIDEM's comment that inquired of the rationale for performing an SASE instead of an RI, reviewers should be reminded that there was previous information available for the electroplating shop and very limited information is available for the remainder of Building 32. Since the scope of the project changed to this degree, there is justification for starting at the beginning.

In addition, the RIDEM referenced a "solvent plume" on the north side of Building 32. I suspect they are referring to the fuel-related VOCs that were detected by soil gas survey in the area of Building 44 by the Quad 3 Group (Appendix D of the attached work plan). This is being addressed through the UST program. Traces of TCE were also detected in the soil gas at the northeast corner of Building 32, although no contaminants were detected in groundwater at this location (Building 44 UST SI Report, B&R Environmental, 1997).

Mr. James Shafer
March 26, 1998
Page 2

If you have any questions regarding this material, please do not hesitate to contact me at 508-658-7899.

Very truly yours,

Stephen S. Parker
Project Manager

SSP/

attachment

c: K. Keckler, USEPA (w/encl - 3)
P. Kulpa, RIDEM (w/encl - 4)
K. Coyle, NETC (w/encl - 4)
J. Stump, Gannett Fleming (w/encl - 2)
T. Prior, U.S. Fish & Wildlife (w/encl - 1)
K. Finkelstein, NOAA (w/encl - 1)
J. Trepanowski/M. Turco, B&RE (w/encl - 1)
File 7574-3.2 (w/o encl)

bc:

K. O'Neill (w/encl - 1)
File 7574-8.0 (w/encl - 1)

DRAFT FINAL WORK PLAN, REVISION 1
GOULD ISLAND ELECTROPLATING SHOP
NETC- Newport, Rhode Island

W5298183DF

DRAFT FINAL WORK PLAN REVISION 1

FOR

STUDY AREA SCREENING EVALUATION

GOULD ISLAND ELECTROPLATING SHOP
NAVAL EDUCATION AND TRAINING CENTER
NEWPORT, RHODE ISLAND

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Northern Division
Environmental Branch, Code 18
Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop No. 82
Lester, Pennsylvania 19113-2090

Submitted by:
Brown & Root Environmental
600 Clark Avenue
King of Prussia, Pennsylvania 19406-1433

CONTRACT NUMBER N62472-90-D-1298
"CLEAN" Contract Task Order No. 0286

March 1998

PREPARED BY:

STEPHEN S. PARKER
PROJECT MANAGER
BROWN & ROOT ENVIRONMENTAL
WILMINGTON, MASSACHUSETTS

APPROVED BY:

JOHN J. TREPANOWSKI, P.E.
PROGRAM MANAGER
BROWN & ROOT ENVIRONMENTAL
KING OF PRUSSIA, PENNSYLANIA

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

APPENDICES

TABLE OF CONTENTS (Continued)

TABLES

FIGURES

1.0 INTRODUCTION

This Work Plan has been prepared under the Comprehensive Long Term Environmental Action Navy (CLEAN) Contract No. N62472-90-D-1298, Contract Task Order (CTO) 286. The statement of work requires Brown & Root Environmental (B&R Environmental) to provide a Study Area Screening Evaluation (SASE) Work Plan for Building 32 on Gould Island, Newport, Rhode Island. This Work Plan outlines the requirements and describes the procedures for performing investigations at Building 32 (Gould Island - study area 17).

The purpose of this Work Plan is to describe the investigation to identify and characterize any environmental contamination related to the Gould Island Building 32 operations located on the northern portion of Gould Island in Narragansett Bay. The SASE report will be prepared in accordance with general EPA guidance and the Federal Facilities Agreement between the U.S. Environmental Protection Agency (EPA), Rhode Island Department of Environmental Management (RIDEM) and the U.S. Navy.

1.1 SITE-SPECIFIC INVESTIGATION OBJECTIVES

The investigation objectives for this site are to identify and characterize potential environmental contamination resulting from former Building 32 activities and to assess potential pathways for releases of contamination to the on-shore and off-shore environments. The investigation objectives will be achieved through a focused program of investigation that is based on previous investigation findings and site background information.

Building 32 , the former Torpedo Overhaul Shop, is comprised of an electroplating shop, machine shops, degreasing shops, grinding and buffing shops, and overhaul shops used for naval operations support during the Second World War. This site is one of many known and potential release sites at Gould Island, which include Underground Storage Tanks (USTs), an incinerator, weapons bunkers, and a coastal landfill area. Waste from the electroplating shop was apparently carried through a single discharge pipe to the east passage of Narragansett Bay. The disposal practices for the wastes from other areas of Building 32 operations are not known.

The Initial Assessment Study performed in 1983 for NETC identified the Gould Island electroplating room as one of the areas where contaminants could pose human health or environmental risks. Therefore, a confirmation and verification study was performed in 1986, in which samples were collected near the outfall pipe. Since metal contaminants were found in sediment and shellfish during that study, it was determined that additional investigations were warranted. This SASE is the next step in this investigation process and the investigation has been expanded to include past activities and operations for all of Building 32.

The investigation will assess the presence of releases of hazardous substances to soil, groundwater, and near-shore sediments. Offshore investigations will be conducted at a later date in concert with sites under the jurisdiction of the U.S. Army Corps of Engineers and RIDEM. Therefore, offshore investigations will be limited to confirming the presence of sediment contamination anticipated at point discharges. The site investigation program will include a reconnaissance survey, concrete slab and soil sampling, sediment sampling, soil gas sampling, monitoring well installations, and groundwater sampling.

Given the available site background information, the investigation program is planned to document the presence of any environmental contamination, assess the nature the of contamination, and describe potential threats to human health and the terrestrial environment. The findings of the SASE may be used in accordance with a subsequent Remedial Investigation, if one is deemed necessary, to evaluate remedial actions at the site through the performance of a feasibility study.

A description of the study objectives is included in Section 2.6, which discusses the development of project-specific data quality objectives.

This investigation will be performed in two phases. The first phase will include a site reconnaissance and initial sample collection of concrete cores, surface soil samples, sediment samples, and soil gas sampling. Based on a review of the laboratory analytical results from data collected during this first phase, the locations for borings and monitoring wells will be selected, as follows:

Phase I Activities

Task 1: Building 32 Interior Survey, Inspection, and Clearing

Task 2: Concrete Slab Floor and Sub-Slab soil Sampling

Task 3: Underground Drainage System Clearing, Tracking, and Sampling

Task 4: Offshore Outfall Tracking/Underwater Imaging

Task 5: Sediment Sampling

Task 6: Soil Gas Sampling

Task 7: Surface Soil Sampling

Phase II Activities

Task 8: Geologic/Hydrologic Investigation

Task 9: Ecological Setting Evaluation

Task 10: Onshore Survey

1.2 PROJECT ORGANIZATION AND RESPONSIBILITIES

B&R Environmental will be responsible for the overall management of the project, including the performance of field activities presented in this Work Plan.

NAVFAC personnel will be responsible for administrative and technical oversight of the program, and project management and coordination between state and federal regulatory agencies, while the NUWC and NETC on-site representatives will be responsible for on-site coordination with B&R Environmental.

Key Navy personnel supporting this project are as follows:

James Shafer, RPM
Naval Facilities Engineering Command, Northern Division

Kevin Coyle, Facility Contact
NETC PWD - Environment

Philip DeNolfo
NBSWTF Manager, NUWC

Joann Spangenberg
NUWC DIVNPT Environmental, Safety and Security

Key B&R Environmental personnel supporting this project are as follows:

Stephen Parker
Project Manager

Lucy Guzman
Lead Chemist

Kevin O'Neill
Lead Biologist

Brown & Root Environmental, Wilmington, MA
Phone: (978) 658-7899
FAX: (978) 658-7870

Matt Soltis
CLEAN Health and Safety Manager

Dave Yesso
Quality Assurance Manager

Brown & Root Environmental, Pittsburgh, PA
Phone: (412) 921-7090
FAX: (412) 921-4040

Greg Maynard
Lead Risk Assessor
Brown & Root Environmental
King of Prussia, Pennsylvania
Phone: 610-491-9688
Fax: 610-491-9647

The B&R Environmental Project Manager (PM) will have the primary responsibility for implementing and managing the investigation. The B&R Environmental PM will also be responsible for notifying regulatory agencies of field activities or schedule modifications. The Field Operations Leader (FOL) and lead technical staff will be appointed to support the PM.

The CLEAN Health and Safety Manager is responsible for reviewing health and safety plans for all CLEAN operations, and performs site audits to ensure compliance with program, and site health and safety requirements.

The Quality Assurance Manager is responsible for QA/QC requirements for the B&R Environmental CLEAN program. This individual reviews data and deliverable documents, and performs system audits to ensure contract QA/QC goals are met.

The Lead Chemist will advise the PM on technical requirements of the data and sample collection efforts. This individual will also assume a second role as site QA/QC officer.

The FOL will be responsible for directing on-site field activities and will report directly to the PM. The FOL will coordinate efforts of the field sampling staff, the subcontractors, and the lead technical staff. The FOL will be responsible for identifying problem areas and bringing them to the attention of the PM for resolution.

A Site Safety Officer (SSO) will be designated prior to field activities and will be responsible for ensuring adherence to all health and safety requirements. The SSO reports directly to the CLEAN Health and Safety Manager and the PM.

The Lead Biologist and Lead Risk Assessment personnel will be responsible for reviewing the sampling program to ensure it is adequate to meet the objectives of the study, for assimilating the data into a format amenable to manipulations required for risk assessment modeling and calculations, and for performing the risk assessment steps.

In addition to the above personnel, B&R Environmental program personnel will provide overall support in subcontracting, cost tracking, progress reporting, and supervising the PM. The program personnel include:

John Trepanowski, P.E.
Program Manager

Garth Glenn, P.E. .
Deputy Program Manager

Brown & Root Environmental, King of Prussia, PA
Phone: (610) 491-9688
Fax: (610) 491-9647

1.3 PROJECT DELIVERABLES

Project deliverables submitted during this project will include:

- An SASE report, including:
  - Summary of site background information
  - Description of field investigation activities
  - Summary of geologic and hydrogeologic conditions found during investigation activities
  - Summary and interpretation of chemical data
  - Presentation and evaluation of contaminant source investigations
  - Description of potential contaminant fate and transport

   - Conclusions and recommendations for additional investigation and remedial actions (as required)

- A human health risk assessment, including:
   - Exposure assessment describing concentrations of contaminants found and potential routes of exposure
   - Risk-based selection of chemicals of potential concern
   - Toxicity assessment for the chemicals of potential concern
   - Risk characterization to estimate carcinogenic and non-carcinogenic risks

- An ecological risk assessment, describing:
   - Problem Formulation describing exposure pathways
   - Exposure Characterization for selected receptors
   - Risk Characterization

- Supporting documentation, including:
   - Maps depicting surveyed monitoring wells, underground drain/pipe lines, other sampling points, and other significant features including identified habitat areas
   - Results from laboratory analysis of samples
   - Boring logs and well installation logs

A more detailed description of the SASE report is presented in Section 5.0 of this Work Plan.

1.4 WORK PLAN ORGANIZATION

Section 2.0 of this Work Plan describes the history of the site and some of the findings of previous investigations on and around the site. Section 2 also describes the basis for the Data Quality Objectives (DQOs) developed for this project.

Section 3.0 presents a description of the field work planned for this investigation. Tasks are listed in chronological order of execution. Sample collection procedures and analytical parameters are also described in this section.

Section 4.0 presents the Quality Assurance Plan for the SASE. This plan describes the QA/QC sample collection procedures and frequencies, data quality protocols, and analytic data validation requirements.

Section 5.0 presents a general outline of the SASE report, and human health and ecological risk assessments that will be prepared following completion of all the field work described in Section 3.0.

Section 6.0 presents references cited and used in preparing this Work Plan.

Section 7.0 presents photographs describing site conditions as of March 1997.

A site specific Health and Safety Plan is attached as Appendix A. Appendix B presents Standard Operating Procedures (SOPs) for the field investigation work. Appendix C contains samples of forms to be used for documentation during this investigation. Appendix D presents selected background data collected at the site during previous investigations.

1.5 CHANGES TO THE WORK PLAN

Work plan development is performed in steps, with the Navy providing a draft, draft final, and final version to oversight parties to allow for comments and other input. However, during the project execution, it may become necessary to modify the Work Plan after it is finalized. If the plan for collecting data needs to be altered, the work plan may be amended through the use of a Request for Field Modification (RFM) form. This form will be prepared by the B&R Environmental FOL and forwarded to the B&R PM. The PM will make a recommendation to the Navy RPM, who (if necessary) will forward the RFM to NETC and NUWC representatives, and to the regulatory oversight RPMs. Time limits on acceptance of, or comment to, the field modification requests will be stated. An example of the RFM form is presented in Appendix D.

1.6 SCHEDULE AND REGULATORY OVERSIGHT

A schedule for field investigations has not been prepared but one will be prepared and submitted to the oversight parties U.S. EPA and RIDEM upon development of a cost/schedule proposal to perform the field work. This schedule will be updated as necessary to inform oversight personnel when different tasks and activities are scheduled to occur. A 24-hour advance notification of changes in scheduled field activities will be given to the regulatory agencies.

2.0 BACKGROUND INFORMATION

This section presents the available background information that was used to design the Study Area Screening Evaluation (SASE) for Building 32 on Gould Island .

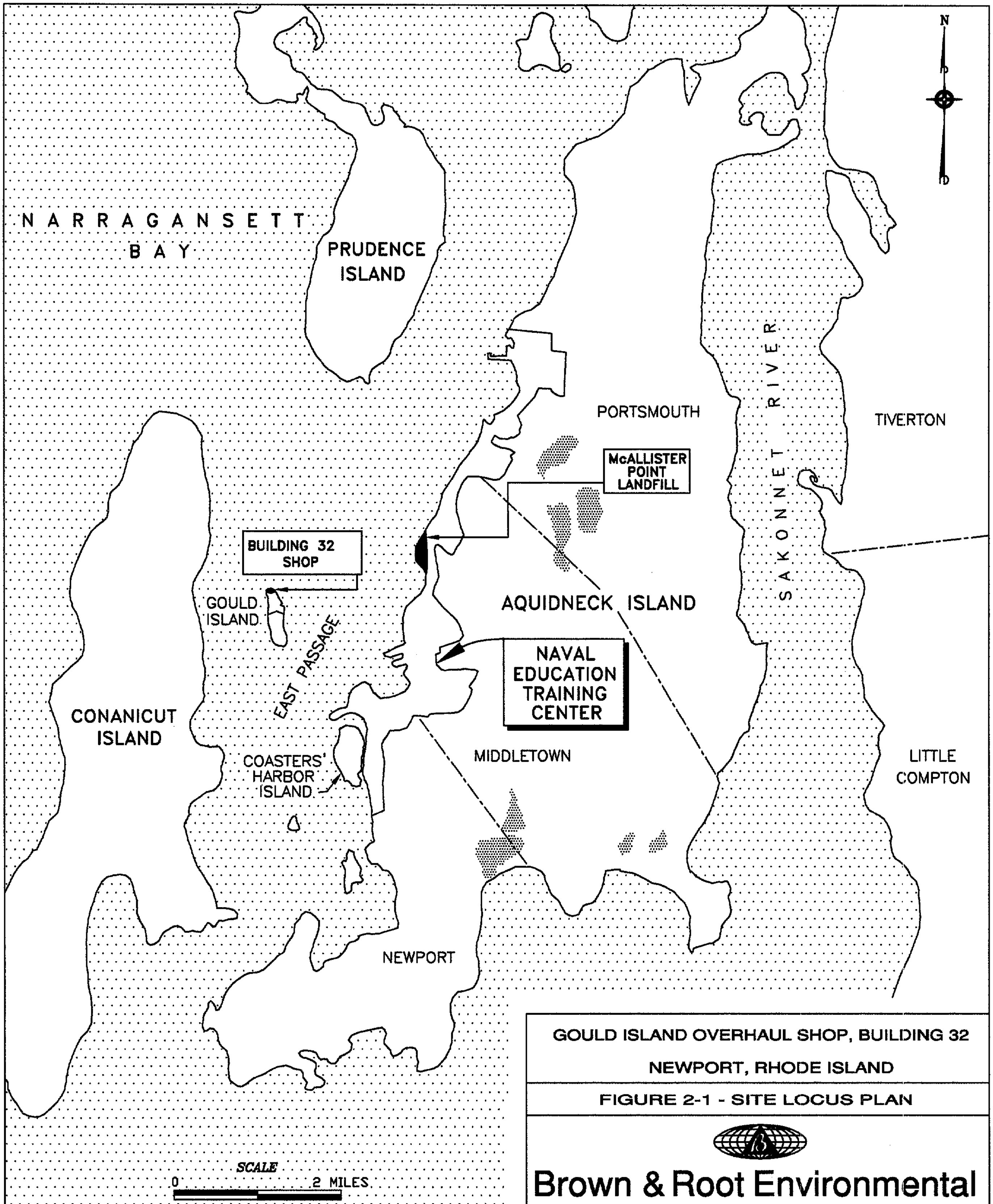
2.1 SITE LOCATION

Gould Island is located in the East Passage of Narragansett Bay in Rhode Island, approximately 1.5 miles from the NETC shoreline. Gould Island is located between Aquidneck and Conanicut Islands, and occupies approximately 52 acres (Figure 2-1). Building 32, located on the northeast end of Gould Island, served as a torpedo overhaul shop that has been inactive since the 1950's (Figure 2-2). A Navy torpedo testing range is located on the northern tip of the island and is still active. The remainder of the island is inactive.

Gould Island was purchased by the Navy in the early 1940s to construct a weapons support center for naval vessels. Photos taken during construction show the island was redeveloped with housing, a water tower, and a seaplane base at the south end of the island; and the power plant, an overhaul shop, a covered tramway, and a torpedo test firing pier at the north end. In addition, fueling docks, two large coal piles, ammunition bunkers, and a number of other unidentifiable structures were present.

A large portion of the island that contains known potential release sites has been transferred from the Navy to the State of Rhode Island. However, a complete inventory of these sites has not been performed. NETC retains ownership of the northern end of the island, and has conducted investigations at known former UST locations in accordance with RIDEM UST regulations and at Building 32.

Building 32 is planned for demolition, although no date has been set. The building and the adjacent coal-fueled power plant (Building 33) are in disrepair, and the other structures on this portion of the island have given way to opportunistic vegetation and wildlife. This portion of the island is off limits to the public although trespass by recreational boaters is possible. Buildings 32 and 33 have been recently surrounded with a nine-foot chain-link and barbed-wire fence, which is secured at all times.



SOURCES: DRAFT FINAL REMEDIAL INVESTIGATION REPORT
TRC ENVIRONMENTAL CORPORATION - AUGUST 1994

ACAD NAME: C:\DWG\GOULD\FIG_2-1.DWG

GOULD ISLAND OVERHAUL SHOP, BUILDING 32

NEWPORT, RHODE ISLAND

FIGURE 2-1 - SITE LOCUS PLAN

Brown & Root Environmental

A Division of Halliburton NUS Corporation

55 JONSPIN ROAD
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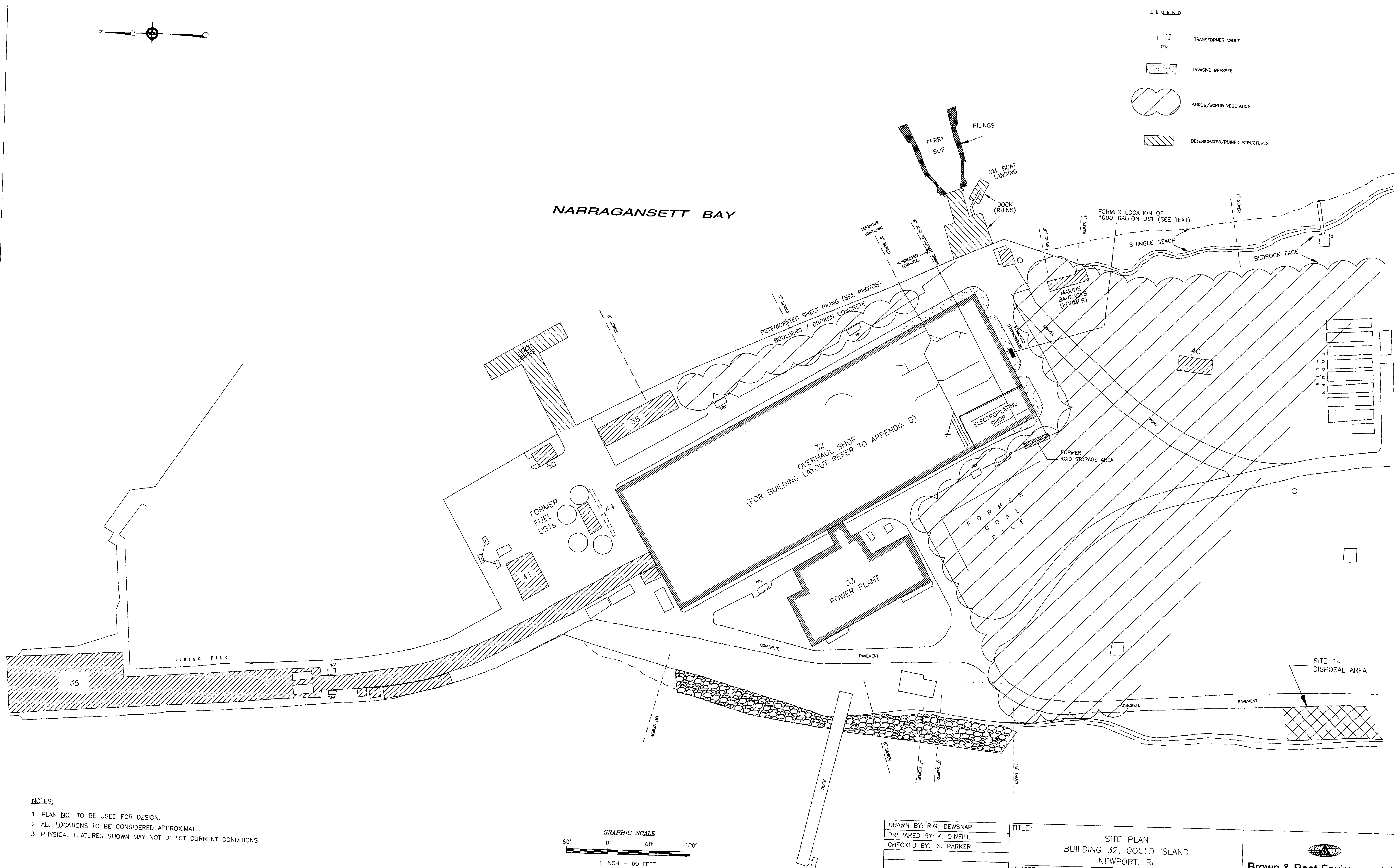
(978)658-7899



NOTES:

1. PLAN NOT TO BE USED FOR DESIGN.
2. ALL LOCATIONS TO BE CONSIDERED APPROXIMATE.
3. PHYSICAL FEATURES SHOWN MAY NOT DEPICT CURRENT CONDITIONS

DRAWN BY: R.G. DEWSNAP	TITLE: SITE PLAN BUILDING 32, GOULD ISLAND NEWPORT, RI
PREPARED BY: K. O'NEILL	SOURCE: ADAPTED FROM "MAP OF GOULD ISLAND U.S. NAVAL TORPEDO STATION NEWPORT R.I. SHOWING CONDITIONS ON JUNE 30, 1948"
CHECKED BY: S. PARKER	SCALE: 1" = 60'
PROJECT MANAGER: S. PARKER	DATE: MARCH 19, 1998
PROGRAM MANAGER: J. TREPANOWSKI	PROJ. NO: 7574 CTO: 286
	DRAWING NO: FIGURE 2-2
	ACFILE NAME: C:\DWG\NAVY\GOULD\FIG_2-2.DWG
	REV: 1

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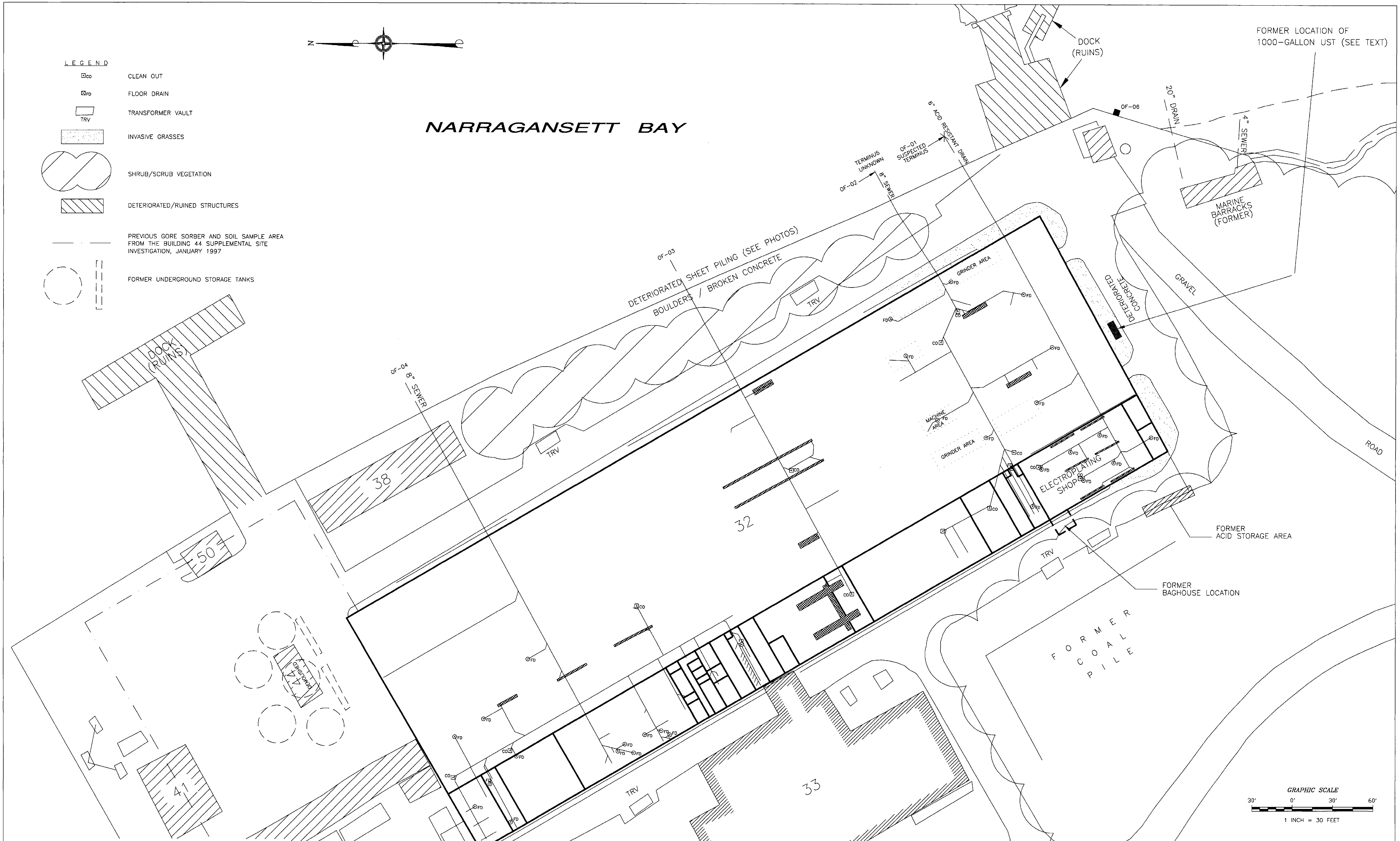
(978)658-7899

00053 F B1>



NOTES:

1. PLAN NOT TO BE USED FOR DESIGN.
2. ALL LOCATIONS TO BE CONSIDERED APPROXIMATE.
3. PHYSICAL FEATURES SHOWN MAY NOT DEPICT CURRENT CONDITIONS

DRAWN BY: D.W. MACDOUGALL	TITLE: SITE PLAN, BUILDING 32, GOULD ISLAND, NEWPORT, RHODE ISLAND
PREPARED BY: K. O'NEILL	SOURCE: ADAPTED FROM "MAP OF GOULD ISLAND TORPEDO STATION NEWPORT R.I. SHOWING CONDITIONS ON JUNE 30, 1948"
CHECKED BY: S. PARKER	SCALE: 1" = 30' / DATE: MARCH 19, 1998 / PROJ. NO: 7574 CTO: 286
PROJECT MANAGER: S. PARKER	DRAWING NO: 2-3 / ACFILE NAME: DWG\NAVY\GOULD\FIG_2-3A.DWG / REV: 0
PROGRAM MANAGER: J. TREPANOWSKI	

Brown & Root Environmental
55 JONSPIN ROAD
WILMINGTON, MASSACHUSETTS 01887
(978)658-7899

2.2 SITE DESCRIPTION

The Building 32 facility was used for overhaul and storage of torpedoes during WW II. The building includes the plating shop, a grinding and buffing shop, degreasing units, and equipment formerly used to overhaul torpedoes. Reportedly, extensive electroplating and degreasing operations were performed in the building between 1942 and 1945. Construction plans for Building 32 obtained from the NETC Public Works Department were used to identify the interior construction, drainage, and plumbing details. Figure 2-3 is re-drawn from the March 1942 Overhaul Shop Plumbing Floor Plan, which shows the location of floor trenches and floor drain system, as well as the other major features in this area.

The building was inspected in March 1998 to confirm existing conditions relative to the construction drawings. At that time it was observed that the trenches and testing tanks shown on the construction drawings were present as specified. However, floor drains and drainway cleanout were not installed where they are shown on the drawings. A close inspection of the building floor found floor drains only in the electroplating room, the engine room, and the lavatories. While not observed directly, it was assumed that drains are present in the trenches and testing tanks, as there was little or no standing water in these trenches and tanks.

Access to the interior of Building 32 is through large freight/equipment overhead doorways at the north and south ends of the building with smaller, personnel doors, located at each exterior wall. The main portion (overhaul and storage area) of the building (excluding the plating shop) is relatively open space. Most of the cement floor in this area is covered with a non-conductive wood block floor finish which has signs of significant water damage (buckling and staining). several floor trenches and floor drains are located in the storage area. Debris from the deteriorated ceiling/roof is scattered on the floor area.

Two doorways on the east wall of the plating shop provide access from the main portion of the building. The plating shop room consists of numerous square metal open top vats ("baths"), two concrete open top round plating tanks ("pits"), several wooden benches, a small sandblasting room, a motor generator room, a small "acid dipping room" with additional baths, a small office, and floor trenches and drains (TRC 1992). The metal baths are approximately 3 feet wide by 5 to 15 feet long. The two concrete cylindrical pits are approximately 4 feet in diameter by 8 feet deep (with concrete bottoms), with most of each pit extending below the floor of the room (TRC 1992). A small bathroom is present at the northern corner of the plating room.

The electroplating shop floor is constructed of concrete, with a series of open top floor trenches and floor drains. Construction plan drawings indicate the shop floor was to be coated with an acid-resistant mastic coating. A close inspection of this floor provided evidence that it does have some form of resinous coating. As shown on Figure 2-3, the floor trenches are located along the eastern and western walls of the room and in the center portion of the shop. The open top trenches are partially covered with metal grates. The layout of the planned subsurface piping associated with the trenches and drains is also shown in Figure 2-3. The design drawings indicate that trenches and drains associated with the electroplating shop are connected to a single 6-inch diameter acid-resistant pipeline that discharges to the east side of Gould Island (OF-01) near the Ferry Slip (Figure 2-2).

A site walkover in March 1997 (including B&R Environmental, Navy, U.S. EPA, RIDEM, etc.) confirmed TRCs observations of the study area (TRC 1992). Significant observations from the TRC site visit included the following:

- Numerous metal vats were present in the plating room. The locations and orientation of the vats is provided on Figure 7 in Appendix D of this Work Plan (TRC 1992).

- A series of three trench drains were present running along the floor of the plating room. These drains were located along the long axis of the plating room, one on each side of the room with the third in the middle. These trench drains were partially covered with metal grates (Figure 2-3). Floor trenches were also present in the main area of Building 32.

- Several floor drains were present in the concrete floor of the plating shop and the main areas of Building 32 (Figure 2-3).

- Overhead signs were observed above several tanks. in the plating shop Individual signs read "Chromic Acid", "Muriatic Acid", "Sulfuric and Nitric Acid", and "Caustic Soda".

Section 7 of this work plan presents photographs of current conditions of the site as of March 1997.

2.3 SITE HISTORY

Available information (Envirodyne, 1983) indicates that both electroplating and degreasing operations were conducted in Building 32 in the mid-1940 s during World War II. Building 32 was used as a torpedo overhaul and storage shop. The building includes the plating shop, a grinding and buffing shop, degreasing units, and equipment formerly used to overhaul torpedoes.

It is not known where or how waste materials generated from the plating and degreasing activities were disposed. However, as Figure 2-2 indicates, it is assumed that most of the wastes (including electroplating shop wastes) from the floor trenches and floor drains in the were likely to have been discharged through offshore outfall pipes. The electroplating shop wastes were probably discharged through the outfall on the east side of Gould Island (location OF-01). The Confirmation Study report (Louriero, 1986) suggested that the plating sludges were probably disposed of in a disposal area located on west side of Gould Island (Site 14 Figure 2-2). An investigation to determine if electroplating sludge was disposed of at another location on Gould Island is not included in the scope of this SASE.

Aerial mapping photographs dating from 1942, 1951, 1963, 1965, 1970, 1975, 1981, 1988, and 1992 were reviewed at the Rhode Island Department of Administration, Division of Planning. In general, the RIDEM aerial photography was of minimal use in evaluating potential impacts or the extent of contamination at this study area since the physical location of the plating and overhaul shops is inside Building 32.

Aerial photographs (1942) from NETC Public Works files were also reviewed. These aerial photographs revealed the general locations of the off-shore electroplating shop discharge pipe leading to outfall OF-01, sewerage (soil) pipes leading to outfalls OF-02, OF-03, OF-04, OF-05, and a stormwater discharge pipe leading to outfall OF-06 near the southeast corner of Building 32 (Figure 2-3). The precise discharge point of the electroplating shop and sewerage outfalls could not be determined using aerial photographs since these outfalls discharge off shore, near or below the low tide waterline. However, it appears that the terminus of the pipe that would correspond to the electroplating shop drain is only 25 feet off shore of the seawall. The stormdrain outfall was observed to discharge near the seawall. These aerial photographs also show Building 32 under construction in June 1942 (section 7 of this Work Plan).

A construction plan for plumbing is presented in Appendix D. This diagram shows the planned location of soil pipes exiting the building. However during an inspection performed March 4, 1998, many floor drains and other plumbing components were not found at the locations described on these plans.

On March 4, 1998 the intertidal zone was inspected to attempt to locate evidence or remnants of the outfalls at low tide. At this time, the following was noted:

- There is no evidence of the presence of OF-01. If this was made of an "acid resistant" material, as specified in construction drawings, it may have been clay or porcelain, which would not have withstood erosion and deterioration of surrounding concrete, sheetpiling and other structures.

- OF-02 was also not found, and there is extensive deterioration of the sheet piling in this area. However, the location where this pipe exits from the building was confirmed from an inside pipe chase.

- OF-03 was found, extending approximately 25 feet from the sheetpiling and seawall. This area has less deterioration due to the presence of concrete barriers near the steel sheetpiling wall.

- OF-04 was not found, although the location where this pipe exits the building was confirmed from an inside pipe chase.

- OF-05 was found on the west side of the island. However, it appears that this drain is a stormwater drain, servicing the paved area to the west of Building 32, and roof drains on the west side of Building 32.

- OF-06 was not found. There is extensive erosion in this area and only remnants of sheetpiling are present to show where the outfall may have been located.

2.4 PREVIOUS SITE INVESTIGATIONS

This section presents data from previous investigations conducted at the Gould Island Electroplating Shop and Building 32. Copies of the original maps provided in previous investigations and work plans are presented in Appendix D of this Work Plan.

2.4.1 Electroplating Shop Investigations: IAS, Confirmation Study, and Verification Study

An Initial Assessment Study (IAS) conducted by Envirodyne Engineers in 1983 identified areas, including the Gould Island Electroplating Shop, where potential contamination from past waste disposal or handling practices may pose human health or environmental risks. Because the shop was used for electroplating and the fate of the wastes it generated was unknown, the IAS recommended the site be investigated further.

A Confirmation Study (CS) was subsequently conducted of the Gould Island Electroplating Shop (Louriero Engineering, 1986). The Confirmation Study indicated that two offshore discharge pipes were present directly east of Building 32 in Narragansett Bay. The general locations of the discharge pipes are shown on Figure 2-2. The end of one of the discharge pipes (OF-02) was located during the CS. The end of the other pipe (OF-01) was not located, reportedly due to the presence of silt and vegetation over the pipe.

Under the "Verification Step" of the CS, both sediment and mussel samples were collected from two locations in Narragansett Bay (Appendix D). Sampling Station 01 was located just beyond the outlet of the northernmost discharge pipe and Station 02 was located near the outlet of the southern discharge pipe.

Sediment samples were collected from Stations 01 and 02, approximately 25 feet off shore in 1 to 3 feet of water. The sediment deposits from which the samples were collected were reportedly stony silt and sand collected from a depth of 0 to 4 inches. The mussel samples were collected from the intertidal zone shoreward of sediment sampling Stations 01 and 02.

Sediment and mussel samples were analyzed for metals (lead, copper, chromium, nickel, cadmium, mercury, silver) and cyanide (sediments only) as reported in the CS report. Results are summarized in Table 2-1. Sediment and mussel samples were also collected from two control stations (NI and N2) and were analyzed for metals and cyanide (sediment only). Control Station N-1 was located on Aquidneck Island (end of Corey Lane in Portsmouth) and control station N-2 was located off Conanicut Island (off Route 138 north of the Newport Bridge). Control Station N-1 appears to be located adjacent to a sewage outfall. The control station sediments were reported as being stony at both locations, particularly at Station N-1.

According to the CS report, the "Verification Step" sample results "...*indicate that slightly* elevated concentrations of cyanide and copper are present in sediments and an elevated concentration of copper is present in mussels collected from the vicinity of one of the discharge pipes....". This judgment was based on comparing the site sample results with the control station sample results (see Table 2-1).

The "*Verification Step*" *sediment sample data does show that cyanide was detected at* concentrations higher (approximately four times greater) than those detected in the control samples, and copper was detected at an elevated level (above the control sample) in the Station 01 sediment sample.. In addition, copper was also detected at a higher concentration in the Station 02 mussel sample (26.3 ppm) than that detected in the Station 01 mussel sample (6 ppm) and the control mussel samples (4.3 and 7.2 ppm).

Under the "Characterization Step" of the CS, the mussels at Station 02 were resampled as a check on the metals concentrations detected previously in the "Verification Step". This single mussel sample was analyzed for lead, copper, chromium, and nickel. These sample results are presented Table 2-1. The sample results indicate that the detected metals concentrations in mussel at Station 02 are similar to those detected in the "Verification Step" control samples.

The CS recommended that "no further studies or remedial actions are needed at this site because the levels of contaminants found are not significantly high" (CS, 1986).

2.4.2 Building 32 and Waste Disposal

A Waste Inventory and Sampling Report (ENSR, 1992) was prepared to inventory and characterize waste materials present in Buildings 32 and 35. This program was undertaken to support a Navy contract for the removal of these materials prior to the planned building demolition.

TABLE 2-1
ANALYTICAL RESULTS FOR SEDIMENT AND MUSSEL SAMPLES
FROM THE "CONFIRMATION STUDY REPORT" (LOUREIRO ENGINEERING, 1986)
GOULD ISLAND OVERHAUL SHOP
STUDY AREA SCREENING EVALUATION
NEWPORT, RHODE ISLAND

STATION NUMBER	01	02	N-1 (control station)	N-2 (control station)	N-2 (control duplicate)
MEDIA AND ANALYSIS					
SEDIMENT - December 1983					
Cyanide	0.121	0.111	0.031	0.027	NA
Chromium	<0.25	<0.25	11.5	8.0	NA
Cadmium	<0.05	<0.05	<0.05	<0.05	NA
Lead	<0.5	6.5	27.5	6.8	NA
Mercury	<0.02	<0.02	<0.02	<0.02	NA
Silver	<0.5	<0.5	<0.5	<0.5	NA
Copper	26.0	17.4	18.3	10.3	NA
Nickel	<0.25	<0.25	21.3	11.3	NA
MUSSELS - December 1983					
Chromium	<2.5	<2.5	<2.5	<2.5	NA
Cadmium	<0.5	<0.5	<0.5	<0.5	NA
Lead	<1.0	<1.0	<1.0	<1.0	NA
Mercury	<0.04	<0.04	<0.04	<0.04	NA
Silver	<1.0	<1.0	<1.0	<1.0	NA
Copper	6.0	26.3	7.2	4.3	NA
Nickel	<2.5	<2.5	<2.5	<2.5	NA
MUSSELS - September 1984					
Chromium	NS	1.0	1.1	2.8	1.4
Lead	NS	5.0	4.9	3.8	5.2
Copper	NS	6.6	6.8	8.2	5.4
Nickel	NS	3.9	4.9	5.1	4.9

NOTES:
- All results in ug/gm (dry weight basis).
- Available sample locations are presented in Appendix D.
- Sediments reportedly collected from a depth of 0 to 4 inches.
- NS = not sampled
- NA = not applicable

Reference: Loureiro Engineering Associates, May 15, 1986, Confirmation Study Report on Hazardous Waste Sites at Naval Education and Training Center, Newport, RI, prepared for the Northern Division, Naval Facilities Engineering Command.

Eight samples (T-16, T-17, and T-24 to T-29 inclusive) were collected from within the electroplating shop, and one sample was collected from a manhole (T-30) located just outside of the doorway leading to the electroplating room from the interior of Building 32. These locations are shown in Appendix D of this Work Plan.

Five liquid samples (T-16, T-17, T-24, T-25, and T-26) were analyzed for corrosivity (pH), reactivity (cyanide and sulfide), flashpoint, PCBs, and all Toxicity Characteristic Leaching Procedure (TCLP) parameters. Samples T-25 and T-26 were specifically referred to as "plating solutions" on report figures. The TCLP sample results showed concentrations of lead (7.8 mg/1) in sample T-25, and lead (5.7 ppm) and cadmium (7,000 ppm) in sample T-26, at levels greater than the hazardous waste characterization regulatory limits (40 CFR Part 261 Subpart C) for lead (5.0 ppm) and cadmium (1.0 ppm). Both samples were collected from vats located in the "acid dipping room" portion of the electroplating room. (Complete analytical results for these samples are not available, and are therefore not summarized in tabular form.)

In addition, two composite liquid samples (Composite 1 and Composite 2) were also collected and analyzed for a broad range of parameters to further characterize the materials for disposal purposes. Composite sample 1 consisted of samples T-16, T-17, T-24, T-25, T-28, T-29, and T-30. Composite 2 consisted of samples T-26 and T-27.

Analyses of the composite samples included BTU value, flashpoint, corrosivity (pH), reactivity (sulfide and cyanide), priority pollutant volatiles, priority pollutant semivolatiles, priority pollutant pesticides/PCBs, and metals (antimony, arsenic, cadmium, chromium, lead, manganese, potassium, sodium, and selenium). The composite sample results are provided with the site background information in Table 2-2.

The analytical results indicate concentrations of heavy metals in both samples. Elevated levels of total cadmium (8,080 ppm) and lead (11 ppm) were detected in Composite 2. In addition, low levels of a volatile organic compound (bromomethane at 19 ppb) and semivolatile organic tentatively identified organic compounds (TICs) at 1,476 ppb were detected in Composite 2. Another sample (MH-1) potentially associated with the electroplating shop operations was collected from a manhole located approximately 20 feet from the southeast corner of Building 32. This location is shown in Appendix D of this Work Plan. This sample was collected as part of Composite 3 which consisted of nine aqueous sample aliquots from the southern portion

TABLE 2-2
ANALYTICAL RESULTS FOR COMPOSITE LIQUID SAMPLES
FROM THE "WASTE INVENTORY SAMPLING REPORT" (ENSR, 1992)
GOULD ISLAND OVERHAUL SHOP
STUDY AREA SCREENING EVALUATION
NEWPORT, RHODE ISLAND

SAMPLE NUMBER	COMPOSITE 1	COMPOSITE 2	COMPOSITE 3
DESCRIPTION OF COMPOSITES (Also refer to Table 2-3)	T-16, T-17, T-24, T-25, T-28, T-29, T-30	T-26, T-27	T-6:(L1, L2), T-7, T-8, T-9, T-10, T-12, T-22 T-23, MH-1
ANALYSIS			
BTU (BTU/LB)	157	0	16
Flashpoint (C)	>60	>60	>60
Corrosivity (SI units)	6.5	6.5	7.5
Reactive Sulfide (mg/l)	<1.0	<1.0	<1.0
Reactive Cyanide (mg/l)	<0.25	<0.25	<0.25
Volatiles (ug/l)			
Bromomethane	ND	19	ND
Chlorobenzene	ND	ND	14 J
Trichloroethane	ND	ND	16
Semivolatiles (ug/l)	ND	ND	ND
Tentatively ID'd Compounds (TICs)	25	1476	2368
1Methyl, 2-Benzene	ND	104	ND
Pyridine	ND	ND	720
Pesticides/PCB (ug/l)	ND	ND	ND
Metals (total) (mg/l)			
Antimony	0.030	0.30	
Arsenic	0.004		0.007
Cadmium	0.580	8,080	2.10
Chromium	0.073	1.10	0.15
Lead	1.500	11.0	1.7
Lithium		0.33	0.62
Manganese	1.870	20.7	2.4
Potassium	66.5	445	397
Silver		0.41	0.10
Sodium	167	6,560	2,260
Strontium	0.140	13.5	0.90

NOTE: - Available sample locations are presented in Appendix D.
- Table 2-3 presents a description of each "T-" sample comprising the composite samples summarized above.

Reference: ENSR Consulting and Engineering, February 14, 1992, Waste Inventory and Sampling Report for Buildings 32 and 35 (Inactive), Naval Underwater Systems Center (NUSC), Gould Island Annex, Newport, Rhode Island, prepared for the Northern Division, Naval Facilities Engineering Command under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Program.

of Building 32 (not including the electroplating room). Composite 3 included liquid from floor trench samples near prior solvent storage areas, a grinding room vat, and the manhole liquid sample. Composite 3 is comprised of discrete samples T-6 (L1 and L2), T-7, T-8, T-9, T10, T-12, T-22, T-23, and MH-1, which represent a total of approximately 2,521 gallons of fluid. Discrete sample definitions are provided in Table 2-3.

The analytical results of Composite 3 identified concentrations of total metals, two volatile organic compounds (chlorobenzene at 14J ppb and trichloroethane at 16 ppb), and semivolatile organic compounds (pyridine at 720 ppb and TICs at 2,368 ppb). Results from analysis of Composite 3 also indicated the presence of cadmium (2.1 mg/1).

As a result of these findings, NETC undertook a removal action to remove the liquid and semi-liquid wastes from these areas. This effort is documented in a report that was not available but will be summarized in a later version of this Work Plan.

2.4.3 UST Closure South of Building 32

An Underground Storage Tank (UST) Closure Assessment Report describes tank closure and related investigative activities conducted at Building 32 by Brown & Root Environmental (B&RE 1997). A 1,000-gallon steel UST was removed from the south of Building 32 in July 1997 as presented in Figure 2-4. The investigation included soil borings and installation of 3 groundwater monitoring wells. Soil samples from the soil borings were analyzed for TPH (GRO-Method 8015) and the results are presented in Figure 2-5. TPH was detected in all samples except the sample from SB17. No TPH concentrations were identified exceeding RIDEM Residential Direct Exposure Criteria (500 mg/kg) or exceeding RIDEM Industrial/Commercial Direct Exposure Criteria (2,500 mg/kg). Positive detections ranged from 37 mg/kg for SB16 to 260 mg/kg for sample TNK-W.
Results from groundwater samples collected from the three wells and one groundwater sample collected from the tank grave (TNK-AQ) were submitted for TPH (Method 418.1), VOCs (Method 8260), SVOCs (Method 8270), and RCRA metals (Method 6010). The groundwater results are presented in Table 2-4 and Figure 2-6. TPH was identified in the sample from MW303 at 1.1 mg/L. TPH was not identified in the samples from MW301, MW302, and TNK-AQ. One volatile compound was identified at a level above the RIDEM Groundwater Objective for GA areas in the sample obtained from MW301. For this sample, trichloroethene was identified at 6 ug/L, exceeding the areas GA Groundwater Objective of 5 ug/L. No other VOCs were identified at

TABLE 2-3
DISCRETE SAMPLE DESCRIPTIONS
FROM THE "STUDY AREA SCREENING EVALUATION WORK PLAN" (TRC, 1992)
GOULD ISLAND OVERHAUL SHOP
STUDY AREA SCREENING EVALUATION
NEWPORT, RHODE ISLAND

SAMPLE IDENTIFICATION	LOCATION	WASTE FORM	ESTIMATED QUANTITY
T-16	Tank	Aqueous	5 gallons
T-17	Tank	Aqueous	10 gallons
T-24	Tank	Aqueous	10 gallons
T-25	Tank	Aqueous	5 gallons
T-26	Vat	Acids (Plating Solution)	2 gallons
T-27	Tank	Aqueous (Plating Solution)	2 gallons
T-28	Tank	Solid/Liquid	5 gallons
T-29	Tank	Aqueous	75 gallons
T-30	Manhole	Aqueous	NS
MH-1	Manhole 20 feet from SE corner of Building 32	Aqueous	NS
T-6 (L1,L2), T-7, T-8, T-9, T-10, T-12, T-22, T-23	Floor trenches near prior solvent storage areas, and a grinding room vat	Aqueous	Represents a total of approximately 2,521 gallons of fluid

NOTE: - Available sample locations are presented in Appendix D.

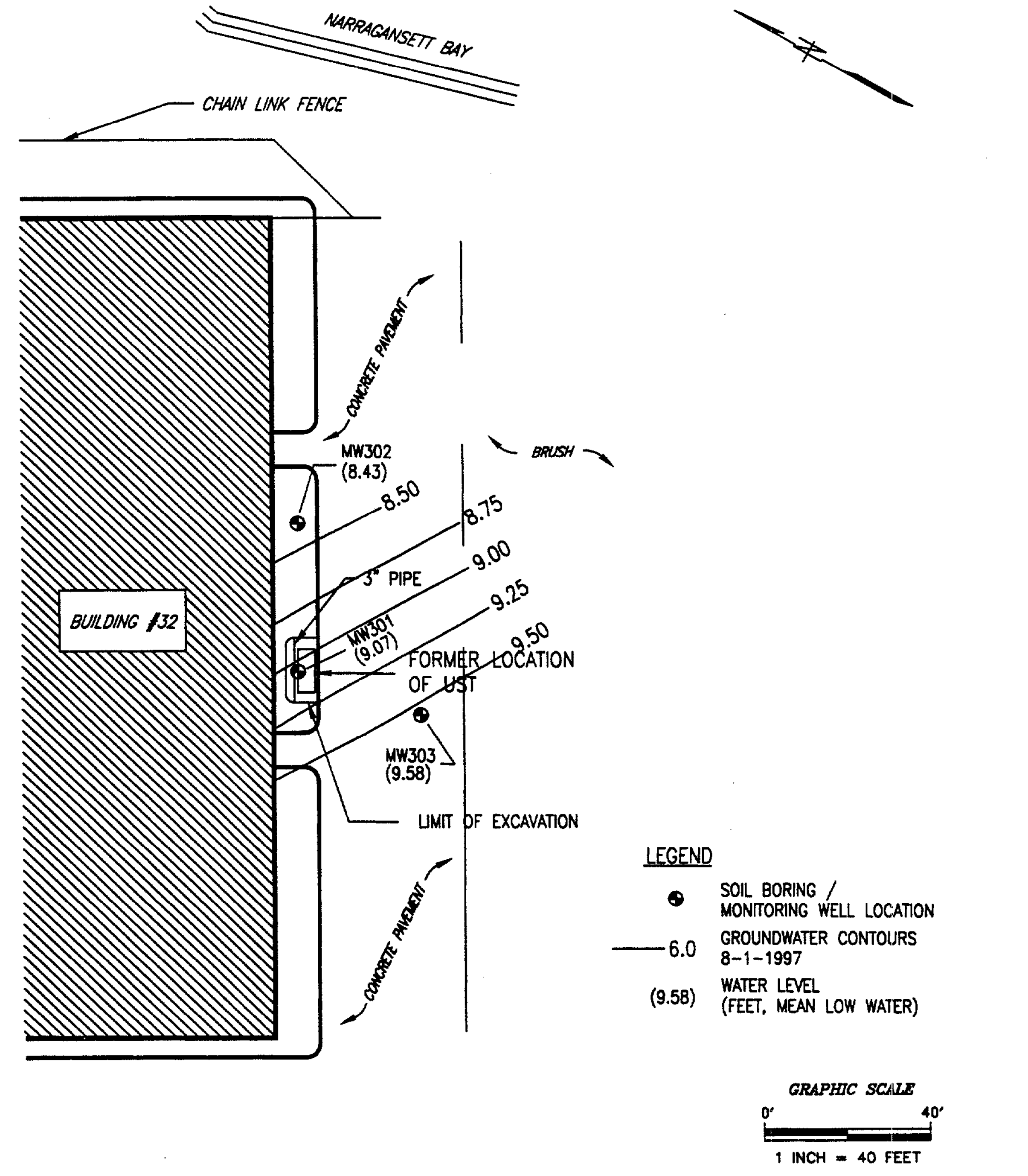
Reference: TRC Environmental Consultants, Inc., July 1992, Study Area Screening Evaluation Work Plan (Volume VI, Gould Island Electroplating Shop, Study Area 17), Naval Underwater Systems Center, Newport, Rhode Island, prepared for the Northern Division, Naval Facilities Engineering Command.

NS - *Not specified.*

TABLE 2-4
GROUNDWATER SAMPLE DATA SUMMARY
FOR THE UST CLOSURE ASSESSMENT REPORT (B&R Environmental, October 1997)
GOULD ISLAND BUILDING 32 (SOUTH)
NEWPORT, RHODE ISLAND

SAMPLE IDENTIFICATION NO.	TNK-AQ	MW301	MW302	MW303	GA GROUND WATER OBJECTIVE[1]
SAMPLE MEDIUM	**AQ**	**AQ**	**AQ**	**AQ**	**ug/l**
PARAMETERS (mg/L)					
Total Petroleum Hydrocarbons	ND	ND	ND	1.1	-
TCL VOCs (ug/L					
Methylene Chloride	NA	0.8J	1	4	5
Acetone	NA	6	5J	8	-
cis-1,2-Dichloroethene	NA	10	1J	ND	70
trans-1,2- Dichloroethene	NA	4	ND	ND	100
Chloroform	NA	0.7J	ND	0.9J	100[2]
Trichloroethene	NA	6	ND	0.8J	5
Toluene	NA	ND	5	ND	1000
Ethylbenzene	NA	ND	2	ND	700
Total Xylenes	NA	ND	8	ND	10000
TCL SVOCs (ug/L)					
Bis(2-ethylhexyl) phthalate	NA	12	6J	32	-
INORGANICS (ug/L)					
Arsenic	NA	5.6	2.3	ND	-
Barium	NA	44.8	64.8	106	2000
Cadmium	NA	0.29	ND	0.55	5
Chromium	NA	9.9	14.6	5.2	100
Lead	NA	8.5	4.0	6.5	15
Mercury	NA	0.01	ND	ND	5

Notes: (1) Rhode Island Department of Environmental Protection Remediation Regulations - March 31, 1993; Amended August 1996
(2) Total Trihalomethanes GA Groundwater Objective
J - Estimated value
ND - Not Detected
NA - Not Analyzed



GROUNDWATER CONTOUR MAP (8/1/97)				FIGURE 2-4
BUILDING 32, GOULD ISLAND				Brown & Root Environmental 55 Jonspin Road Wilmington, MA 01887 (978)658-7899
NETC – NEWPORT, RHODE ISLAND				
DRAWN BY:	D.W. MACDOUGALL	REV.:	0	
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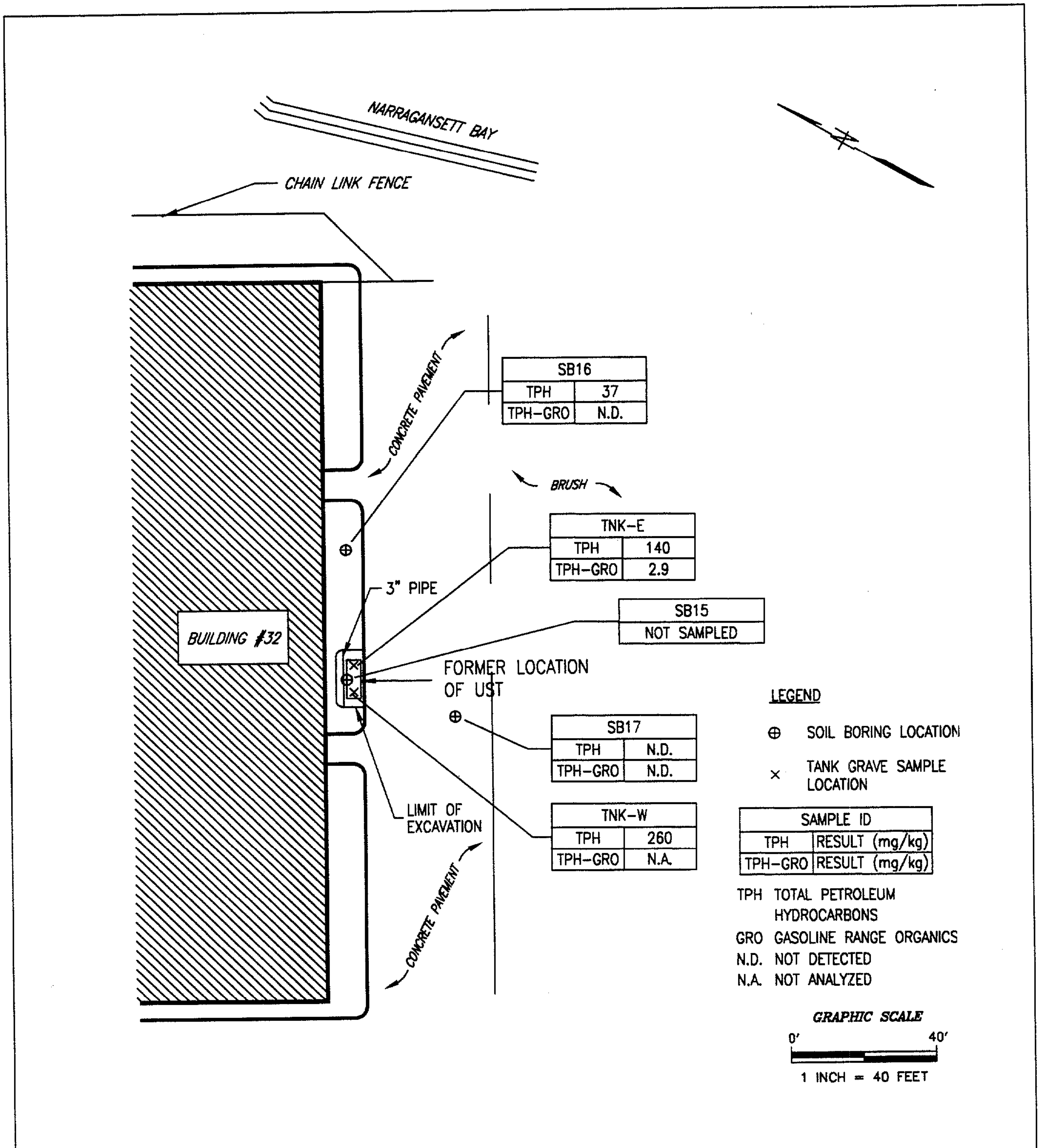

SOIL SAMPLE RESULTS (JULY 1997)			
BUILDING 32, GOULD ISLAND			
NETC – NEWPORT, RHODE ISLAND			
DRAWN BY:	D.W. MACDOUGALL	REV.:	0
CHECKED BY:	K. O'NEILL	DATE:	19 MAR 98
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FIGURE 2–5

Brown & Root Environmental
55 Jonspin Road Wilmington, MA 01887
(978)658–7899

levels in excess of the RIDEM Groundwater Objective for GA areas. No SVOCs or metals were identified at levels in excess of the RIDEM Groundwater Objective for GA areas.

2.4.4 Building 44 Site Investigations

Several studies have also been conducted to assess the former Pump House (Building 44) which was located approximately 50 feet north of Building 32. These studies included a UST Closure Assessment Report (Environmental Resource Associates, Inc. 1994), Site Investigation - Groundwater Investigation (Q3G 1995), Phase I Environmental Assessment (Q3G 1996), Supplemental Site Investigation (Q3G 1997), and Underground Storage Tank (UST) Site Investigation Report (B&RE 1997). Building 44 served as the pump house for seven USTs prior to its demolition.

A Site Investigation was conducted by Quad Three Group (Q3G) in April 1995, which concluded that groundwater and soil at the former Building 44 site had been impacted by petroleum contamination. Their report published in May, 1995 recommended further investigation.

A Phase I Environmental Assessment, dated March 1996, and a Supplemental Site Investigation (SSI), dated September 1996, both conducted by Q3G, followed the May 1995 investigation. The SSI report identified the USTs as the source of impact to groundwater and recommended the installation of four groundwater monitoring wells and development of a site-specific corrective action plan (CAP). One of the tasks performed by the Quad Three Group for the SSI was a soil gas survey. This was accomplished in the area North of Building 32 to the base of the Fining Pier. Sixty Nine "Gore-Sorber" modules were placed in a grid formation in this area. This study found petroleum - related compounds, particularly Benzene, Toluene, Ethyl Benzene, and Zylenes in most of the modules placed within this area. Trichloroethene (TCE) was also detected, with highest concentrations centered on module #127414 (refer to Q3G Map, presented in Appendix D) located 75 feet North West of Building 32, and 150 feet West of the former Building 44 location.

Subsequently, a UST Site Assessment was conducted by Brown & Root Environmental and reported in November, 1997. Tasks included overburden soil boring advancement and soil sample collection, monitoring well installation, groundwater sampling, test pitting, hydraulic conductivity testing, groundwater-level measurements, and tidal influence testing. The soil borings and monitoring well locations are presented in Figure 2-7 and the analytical summary results are presented in Appendix D. The CAP is currently under preparation by B&R Environmental.

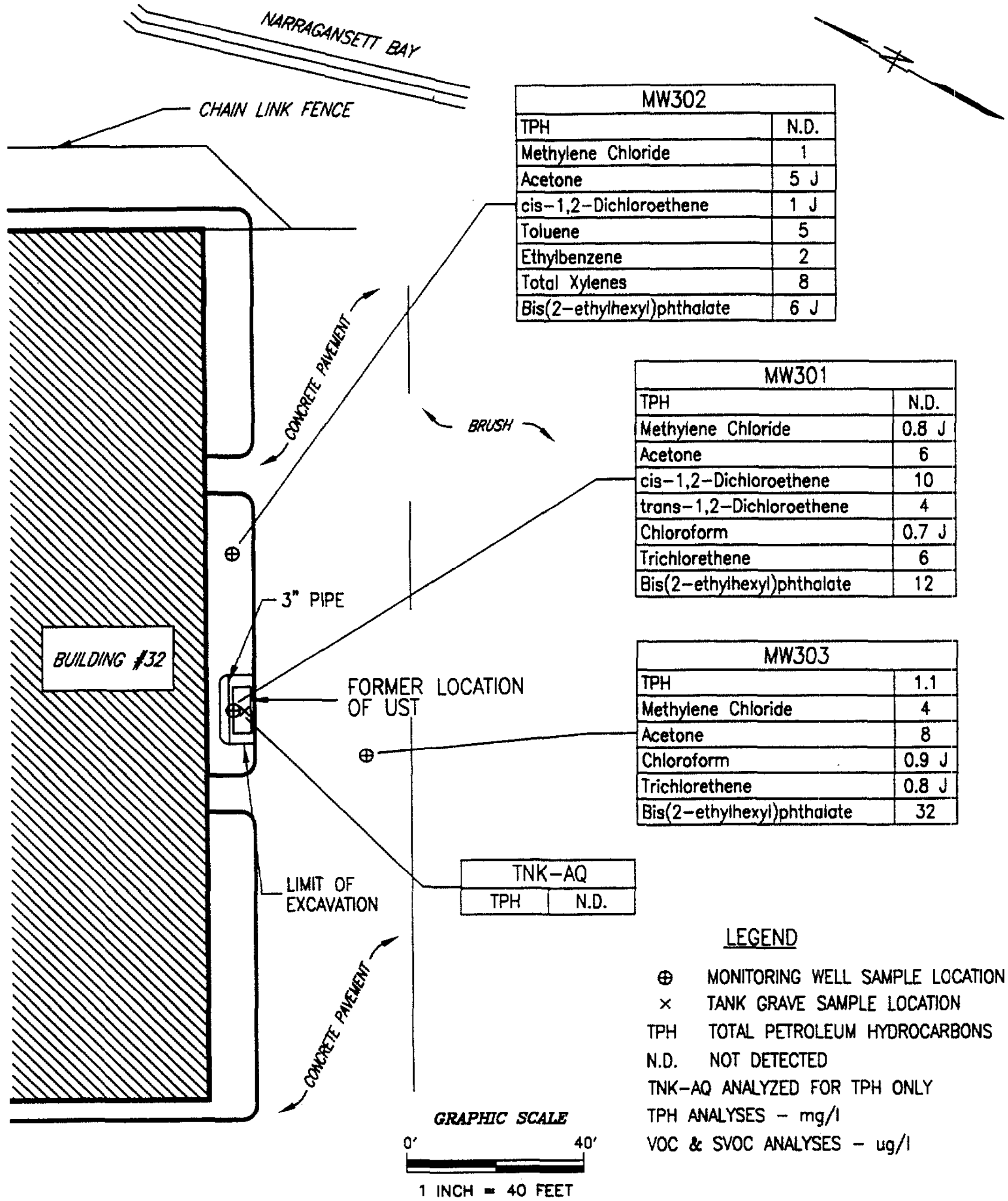
In general, the UST Site Assessment indicated TPH concentrations exceeding RIDEM GA Leachability Criteria (500 mg./kg), RIDEM Residential Direct Exposure Criteria (500 mg./kg) or exceeding RIDEM Industrial/Commercial Direct Exposure Criteria (2,500 mg/kg) at three of the 10 sample locations (SB02, SB03, SB09). One SVOC, Benzo(a)pyrene (0.91 mg/kg) exceeded the RIDEM Industrial/Commercial Direct Exposure Criteria (0.8 mg/kg). The three compounds identified at levels exceeding the residential criteria are benzo(a)anthracene, 1.9 mg/kg, chrysene, 2 mg/kg, and benzo(k)fluoranthene, 0.94 mg/kg. No VOCs were detected in soils exceeding RIDEM Residential or Industrial/Commercial Direct Exposure Criteria, or RIDEM GA Leachability Criteria.

For metals analyses, arsenic was identified in soil at one boring location (2 mg/kg at SB06) exceeding the RIDEM Residential Direct Exposure Criteria of 1.7 mg/kg.

Analysis of groundwater samples indicated the presence of TPH in four of the eleven wells tested. TPH was identified at one location at 1,700 mg/L (MW001) and the remaining three locations at 1.8 to 6.4 mg/L. One volatile compound was identified (methylene chloride at 73 ug/L at MW001) exceeding the GA groundwater Objective of 5 ug/L at one well location. One SVOC (napthalene at 200 ug/L) was detected in excess of the GA groundwater Objective of 20 ug/L at MW001. For metals analyses, lead was identified in samples obtained from six of the 10 sampled wells at levels exceeding the RIDEM Groundwater Objective for GA areas of 15 ug/L. Exceedances ranged from 15.8 MW204) to 243 ug/L (MW003).

2.5 SITE HYDROGEOLOGY AND GEOLOGY

Historic information (U.S. Navy, 1959) indicates that four water supply wells were drilled on Gould Island in the early 1940s. These wells were installed at different locations in an effort to find a usable fresh water supply. A map showing the wells' locations is provided in the site background information in Appendix D. Two of the wells were reportedly advanced to a depth of 330 feet, while the remaining two wells were advanced to a depth of approximately 530 feet. No additional information (construction or boring logs) was available.



MW302	
TPH	N.D.
Methylene Chloride	1
Acetone	5 J
cis-1,2-Dichloroethene	1 J
Toluene	5
Ethylbenzene	2
Total Xylenes	8
Bis(2-ethylhexyl)phthalate	6 J

MW301	
TPH	N.D.
Methylene Chloride	0.8 J
Acetone	6
cis-1,2-Dichloroethene	10
trans-1,2-Dichloroethene	4
Chloroform	0.7 J
Trichlorethene	6
Bis(2-ethylhexyl)phthalate	12

MW303	
TPH	1.1
Methylene Chloride	4
Acetone	8
Chloroform	0.9 J
Trichlorethene	0.8 J
Bis(2-ethylhexyl)phthalate	32

TNK-AQ	
TPH	N.D.

LEGEND

- ⊕ MONITORING WELL SAMPLE LOCATION
- × TANK GRAVE SAMPLE LOCATION
- TPH TOTAL PETROLEUM HYDROCARBONS
- N.D. NOT DETECTED
- TNK-AQ ANALYZED FOR TPH ONLY
- TPH ANALYSES – mg/l
- VOC & SVOC ANALYSES – ug/l

AQUEOUS SAMPLE RESULTS (JULY 1997)			FIGURE 2-6
BUILDING 32, GOULD ISLAND			
NETC – NEWPORT, RHODE ISLAND			Brown & Root Environmental
DRAWN BY: D.W. MACDOUGALL	REV.: 0		55 Jonspin Road Wilmington, MA 01887
CHECKED BY: K. O'NEILL	DATE: 19 MAR 98		(978)658-7899
SCALE: 1" = 40'	ACAD NAME: C:\DWG\NAVY\GOULD\AQRES.DWG		

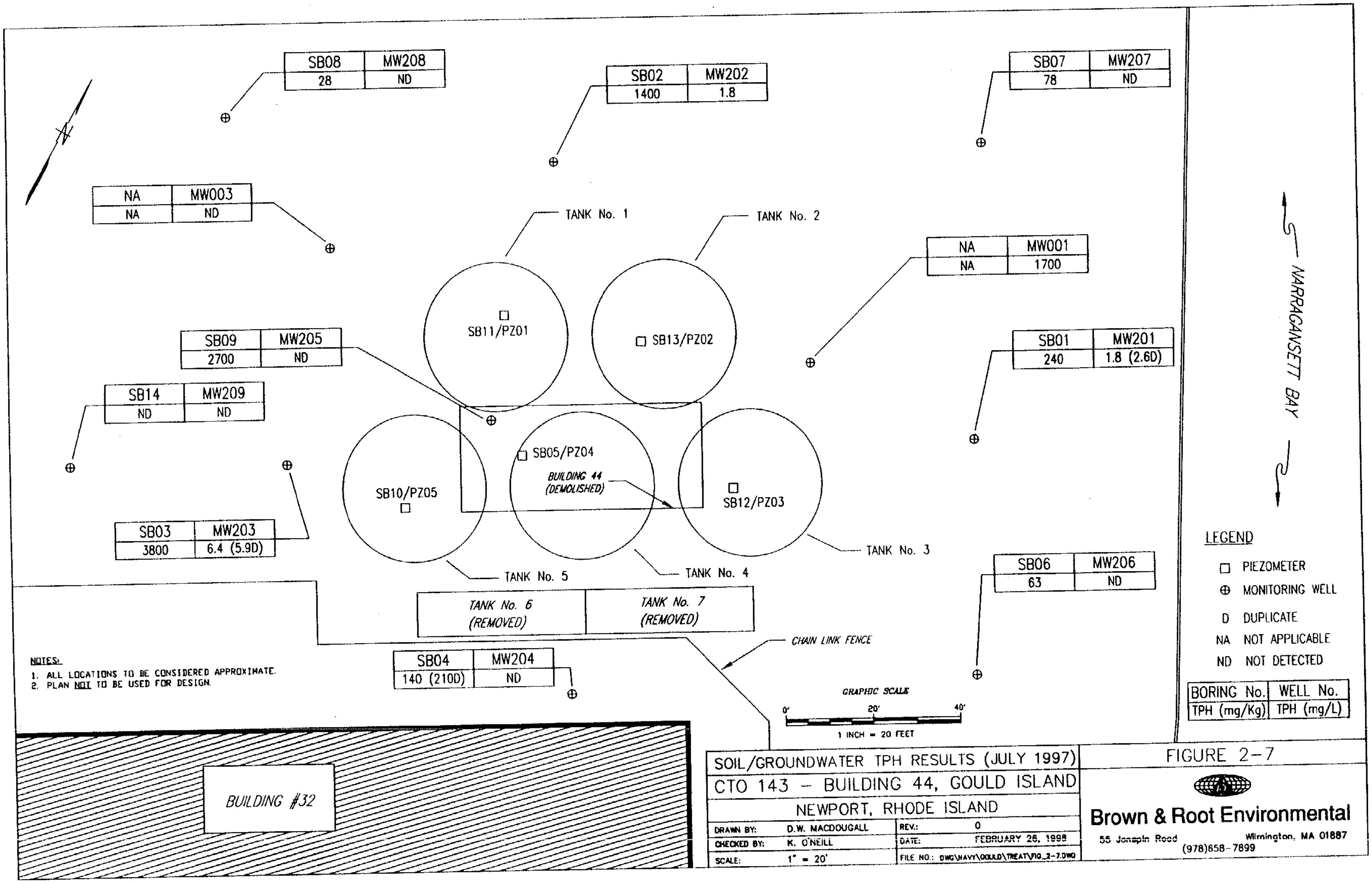
The reported flow capacities of the two 330-foot wells and two 530-foot wells were 7 to 35 gpm and 6 to 10 gpm, respectively. The wells yield was deemed inadequate to support island needs and therefore a fresh water supply line was extended from Aquidneck Island. (U.S. Navy, 1943 and U.S. Navy, 1959)

According to the August 29, 1959 Newport Area of Public Works Data Book, Gould Island received water from an 8-inch water main from the Newport Municipal Water Works located on Aquidneck Island.

Based upon a review of Gould Island topography and the island setting, shallow groundwater is anticipated to flow radially outward from the center of the island toward Narragansett Bay. Three monitoring wells installed for the UST Closure Assessment Report were used to develop a limited groundwater contour map for the south end of Building 32 (see Figure 2-7). These data indicate local groundwater flows north-northeast toward Narragansett Bay with a gradient of 0.021 foot/foot. Groundwater elevation at these wells ranged between 0.77 and 2.43 feet below ground surface in August 1997. Data from the Building 44 (former Pump House) were used to develop a groundwater contour map for the north end of Building 32. These data indicate local groundwater flows north, east and west from the area north of Building 32 (Figure 2-7). Groundwater elevations range from 1.11 to 0.51 feet above mean sea level (MSL). According to the IAS report (Envirodyne, 1983), groundwater on Gould Island "is generally within a depth of 10 feet". The site is located within a RIDEM groundwater zone classified as GA/NA.

The Prudence Island Broadway well is the closest public groundwater supply well to Gould Island. This well is located approximately 4.5 miles north of the study area across Narragansett Bay. No public supply wells are present on Gould Island.

An NUS Final Target Memo (NUS, 1991) indicates, "There are no drinking water supply wells nor any non-drinking water uses of groundwater on Gould Island (Reilly 1991b, 1991e). Based on the assumption that Narragansett Bay represents an aquifer discontinuity surrounding Gould Island, no groundwater resources within 4 miles of the Gould Island Electroplating property are potentially affected."



SOIL/GROUNDWATER TPH RESULTS (JULY 1997)
CTO 143 – BUILDING 44, GOULD ISLAND
NEWPORT, RHODE ISLAND

FIGURE 2-7

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CHECKED BY:	K. O'NEILL	DATE:	FEBRUARY 26, 1998
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2.6 DATA QUALITY OBJECTIVES

The data quality objectives (DQOs) for this project were developed in accordance with the EPA Guidance for Data Quality Objectives (EPA G4 document). The G4 document suggests seven steps be followed to develop project DQOs. This action has been done in a cursory manner for this project, since the objectives are in part dictated by CERCLA guidance, the Federal Facilities Agreement, and other standard guidance's to perform investigations. The intended use of the data resulting from a field investigation is a determining factor in defining the DQO for that data. To be certain that the data is consistent with the goals of the investigation, the seven steps of defining DQOs has been presented in this Section.

The seven steps are described in the following subsections:

2.6.1 Statement of the Problem

Building 32 was constructed in the 1940s to service and store torpedoes used during World War II. All the facilities in the area were constructed to allow waste water to discharge to Narragansett Bay, near the Gould Island shore.

Site history and design drawings for Building 32 show floor drains in the electroplating shop connecting to an acid resistant drain line that was designed to discharge into Narragansett Bay at the east shore of Gould Island. Floor drains and trench drains in the main portion of Building 32 also discharged to the bay through a series of sewerage/soil pipelines. It is assumed that most of the waste liquids were disposed of in this manner. Sludges are also typically generated during the electroplating process, and the disposal method for these materials is unknown. Site history indicates that this material may have been disposed of at an on-site landfill, which is not a part of this investigation.

The problem this investigation will address is whether disposal of waste material from Building 32 activities have resulted in residual contamination to the soil and groundwater proximal to the building, and whether that contamination poses a viable risk to potential receptors at the site. This investigation will focus on waste materials that were typically used in electroplating operations, on waste materials that have been found at other electroplating shop waste and degreasing operations sites, and contaminants that have detected during previous investigations at the site. These will include metals, volatile organic compounds, semivolatile organic compounds and PCBs.

2.6.2 Identification of the Decision

After the completion of this study, a decision will be made whether additional studies and actions are needed under the CERCLA process. This decision will be made based on the potential for risk to receptors identified as a part of this SASE. If a reasonable potential for risks to receptors is present, additional steps in the CERCLA process will be followed, quantifying that risk and then moving forward with a feasibility study.

2.6.3 Inputs to the Decision

Inputs to the decision are the elements used in the decision process. Inputs to the decision as stated in Section 2.6.2 are as follows:

- concentrations of the contaminants present
- presence of receptors
- presence of a completed exposure pathway to the receptors
- EPA and RIDEM standards for determining adverse risk
- potential for contaminants to complete an exposure pathway in the future
- future use of the site

2.6.4 Definition of the Study Boundaries

Study boundaries can be physical and temporal. This section defines the boundaries and the rationale for their selection.

Two separate areas require evaluation. The first is the onshore area, defined by the terrestrial environment to mean low water. The second is the marine environment, which includes the offshore area, extending to the mean high water. Some overlap will result but it is necessary to fully evaluate both areas.

The decision stated in Section 2.6.2 focuses on the waste generated from the electroplating shop and degreasing operations at Building 32. Because other source areas may exist on the island, the study would have to remain focused on the area proximal to Building 32 and the discharge pipes exiting the building to avoid interference from other potential source areas. Therefore, the study will evaluate the soil and groundwater under the building , the discharge pipes, the fenced area to the west and south of the building, and the island landmass to the north and east of the building.

Behavior of contaminant discharges in ocean water at different tide and wind conditions could allow contaminant deposition to have occurred anywhere near the discharge pipes. The most recent analysis of sediment samples from the area indicates the presence of moderate concentrations of metals in the sediment at and near the electroplating shop discharge pipe. At the time of that sample collection (1986), large quantities of plating residues remained in the vats and trenches connected to the discharge pipe, which may have constituted a continuing source. Since that sample collection effort, the waste residues have been removed, eliminating the source. It is expected that the material in the onshore portions of the site (in the soil and possibly under the building) are likely to have degraded very little. However, migration and degradation of contaminants over time in the marine systems may have resulted in a natural attenuation or dispersion of contaminants in these offshore areas.

Therefore, this study will address the onshore area in detail. However, investigations in the offshore area will be restricted to a limited sampling program to determine the continued presence of contaminants in the sediments after the source materials have been removed and the potential presence of contaminants in the sediments related to discharge pipes that have not previously been sampled.

Temporal boundaries are more difficult to isolate. While the site history reveals that activity was limited to a period 40 to 50 years in the past, the current exposure and current risk must be evaluated. In addition, the future risk must be evaluated, but first, the future use of the site must be determined. Since the Navy has no definite plans for the site, assumptions of future use of its onshore locations will be made.

Exposure scenarios for the current and future use will include recreational, construction worker and full-time industrial worker at the site. In addition, it is reasonable to assume that trespassers are currently accessing this site by water. Residential scenarios will not be evaluated.

2.6.5 Decision Rule

The decision rule is a clear statement defining the requirements of the investigation based on the possible outcomes of the study. For this work plan, the decision rule shall be as follows:

> If the human health and ecological risk evaluations provided by the data collected during this study indicate that a reasonable probability of adverse health effects exist determined by risk characterization to the recreational, trespassing, or worker receptors, or there is any potential for negative effects to ecological receptors known to be present at the site as defined by U.S. EPA and RIDEM regulations and the requirements of the Federal Facilities Agreement, then further steps in the CERCLA process will have to be taken to quantify risk, perform any further definition of the extent of contamination and, perform a feasibility study to evaluate remedial action alternatives.

2.6.6 Limits on Decision Errors

The limits of decision errors are set to quantify the potential for false negative and false positive decisions. This study was designed to result in a low potential for a false negative decision, i.e., a decision not to proceed with CERCLA actions when the risk defined in the Decision Rule does exist and actions should be taken. Conversely, a somewhat higher tolerance for a false positive decision is acceptable for this stage, since the resulting effect is only to carry the process as far as the feasibility study. A new decision rule would be set for a cleanup action as a part of the Record of Decision (ROD).

Therefore, a number of sample stations are required, all targeted toward likely release points. A conservative assessment of risks will decrease the potential for a false negative decision but not overly increase potential for a false positive decision. This conservatism is applied with exposure scenarios and other parameters used to measure exposure. In addition, the reasonable worst-case scenario for exposure will be evaluated using the maximum concentrations detected. Average concentrations are also used in the risk assessments to provide a means of comparison.

2.6.7 Design for Obtaining Data

The DQO process described in the G4 DQO document describes the use of various statistical approaches for developing a database. These approaches are based on the representativeness of the data that is required. For instance, if the Decision Rule was to "remove soils with concentrations of lead above 10 mg/kg" the sampling plan would be based on identifying hot spots of a specific size, which is determined by the precision of the removal action to be taken.

However, since this investigation is being performed to measure reasonable maximum risk to receptors, the design of the sampling plan can be more qualitative, or "targeted". The sampling plan is provided in Section 3 of this work plan. This plan calls for the collection of samples in two distinct areas, the onshore area and the offshore area. Samples from both areas will be collected to measure concentrations of contaminants present to which human and ecological receptors may be exposed.

Specifics on the precision, accuracy, etc. of the data collected are described in the Quality Assurance Project Plan, presented in Section 4 of this work plan.

3.0 FIELD SAMPLING PLAN

This section presents a description of the field investigation activities that are planned for the site. This section and Section 5.0 also discusses how this data will be used.

3.1 INTRODUCTION

The objective of the Field Sampling Plan (FSP) is to obtain data to support the SASE report, including the human health (recreational and trespasser scenarios) risk evaluation and the ecological assessment, described as a part of the decision rule presented in Section 2.6.5. The following sections detail the field activities to be performed during this investigation. Proposed sample stations are depicted on Figure 3-1.

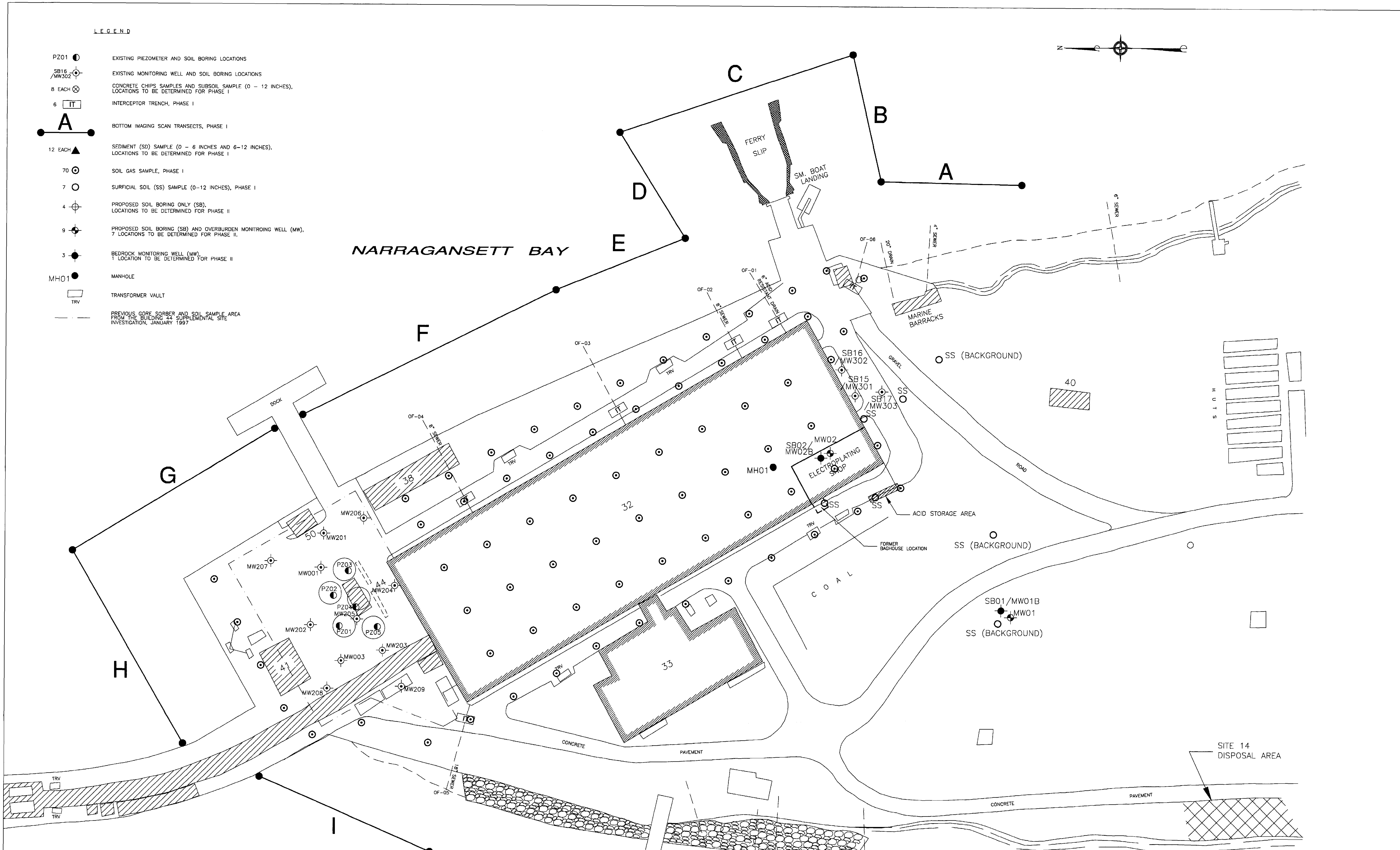
As presented in Section 1, a two-phased approach for fieldwork activities will be used to maximize the efficiency of the sampling program. Phase I activities will be performed to document whether a release of contamination to the environment has actually occurred. Phase I and Phase II results will be used to characterize the nature and extent of site-related environmental contamination. These data will be adequate to support the SASE report objectives stated above.

Specific Standard Operating Procedures (SOPs) will be referenced where applicable (SOP Reference Manual B&R Environmental, 1996). The analytical laboratory has not been identified. Once selected, laboratory SOPs will be maintained as part of the administrative record.

The FSP two-step approach includes the following tasks:

Phase I Activities

- Task 1: Building 32 Interior Survey, Inspection, and Clearing
- Task 2: Concrete Slab Floor and Subsoil Sampling
- Task 3: Underground Drainage System Clearing, Tracking and Sampling
- Task 4: Offshore Outfall Tracking /Underwater Imaging
- Task 5: Sediment Sampling
- Task 6: Soil Gas Sampling
- Task 7: Surface Soil Sampling



NOTES:

1. PLAN NOT TO BE USED FOR DESIGN.
2. ALL LOCATIONS TO BE CONSIDERED APPROXIMATE.
3. PHYSICAL FEATURES SHOWN MAY NOT DEPICT CURRENT CONDITIONS
4. THE NUMBERS ALONGSIDE THE PROPOSED SAMPLE LOCATIONS INDICATE THE PROPOSED NUMBER OF SAMPLE TO BE TAKEN. TBD = TO BE DETERMINED.

DRAWN BY: D.W. MACDOUGALL	TITLE: PROPOSED SAMPLE LOCATIONS BUILDING 32, GOULD ISLAND NEWPORT, RHODE ISLAND
PREPARED BY: K. O'NEILL	SOURCE: ADAPTED FROM "MAP OF GOULD ISLAND U.S. NAVAL TORPEDO STATION NEWPORT R.I. SHOWING CONDITIONS ON JUNE 30, 1948"
CHECKED BY: S. PARKER	SCALE: 1" = 50' · DATE: MARCH 19, 1998 · PROJ. NO: 7574 CTO: 286
PROJECT MANAGER: S. PARKER	DRAWING NO: 3-1 · ACFILE NAME: DWG\NAVY\GOULD\FIG_3-1.DWG · REV: 2
PROGRAM MANAGER: J. TREPANOWSKI	

Brown & Root Environmental
55 JONSPIN ROAD
WILMINGTON, MASSACHUSETTS 01887
(978)658-7899

00053 I02X

Phase II Activities

Task 8: Geologic/Hydrologic Investigation

Task 9: Ecological Setting Evaluation

Task 10: Onshore Survey

3.2 PHASE I ACTIVITIES

Phase I activities (Tasks 1-7) will be performed to determine if Phase II activities (Tasks 8-10) are required. This determination will be made following Phase I sample collection, analysis and data evaluation.

3.2.1 TASK 1: Building 32 Interior Survey, Inspection, and Clearing

Task 1 activities are planned to clear remaining equipment (removable metal vats, tanks, etc.) and large debris from the interior of Building 32. This activity will be performed to minimize physical hazards and provide access within the building while later activities are performed.

As a part of Task 1, a records search will be conducted to determine the types of materials used in Building 32 activities at Gould Island. Materials typically used in electroplating and degreasing operations in the 1940s will be identified as potential contaminant sources.

3.2.1.1 Reconnaissance Survey

Prior to initiating inspection and clearing activities, a site walkover will be conducted by the B&R field team members to familiarize themselves with site conditions. The study area will be visually surveyed with respect to access restrictions and sampling locations. Site-specific health and safety considerations, including emergency evacuation procedures, will be reviewed. Pertinent features, such as overhead and subsurface utilities, structural integrity of different areas of the building, and other potential hazards will be reviewed with Navy personnel with respect to anticipated sampling activities.

During the site walkover, an ambient air survey will be conducted inside the Building 32 work areas. This survey will be conducted throughout the building. The survey will include accessible floor penetrations (drains, trenches, pits, etc.) and areas where floor sampling/borings are planned.

The ambient air survey will be conducted with photoionization (PID) or flame ionization (FID) survey monitoring instruments to assess ambient conditions for the presence of volatile organic compounds (VOCs).

Air monitoring will be performed to evaluate personal protection equipment (PPE) required for use during other operations. These sample collections will be performed as a part of the HASP, and are described in Appendix A.

3.2.1.2 Building 32 Equipment Clearing

After air monitoring has been completed, removable metal vats, tanks, and other debris will be disassembled/removed and consolidated in area(s) of Building 32 where they will not interfere with other planned activities. This activity will primarily occur in the electroplating shop where a significant amount of equipment is still present. Prior to the equipment removal, the existing conditions within the building will be thoroughly photo-documented (video and still photographs). The equipment to be moved will be given an identification number and its original location depicted on a scale drawing. To the extent possible, the equipment will not be mangled or unduly damaged during the removal process.

The equipment will not be cleaned or decontaminated for disposal during this phase of on-site activity. Moved equipment will be stored on and be covered by polyethylene sheeting to minimize potential cross-contamination of Building 32 areas. The removed equipment will be stored in such a way as to facilitate easy inspection. Loose particulate matter and small debris will be collected and containerized for waste characterization, as described in Section 3.4.1 of this Work Plan. These activities will be performed by a demolition subcontractor supervised by B&R Environmental.

3.2.2 TASK 2: Concrete Slab Floor and Subsoil Sampling

The design of the concrete floor in the electroplating shop specified acid resistant mastic coatings. It is not known if these coatings were installed. Site inspections performed during previous investigations indicated that the concrete floors, trenches, and the two cylindrical pits may be potentially contaminated with hazardous substances from site activities. In addition, several trenches are located throughout the main, open portion of Building 32, which may also be potentially contaminated or have acted as migration pathways for hazardous substances from activities in these areas.

After completion of the Task 1 activities, the concrete slab floor and trenches, pits, etc. in the plating shop and trenches in the Building 32 main area will be inspected for significant cracks and/or damaged/deteriorated areas where contamination may have been released to the subsurface soils. These areas will be targeted for concrete and sub-slab soil sampling. If unsound areas are not found in the concrete slab floor, sampling locations will be based on visible staining, if present. The building design drawings indicate the concrete at these locations is a 6-inch thick poured and formed slab, without reinforcement.

An estimated eight concrete floor and/or trench samples will be collected during this sampling activity. Sampling locations will be selected based on the criteria listed above and may include collection of samples in the pre-formed trenches, acid dipping room, concrete pits, and other general areas of Building 32.

Concrete chip samples will be collected from stained and/or cracked areas of the concrete floor to a depth of 0.5 inches (measured from the floor surface). Sampling depth may be extended if staining has penetrated deeper than 0.5 inches into the concrete. A rotary hammer drill equipped with a hardened steel chisel bit (or equivalent) will be used to collect the concrete chip samples from the areas of potential contamination. The concrete chips will be placed into 8-ounce wide-mouth jars (except VOC samples) for shipment to the laboratory. The VOC samples will be placed into 4-ounce septum sealed jars, minimizing (to the extent possible) free airspace within the sample container. All samples will be maintained and shipped on ice. The analytical laboratory will perform the sample processing (pulverizing concrete chips) in accordance with the method requirements prior to analysis.

3.2.2.1 Sub-Slab Soil Sampling

During this activity, the soils immediately beneath the concrete floor or trench where the chip sample was collected will also be sampled. The sub-slab soil samples will be collected from the 0-12 inch soil interval at each concrete chip sample location (estimated 8 samples). Prior to soil sampling, clear access to the subsoil will be provided by removing any remaining overlying concrete from the sample location point using a rotary hammer drill or concrete coring device.

Fresh soil will first be exposed and then the VOC sample will be achieved by collecting and transferring an undisturbed soil sample for in-vial handling and analysis in accordance with the Region I, EPA-New England Draft Standard Operation Procedure for Soil Sample Collection and Handling For The Analysis of Volatile Organic Compounds (March 1997). After collection of the VOC sample, the remaining soil sample will be collected using hand tools (stainless steel augers or scoops), placed in a stainless steel bowl and thoroughly mixed and transferred to the appropriate sample containers for analysis.

The concrete and sub-slab soil samples will be analyzed for TCLP metals, full TCL organics (VOCs, BNAs, pesticides, PCBs), TAL metals, cyanide, and TPH (GRO-DRO, Method 8015A). Results from these analyses will be used to establish baseline parameters of chemical constituents for the existing slab floor and the potential for migration to the subsurface soils.

Each sample location will be located and recorded using taped measurements from existing building features. All pertinent field data including sample location description/measurements, date and time of sample collection, and other pertinent information will be recorded on the corresponding sample log sheet and referenced in the field logbook.

Appropriate chain-of-custody procedures will be followed, as described in Section 4 of this Work Plan. Samples will be labeled, packaged, and shipped according to B&R Environmental SOPs and as described in Section 4. A summary of analytical samples is presented in Table 3-1. Analytical parameters, sample preservation requirements, required sample containers, and a summary of quality control samples are presented in Section 4.

3.2.3 TASK 3: Underground Drainage System Clearing, Tracking and Sampling

Six potential underground drainage systems have been identified in relation to the Building 32 site. These include:

- The drainage system within the electroplating shop has been identified as a potential contamination migration route to Narragansett Bay. The interior drainage system (floor drains, trenches, pits, etc.) within the electroplating shop are connected to the OF-01 outfall to the east of Building 32. Additionally, one floor drain located outside the plating shop is also connected to this discharge line. As described in Section 2.0, historic Building

TABLE 3-1
FIELD SAMPLING SUMMARY
BUILDING 32, GOULD ISLAND
STUDY AREA SCREENING EVALUATION
NEWPORT, RHODE ISLAND

ACTIVITY & PHASE	MEDIA	NUMBER OF SAMPLES*							
		TCL VOCs	TCL SVOCs[1]	TAL Metals	Cyanide	TCLP Metals	TPH (GRO-DRO)	TOC Grain Size/ AVS/SEM	Waste Characterization[2]
Concrete Slab Floor Sampling - PHASE I Task 2	Concrete	8	8	8	8	8	8		
	Sub-Slab Soil	8	8	8	8	8	8		
Drainage System Sampling PHASE I Task 3 [3]	Residue [5]	18	18	18	18		18		2
Sediment Sampling PHASE I Task 5	Sediment	24	24	24	24		24	24	
Soil Gas Sampling Phase I Task 6	Passive Sampler	70					70		
Surficial Soil Sampling PHASE I Task 7	Soils	7	7	7	7		7		
Phase I Total		**135**	**135**	**135**	**135**	**16**	**135**	**24**	**2**
Geologic/Hydrogeologic Investigation PHASE II Task 8 [4]	Soil	26	26	26	26		26		8
	Groundwater	12	12	12	12		12		10
Phase II Total		**38**	**38**	**38**	**38**	**0**	**38**		**18**
	Phase I & II Total	173	173	173	173	16	173	24	20

* **Does not include QA/QC samples**

(1) SVOC Parameters include TCL base, neutral and acid extractable compounds, and pesticides and PCBs

(2) Waste Characterization includes: corrosivity, reactivity, ignitability for IDW disposal

(3) Five manholes/catch basins/or depositional areas assumed, all samples shipped for laboratory analysis

(4) Thirteen borings proposed with continuous sampling through 15 feet of overburden to bedrock (assumed), see text for sample selection scheme.

(5) Residue samples maybe either liquid or solid.

32 plans, presented in Appendix D, were used to determine a connection of the drainage system to outfall OF-01 (Figure 2-3).

- Four Building 32 sewerage outfalls (OF-02, OF-03, OF-04, and OF-05, Figure 2-3) have been identified as potential contamination migration routes. Construction plans shown in Appendix D have indicated that these outfall discharge lines are not connected to the electroplating shop drainage system (OF-01). Plans show that these outfalls are connected to general work area (i.e. grinder stations, etc.) and storage area floor drains, and the building lavatories, cafeteria, and offices. However, these flood drains were not found during an inspection of the building interior in March 1998. In addition, the potential for contamination releases from these outfalls has not previously been investigated.

- A review of NETC Public Works aerial photographs located a 20-inch diameter storm drain outfall (OF-06, Figure 2-3) that may act as a contamination migration route to Narragansett Bay. Previous studies have indicated elevated levels of contamination in a liquid composite sample (No. 3) collected from areas outside the electroplating shop (see Section 2.0). Contaminants detected in the sample were similar to components of the residue composite samples collected in the electroplating shop. Composite 3 was collected in a manhole in Building 32 that may be associated with this stormwater outfall although this has not been confirmed. The manhole and underground drainage system related to the OF-06 outfall is not shown on construction drawings (Appendix D). Therefore, further investigation of this system is warranted and is described below.

3.2.3.1 Outfall Interceptor Trenches

Outfall "interceptor trenches" will be excavated at the five discharge outfalls that exit Building 32 (OF-01 through OF-05) and the one stormwater outfall (OF-06) as presented in Figure 3-1. If additional drainage lines are determined to be discharging from Building 32, then additional interceptor trenches may be excavated. These interceptor trenches will intersect the drainage lines in the area between the building foundation and the seawall, typically as close to the foundation wall as practical. The trenches will provide access points for drainline cleaning equipment and collection points for potential drainage system residue and wash water that will be used during cleaning.

The approximate locations of the discharge lines will be located from building drawings and visible outfall structures at the seawall. An excavator will be used to excavate and expose each discharge line. Careful probing with hand-held equipment will be performed ahead of the excavator bucket to minimize damage to the drainlines. After exposing the lines, test bore holes will be drilled into the lines to inspect for liquids and residue before opening. If necessary, a temporary containment system will be located beneath the pipe to collect any remaining liquids or residue that may be discharged during the opening process. Pumps and storage tank equipment will be available in the event significant quantities of liquids are present in the lines. Discharge lines will then be available for inspection and clearing (as necessary) from the interceptor trench into the building lines and also from the interceptor trench to the bay.

3.2.3.2 Outfall Drainage System Clearing, Tracking and Sampling

Once opened, the outfall drainage systems will be inspected and tracked with utility tracking equipment (video cameras, smoke testing, etc.), and, if necessary, cleared for inspection to determine the potential contaminant discharge pathway/sources. Inspection and tracking of the manhole outside the electroplating shop will also be performed under this subtask (MH01 on Figure 2-2). Any manholes or catch basins found will be numbered for identification. If openings, holes, cracks, etc., are identified during the inspection, those locations will be targeted for shallow borings or monitoring wells as part of Phase II activities. It should be noted that there are limitations on the videotaping of underground drain lines that may apply to pipes leading to the outfalls. The pipes need to be a minimum of 2.25 inches inside diameter with no obstructions. Cameras can only be advanced past one turn in the piping without risking loss of the camera. If this occurs and additional access points (e.g. clean-outs) are not available for cameral access, then gaps in the video tracking will be present in the investigation, or another approaches may be employed.

Residue Sampling

Three residue samples will be collected from within each Building 32 discharge pipeline (OF-01 through OF-06). One will be collected from the clean-out near the origin of the line (i.e. the electroplating shop), one will be collected from the wash water during the cleaning of the portions of the line that is within the building, and one will be collected from the wash water during the cleaning of the portions of the line that is exterior of the building (seaward of the interceptor trench). Additional samples will be collected if standing fluids, water or obvious chemical contaminants are found to be present in the cleanouts or drainlines prior to cleaning the drains. These residue samples will be collected to characterize contaminants in the discharge pipeline and determine if a continuing source of contamination is present. The 18 residue samples will be collected from the surface interval (0-6 inches, or to the bottom of the inside of the pipe, which ever is shallower). If residue is found at thicknesses greater than 6 inches, the plan will be modified. If such material is not available, samples will not be collected. If this is the case, wash water from the initial effort in cleaning the lines will be collected instead to determine the presence of residual contaminants. If possible, undisturbed VOC residue samples will be collected in accordance with the March 1997 (or most up-to-date version) of the Region I, EPA-New England Draft Standard Operation Procedure for Soil Sample Collection and Handling For The Analysis of Volatile Organic Compounds.

Accessible manholes/catch basins in these systems that contain residue material will also be sampled for laboratory analyses. The depth of residue material and construction of manhole/catch basin bottoms will be determined during sampling. If necessary, accessible manholes/catch basins will be cleared by removing any blockage with dredges, hand tools, or a high-powered vacuum equipment. If inflow/outflow pipes are identified, they will also be tracked with utility tracking equipment. If the pipes appear to be open, smoke tests will be performed to identify discharge or input/source locations. Locations of catch basins, manholes, and discharge points proximal to the study area that are associated with the outfalls will be surveyed by a subcontractor to B&R Environmental. Survey operations are described elsewhere in this section.

If necessary, inflow/outflow pipes will be cleared with medium pressure water sprays (jet-rod). Prior to introducing water to the drainage systems, a temporary containment system will be installed at the outfall(s) identified by the tracking equipment.

Materials that are removed from manholes/catch basins (residue, fluids) will be containerized for waste characterization. Solid waste from each manhole/catch basin will be managed as a separate source, with separate samples for disposal parameter analysis. If results indicate similar constituents, the material from separate sources may be combined and shipped for bulk disposal. Catch basins proximal to the study area that are found to have unconsolidated bottoms will be marked for future sampling.

Due to the unclear or unknown nature and length of the outfalls drainage systems, and unknown number of accessible manholes/catch basins and cleanouts, a preliminary estimate of 18 residue samples will be analyzed for the full TCL organic analyses (VOCs, BNAs, pesticides, and PCBs), TAL metals, cyanide, TPH (GRO-DRO), and TCLP metals analyses. All residue samples will receive an "RS" identifier and will additionally receive a sub-identifier that will aid in locating the sample source (CO for cleanout, MH for manhole, CB for catch basin, WW for washwater., see Section 4.4.1 for details). Appropriate chain-of-custody procedures will be followed (see Section 4.3.2) and samples will be labeled, packaged, and shipped according to B&R Environmental SOP Nos. 6.1 and 6.2. A summary of analytical samples to be collected as a part of this task is provided on Table 3-1. Analytical parameters, sample preservation requirements, required sample containers, and a summary of quality control samples are provided in Section 4 of this Work Plan.

Samples from suspected discharge areas (sediments) will be collected as a part of Task 5.

3.2.4 TASK 4: Offshore Outfall Tracking/Underwater Imaging

As described in Sections 2.3 and 2.4, the Building 32 interior drainage systems to outfalls OF-01 through OF-05 were identified, however, the current and original discharge points have not been located at this time. The objective of this task is to track and locate the existing outfall location for discharges from the Building 32 interior drainage system. In addition, this survey will be used to aid in identifying sediment types and locating sediment sampling locations to be performed under Task 5.

Methodologies used to track the outfall beyond the seawall and also locate potential sediment sample stations will include: visual observations (near shore) at low tide; and video recording devices, e.g. submersible drop video camera for deep water areas; a boat for operational work near and seaward of the outfall positions; and if needed, a professional diver(s) with video or still camera capabilities. The outfall discharge point and potential sediment sampling locations will be recorded on video tape or still photographs, surveyed using GPS equipment to sub-meter accuracy, and temporarily marked using a weighted buoy marker. If feasible, a more permanent marker that is visible at low tide will be staked or anchored at the outfall discharge points. The underwater video operations will be performed by subcontractors to B&R Environmental operating under their own health and safety plans, and supervised by B&R Environmental technical staff.

As part of the bottom survey task, in addition to tracking the discharge line outfalls from the seawall, the bottom imaging scan will be conducted along a 10 segment line (lines A-J) as presented on Figure 3-1. The bottom imaging scan will generally follow the island shoreline at a distance up to 100 feet from the shoreline east and northwest of Building 32. Images from this scan will be used for the selection of depositional areas for sediment sampling and for review by an ecologist for the ecological assessment of the offshore environment.

3.2.5 TASK 5: Sediment Sampling

Previous sampling of Narragansett Bay sediments adjacent to the site showed slightly elevated levels of heavy metals in sediments. At this time the number and locations of sediment samples has not been determined since the information will be based on the results of Task 4. A set number of sediment sample stations has been allocated at this time solely for costing purposes and all locations of these stations shall be on a "to be determined" status based on Task 4 results. It is anticipated that twelve sediment stations will be sampled under this task to characterize present levels of site-related contaminants in the sediments near the electroplating discharge outfall (OF-01), building 32 sewerage outfalls (OF-02 through OF-05), and a storm water outfall (OF-06). Surficial sediment samples will be collected from depositional areas in the bay in the vicinity of the outfalls. If appropriate, additional sediment samples will be collected from depositional areas proximal to the existing terminus of each outfall pipeline.

It is anticipated that sediment samples will be collected from a boat using a stainless steel grab sampling device (petite ponar sampler) and sediment core tube samplers. If possible, in shallow, near-shore areas, stainless steel hand tool samplers may be used for sample collection. If these surface sampling techniques are unsuccessful because of poor sampling conditions (dense or excessive rocky substrate), other methods (vibracoring, etc.) may be employed. Sediment samples will be collected from the 0-6 inch interval at all stations, measured from the sediment surface at all locations. In addition, if depositional sediments are located during the investigation, a 6-12 inch sample will also be collected from all locations using a core sampling (or equivalent) device.

The undisturbed VOC sediment sample will be collected as soon as possible after the sediment sampler is retrieved. The VOC sample will be collected in accordance with the March 1997 (or most up-to-date version) of the Region I, EPA-New England Draft Standard Operation Procedure for Soil Sample Collection and Handling For The Analysis of Volatile Organic Compounds. After collecting the VOC sample the sediment will be deposited into a stainless steel bowl. Attempts will be made to drain any excess standing water from the bowl without loss of fine materials from the sample. The remaining portion of the sample will be thoroughly mixed and transferred to the appropriate sample container.

Sediment samples will be analyzed for the full TCL organic analyses (VOCs, BNAs, pesticides, and PCBs), TAL metals, cyanide, and TPH (GRO-DRO), grain size distribution analysis, total organic carbon (TOC), and Acid Volatile Sulfide/Simultaneously Extractable Metals (AVS/SEM) analyses. In addition, the temperature, pH, specific conductivity, dissolved oxygen, and salinity of the surface water will be measured at each sediment sample location.

Appropriate chain-of-custody procedures will be followed (see Section 4.3.2) and samples will be labeled, packaged, and shipped according to B&R Environmental SOP No. 6.1. A summary of analytical samples is presented in Table 3-1. Analytical parameters, sample preservation requirements, required sample containers, and a summary of quality control samples are presented in Section 4.

Each sediment sample location will also be surveyed using standard transit survey technique or GPS survey equipment (GPS to sub-meter accuracy). Off-shore locations will be buoyed and buoy locations will be maintained until survey actions are complete. If GPS survey is selected, three onshore reference points will be established (staked, nailed, or use of monitoring wells) as control points for integration of GPS data into land survey data. These three control points will also be surveyed during the onshore survey.

3.2.6 TASK 6: Soil Gas Sampling

Under this task, approximately 70 passive soil gas samples (plus quality control samples) will be collected and analyzed for volatile organic compounds (VOCs) and TPH (GRO-DRO) compounds using the Gore-Sorber Screening Survey (or equivalent) passive soil gas detection system. A description of the Gore-Sorber Screening Survey service is provided in Appendix G. The purpose of the survey is to detect potential VOC and TPH contamination in the vadose zone (potentially indicating soil and/or groundwater contamination) which will be used to select and adjust the

Phase II sample locations. The northern area of Building 32 that was previously investigated using the soil gas methodology (see section 2) will not be re-investigated during this Phase I activity. Soil gas samples will be collected at an estimated 70 locations (one soil gas sample per location) as indicated on Figure 3-1.

3.2.5.1 Soil Gas Sampling Procedure

Passive soil gas samples will be collected by deploying the vendor-supplied sorbent collectors at the specified locations for a 3-week exposure period, after which the collectors will be retrieved and sent to the vendor laboratory for analysis. A 700- by 300-foot sample grid will be laid out along five north/south transects at the site as shown in Figure 3-1. Additional soil gas sample points will be established off the grid, near the north end of the Gould Island land mass. At each specified sample location, a pilot hole (1 to 2 inch diameter) will be created to a depth of approximately 3 feet below grade using a slide hammer or rotary drill hammer. The sample depth may be adjusted in the field to maintain the collector above the water table (if possible) during the course of the investigation. The collectors are inserted to the appropriate depth and the hole is sealed using a plug. The collectors are carefully handled at all times by using analyte-free tools and gloves. After a 3-week exposure time. the collectors will be retrieved, sealed in their original containers, and returned to the vendors laboratory for VOC and TPH analyses.

Appropriate chain-of-custody procedures will be followed (see Section 4.3.2) and samples will be labeled, packaged, and shipped according to manufacturers instructions and B&R Environmental SOP Nos. 6.1 and 6.2. The passive soil gas analytes are listed in Appendix G.

3.2.7 TASK 7: Surface Soil Sampling

The objective of the surface soil sampling is to assess the presence and nature of potential surface soil contamination near selected locations on the exterior of Building 32). This information will aid in meeting overall sampling plan objectives. Site-area-specific background surface soil samples will also be collected.

During Phase I activities, surface soils will be collected from four locations near the southwest corner of Building 32 and from three off-site background locations. The samples will be collected from the following general locations: two outside the southern entrance-way to Building 32, one outside the sandblasting room near the historic location of the baghouse (west side), and one near the exterior acid storage area (also on the west side of Building 32). The proposed locations are presented on Figure 3-1, however these locations may be changed based on the soil gas sampling and other Phase I results.

The three proposed background locations are shown on Figure 3-1. Because of the significant disturbances that have occurred on Gould Island in the past, three locations were selected in the hope of acquiring a representative background characterization. An attempt has been made to select background soil sample locations believed to be representative of site background soil conditions that have not been impacted by site activities and are removed from other potential sources (to the extent possible) of contamination. The three background locations to the south and west of Building 32 are situated at a higher elevation than the roadways and building. All surface soil sample locations will be marked with labeled wooden stakes for surveying.

Surface soil samples will be collected from the 0 to 1-foot interval at each location. Stainless steel scoops, trowels, and hand augers will be used for sample collection. Aliquots of the material will be collected *in situ* and containerized for VOCs analysis in accordance with the March 1997 (or most up-to-date version) of the Region I, EPA-New England Draft Standard Operation Procedure for Soil Sample Collection and Handling For The Analysis of Volatile Organic Compounds. The remaining soil sample will be collected into a stainless steel bowl and roots, cobbles, and other solid material larger than 1 inch in diameter will be discarded. The soil will be thoroughly mixed and transferred to the appropriate sample container. The samples will be analyzed for full TCL organics (VOCs, BNAs, pesticides, PCBs), TAL metals, cyanide, and TPH (GRO-DRO). If contamination is found in the surficial interval, borings will be advanced as part of Phase II investigations (Task 8).

Appropriate chain-of-custody procedures will be followed (see Section 4.3.2) and samples will be labeled, packaged, and shipped according to B&R Environmental SOP Nos. 6.1 and 6.2. A summary of analytical samples is presented in Table 3-1. Analytical parameter, sample preservation requirements, required sample containers, and a summary of quality control samples is presented in Section 4.

3.3 PHASE II ACTIVITIES

Phase II activities will be conducted following Phase I sample collection, analysis, and data evaluation.

3.3.1 TASK 8: Geologic/Hydrologic Investigation

The geologic/hydrogeologic investigation will be performed for the area including and immediately surrounding Building 32.

The objective of this task is to characterize potentially contaminated soil and groundwater resulting from historic site operation releases to the environment. Chemical data will be collected to assist in making determinations on the presence, nature, and extent of contaminants in different media. Proposed locations of borings and monitoring wells will be based on Phase I results.

The scope of work for the geologic/hydrogeologic investigation includes the following specific components: characterize the water table aquifer; determine the inorganic and organic site contaminants in soils; collect and evaluate overburden groundwater quality data at a background location, and assess the nature and distribution of overburden groundwater contamination related to Building 32 activities.

The surface and subsurface exploration program will focus on areas of potential releases from leaks from the buildings floor drains, the drainage system, and potential areas of spills or deliberate discharges outside Building 32. An upgradient boring and monitoring well (SB/MW01) will also be installed as part of this investigation. It is anticipated that thirteen borings will be advanced, although the actual quantity and proposed boring/well locations will be selected after evaluation of Phase 1.

3.3.1.1 Advancement of Soil Borings

It is anticipated that borings will be advanced with drilling apparatus using hollow-stem augers, spin casing, or drive and wash drilling systems. The specific drilling method will be determined based on field conditions and the expected use of the borehole.

Continuous standard penetration tests will be conducted during advancement of each boring. Soils will be described according to the Unified Soil Classification System, and logged to provide a complete lithologic record of the subsurface materials. As each split-spoon is opened, the soils will be monitored for organic vapors using a FID field monitoring instrument (Photovac MicroFID) using the jar headspace screening procedure presented in Appendix E. The borehole itself will be periodically monitored for organic vapors, in accordance with the Health and Safety Plan (Appendix A).

Most borings will be continued to the top of bedrock as determined by the B&R Environmental field geologist. Observations during the site walkover (March 1997) indicated bedrock outcropping elevations above sea level near the study area. Three borings completed immediately south of Building 32 for the UST closure determined bedrock to be 5-7 feet below ground surface (B&RE 1997). Due to the expected thin deposits of overburden materials, a characterization of bedrock will be performed to evaluate potential transport of contamination into bedrock.

To address the concerns of potential bedrock contamination, three proposed boring locations will be continued into bedrock by coring and be finished as bedrock monitoring wells. The final selection of the bedrock boring locations will be based on Phase I results and will be determined after discussions with U.S. EPA and RIDEM. These borings will be cored into bedrock a minimum of 10 feet in order to characterize upper bedrock. No wells will be installed across the overburden/bedrock contact or across confining layers identified by the field geologist. Bedrock cores will provide an initial characterization of the nature of bedrock fracturing and potential contaminant transport in the bedrock. Rock coring will be performed with standard NX double-wall core barrels that will provide a nominal 2-inch core and a 3-inch diameter borehole. Bedrock coring will commence only after securely seating the drilling casing into the top of the rock to isolate the bedrock aquifer from the overburden aquifer. The bedrock cores will be logged by the rig geologist at the completion of each core run. Bedrock cores will be described using standard rock description methods. Where applicable, features such as grain size, color, hardness, sedimentary structures, and degree of cementation will be recorded. Planar features including fractures, joints, bedding planes, and other lithologic contacts will be recorded. Rock Quality Designation (RQD) will be calculated. If evidence of contamination exists at the bedrock overburden interface, as identified by FID headspace screening results, the Navy will review the need for more bedrock monitoring wells than are currently scoped for this project.

A log of each borehole will be maintained by the field geologist to describe encountered lithologies, depth of geologic contacts, water table levels, sample depths, and any other pertinent observations made during drilling. Boring logs will also include information on sample number, type, and depth; sample interval and recovery; and data from Standard Penetration Tests.

Drill cuttings will be containerized and sampled for waste characterization, as described in Section 3.4.1. Decontamination of sampling equipment and drilling apparatus will be performed as described in Section 3.4.2.

3.3.1.2 Surface and Subsurface Soil Sampling

As previously mentioned soil boring locations will be selected after evaluation of Phase I results. Soil sample locations are planned to assess potential impacts from leaks in the floor drains, and discharges or spills to sub-slab soils. These locations include one background and upgradient soil boring location (SB01), which will also be completed as monitoring wells. Monitoring wells are planned to be installed at 9 of the 13 soil boring locations and are discussed elsewhere in this section. Below is a discussion of the planned soil sampling activities. Soil borings advanced during this activity will be labeled as SB## reflecting the number of the soil boring location.

The following two surface and/or subsurface soil samples will be collected from each of the planned test boring locations: generally, one from the surface interval and one from just above the depth of the water table. In areas of concrete (slab floor, roadway) or asphalt, the first sample will be collected from the fill material or natural soils just beneath the concrete or asphalt material. If a soil boring location corresponds (within 10 feet) to a surficial soil sample location from Phase I activities, then the 0-1 foot interval will not be repeated at that location. If signs of potential contamination (headspace screening, odors, stains and discoloration, oil) are observed at a greater depth or between the two planned sampling intervals, then the second sample will be collected from the depth of greatest observed concentration (most stained or oily, highest FID/PID readings) beyond the surface interval.

Undisturbed aliquots of the material will be removed from the split-spoon samplers immediately after opening and containerized for VOCs analysis in accordance with the March 1997 (or most up-to-date version) of the Region I, EPA-New England Draft Standard Operation Procedure for Soil

Sample Collection and Handling For The Analysis of Volatile Organic Compounds. The sample for each interval will be treated as a separate sample, and placed into a decontaminated stainless steel bowl. The remaining material will be homogenized with a decontaminated stainless steel scoop or similar device. After mixing to homogenize the sample, aliquots will be removed for each analyte described in Table 3-1. The soil samples will be analyzed for the full TCL organic compounds (VOCs, BNAs, pesticides, and PCBs), TAL metals, cyanide, and TPH (GRO-DRO) analyses.

Samples will be designated as the soil boring designation (SB##), and depth intervals will be expressed in feet: Sample DSY-A-SB05-0204 indicates a sample from the boring for SB05, 2 feet to 4 feet below ground surface. Ground surface within the building will be the concrete slab floor. Characterization and sampling of the concrete slab floor will be performed under a separate task (Task 2) and is discussed elsewhere in this section. Details of sample designations are presented in Section 4.

3.3.1.3 Groundwater Monitoring Well Installation

As part of the assessment of the nature and distribution of contaminants in groundwater, a monitoring well installation and sampling program will be conducted. This program includes installing groundwater monitoring wells at 9 of the 13 boring locations advanced, as described above. Three of soil boring locations will be cluster or "nested" well installations that will include a shallow overburden well and a bedrock well installation at each location (for a total of 12 wells). Examples of typical overburden and bedrock well installations are provided in Figures 3-3 and 3-4. The remaining five monitoring well locations will be installed as shallow overburden wells and will be selected based on the Phase I investigation results and soil boring field results including FID headspace screening results, overburden geology, groundwater elevation, and any observable soil staining, or other indications of possible contamination. In addition, shallow overburden wells will only be installed at a location if saturated overburden material is encountered during the soil boring program. The location of each well installation will be based on the evaluation of the Phase I results.

It is anticipated that eight well locations will be selected to evaluate potential releases of site-related contamination to groundwater based on Phase I and the soil boring program results.

These areas will have been selected based on the potential of releases of contamination from surface spills or sub-slab leaks from the Building 32 activities during past operations.

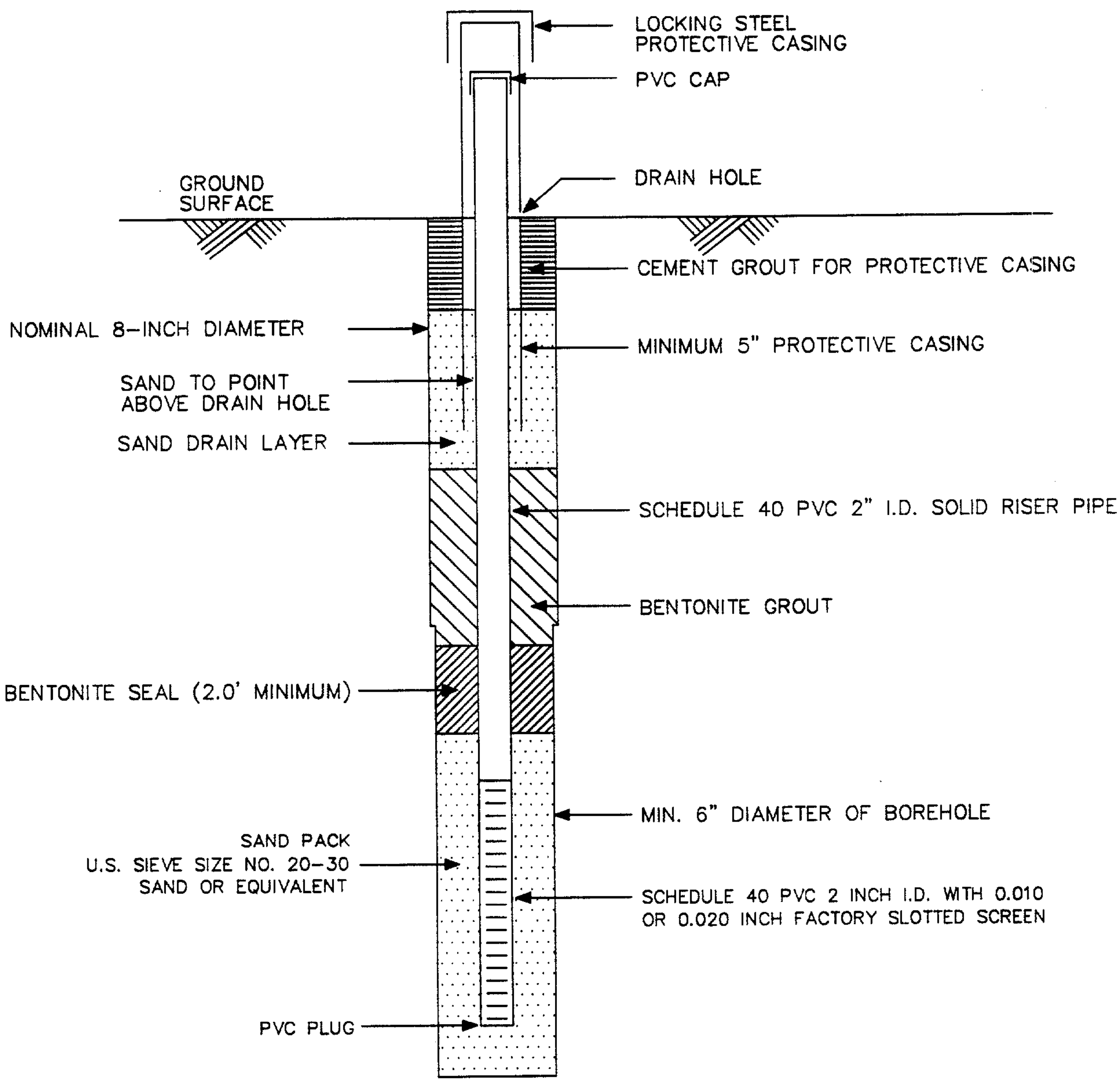
At one additional well location, an overburden and bedrock well cluster will be installed hydraulically upgradient of Building 32 to establish background groundwater quality conditions in the overburden and bedrock aquifer(s).

The depth of the well screen installation will be determined in the field based on conditions that may include: depth to groundwater, vertical zones that are more or less permeable to water than others, soil types present, visual evidence of contamination (and an absence of field instrument response to headspace screening), the presence of multiple horizons of contaminants, and depth to bedrock.

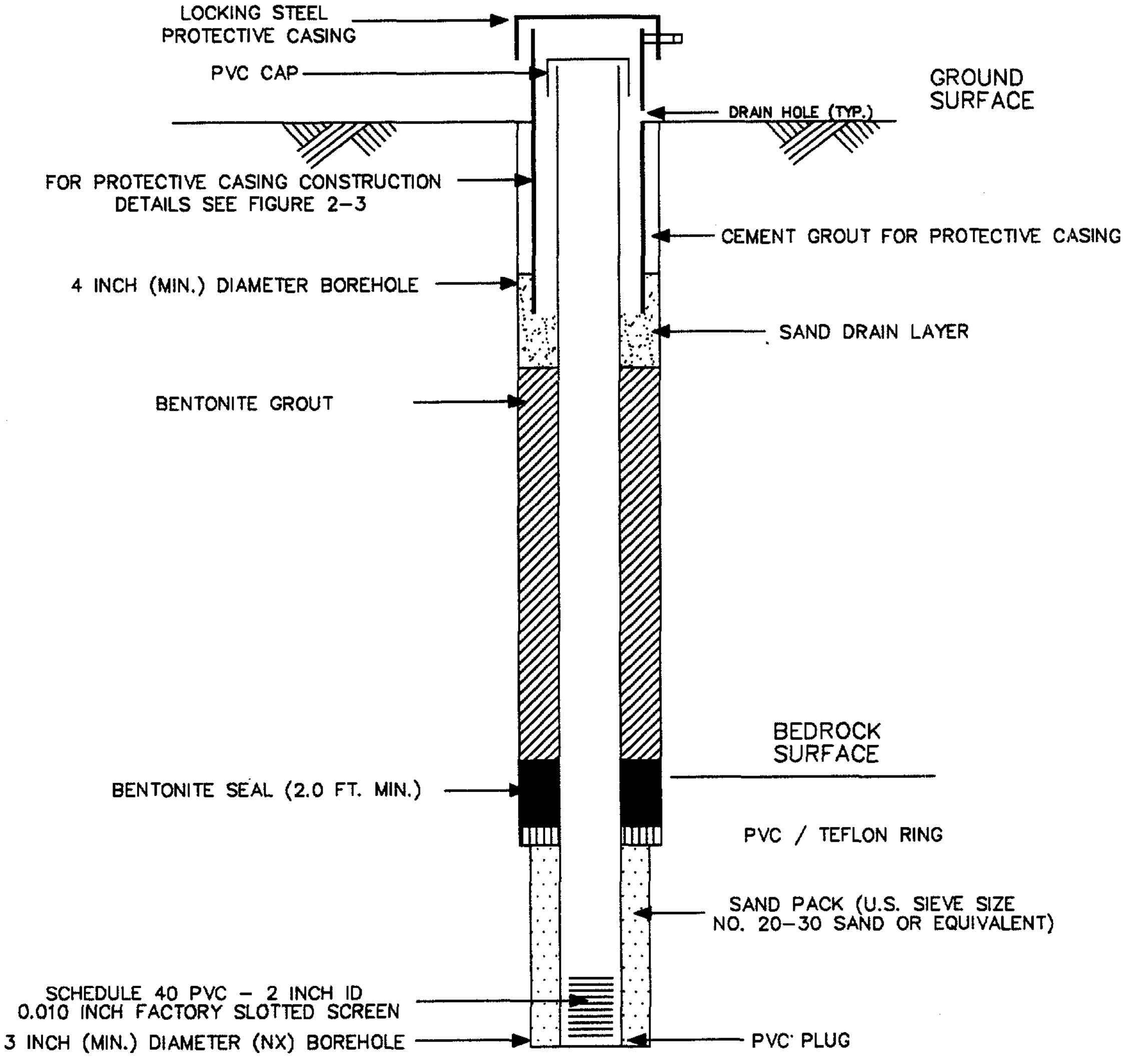
Well screens and sandpacks used for the overburden well installations will be sized in accordance with the geologic formation at each boring location. Well screens with slot sizes of 0.010 (0.25 mm) and 0.020 (0.5mm) will be available at the site. Filter pack sizes of 20 to 40 (0.85 mm to 0.425 mm) and 10 to 20 (2.0mm to 0.85 mm) sieve size sand will be available for installation with each respective screen aperture.

Screen aperture size and filter pack will be selected based on a visual inspection of the split barrel soil samples collected from the screened interval. The field geologist/engineer will classify the soil sample and visually estimate the quantity of the coarse sand fraction present in the interval to be screened. If coarse sand (defined in ASTM D 2487-92 as ranging in size from 2.00 mm to 4.75 mm diameter) represents a minimum of 70 percent by weight of the mass, a 0.020 slot screen and 10 to 20 sieve size filter pack will be installed. If coarse sand represents less than 70 percent of the screened interval, a 0.010 slot screen and 20 to 40 sieve size filter pack will be installed. However, if the screen interval is highly stratified, containing lenses of silty soils, a 0.010 slot screen and 20 to 40 sieve size filter pack will be installed to minimize well siltation.

If possible, the well screens will be installed in the saturated zones across the interval that shows the highest level of contamination. However, if conditions warrant the presence of a light non-aqueous phase liquid (LNAPL), screens may be placed across the expected fluctuation range of the water table to sample the LNAPL. Such changes to the Work Plan will be documented to



OVERBURDEN WELL CONSTRUCTION DETAILS				FIGURE 3-2
BUILDING 32, GOULD ISLAND				Brown & Root Environmental 55 Jonspin Road Wilmington, MA 01887 (978)658-7899
NETC – NEWPORT, RI				
DRAWN BY:	D.W. MACDOUGALL	REV.:	0	
CHECKED BY:	K. O'NEILL	DATE:	19 MAR 98	
SCALE:	NONE	ACAD NAME:	C:\DWG\NAVY\GOULD\MW_TYP.DWG	



BEDROCK WELL CONSTRUCTION DETAILS				FIGURE 3-3
BUILDING 32, GOULD ISLAND				Brown & Root Environmental *A Division of Halliburton NUS Corporation* 55 Jonspin Road Wilmington, MA 01887 (508)658-7899
NETC - NEWPORT, RI				
DRAWN BY:	D.W. MACDOUGALL	REV.:	0	
CHECKED BY:	K. O'NEILL	DATE:	19 MAR 98	
SCALE:	NONE	ACAD NAME:	C:\DWG\NAVY\GOULD\OBR.DWG	

the regulatory parties in Requests for Field Modifications, as described in Section 1.5 of this Work Plan.

Overburden aquifer wells will be installed according to the following protocol: clean silica sand of uniform grain size will be carefully placed in the annular space between the well screen and casing, to a minimum of 1 foot above the top of the screen. A bentonite pellet seal with a minimum thickness of 2 feet will then be installed immediately above the silica sand backfill. The remainder of the borehole will be backfilled with a bentonite grout to a depth of 4 feet below ground surface. A 1-foot thick layer of clean silica sand (such as that used for the sand pack) will be added to serve as a drainage layer beneath the protective casing. This minimizes the possibility of water collecting in the annular space between the casing and the riser. During winter weather, water collecting in this annular space can freeze, resulting in binding the protective casing to the riser. Subsequent frost heaving of the installation can damage the well that has frozen to the casing. The hole will be finished with a cement grout seal and a protective steel casing or flush-mounted roadway box, where appropriate. Wells located within areas of potential vehicle traffic will be finished with concrete grout to match the existing grade of the surrounding paved surfaces.

If groundwater is encountered near the ground surface a contingency overburden monitoring well construction method will be utilized. Because most of the locations scoped for groundwater monitoring wells are within paved areas, the grout could, if necessary be eliminated as long as the protective casing is cemented into the surface pavement. In such cases, the filter pack will extend up as far as 1 foot above the well screen. The remainder of the boreholes will be back-filled around the riser pipe with natural material, in which the protective casing will be set. In the case of upgradient wells, the protective casing will be grouted into the surrounding soils. This arrangement will compromise the longevity of the wells, but it will allow the well to collect shallow groundwater without compromising the representativeness of the samples to be collected.

The bedrock core holes will be backfilled with bentonite and sand to the depth of the well screen. The screen will be set and held in place with stainless steel centralizers and the annular space will be backfilled with Ottawa sand. The area around the remaining riser will be backfilled with bentonite grout. Any bedrock core holes that will not contain a monitoring well screen will be backfilled with bentonite grout.

During the well installation process, the depths of all backfill materials will be continually monitored with a weighted tape. Wells will be completed at the ground surface using flush-mounted road boxes or protective guard pipes. Wells located within paved areas will be finished with concrete grout to match the existing grade of the surrounding paved surfaces.

Bentonite grout will be allowed to set for a minimum of 1 day prior to developing the well. Development will be conducted by bailing, or pumping and surging, to remove residual drill cuttings and fines from around the well screens.

The horizontal and vertical locations of the wells will be surveyed following the completion of well construction. A notch will be cut into the tops of the PVC well riser that will be used as a permanent reference point. The survey operations are described in detail in Section 3.3.3. Well purge water will be managed in accordance with Section 3.4.

3.3.1.4 Well Development

Wells will be developed by bailing and/or surging and pumping, as determined by the field geologist. Fine-grained material around the well screen will be drawn into the well and removed by agitating the well water with a surge block and simultaneously pumping water from the well at a low discharge rate. A pump outfitted with ASTM drinking water grade polyethylene tubing will be used to remove the water from the well. To prevent cross contamination between the wells, the surge block will be decontaminated between use in each well. The surge block will be decontaminated with non-phosphate detergent and tap water, rinsed with tap water, rinsed with methanol, air dried, and rinsed with deionized water. The polyethylene tubing will also be replaced between each well. The dedicated new tubing will be rinsed with deionized water prior to its use. Water produced during well development will be containerized in 55-gallon drums (DOT Specification 17E), as described in Section 3.4.

If the surge block and pumping technique is deemed inappropriate by the B&R Environmental field team based on field conditions, an alternate method will be used to develop the well. A suitable pumping device, e.g., submersible pump, Waterra™ pump, will instead be placed in the well and used for its development.

The volume of water extracted from each monitoring well during development will be monitored and water quality parameters including pH, temperature, salinity, specific conductance, and turbidity will be determined every 15 minutes. Development will continue until pH, temperature, and specific conductance have all stabilized and turbidity is equal to or less than 10 nephelometric turbidity units (NTUs). The well will be considered stable when consecutive readings differ less than 10 percent. If the NTU criteria is not achievable, the parties will determine if a turbidity standard of plus or minus 10 percent of successive well volumes is appropriate on a case-by-case basis.

If a well is not completely developed after 4 hours, the field geologist will notify the B&R Environmental PM for authorization to continue or to stop development.

3.3.1.5 Groundwater Sample Collection

One round of groundwater sampling and analysis will be conducted. Due to the high potential for inorganic contamination in the groundwater at the site and concerns regarding elevated groundwater turbidity effects on the collection of representative, accurate, and reproducible groundwater quality samples, a low-flow (low stress) sample collection operation will be used for this task.

Groundwater samples will be collected from each of the newly installed monitoring wells and will include applicable field QA/QC samples (blanks and duplicates).

Groundwater samples will be analyzed for full TCL analyses, TAL metals, and cyanide. Table 3-2 presents a summary of field samples to be collected. Section 4.0 describes analytical methodologies and QC requirements.

Work elements for this task include:

- Noting, measuring, and if possible, sampling non-aqueous phase liquids (both LNAPL and DNAPL)
- Measuring water levels in wells prior to purging
- Purging wells using low-flow methodology

- Measuring pH, temperature, specific conductance, dissolved oxygen, salinity, and turbidity periodically during the extraction of water from the well
- Collecting samples using low-flow methodology
- Documenting, packing, and shipping samples for analyses

For each well to be sampled, the low-flow groundwater sample collection procedures to be followed are summarized below. The U.S. EPA Region I SOP for low-stress sample collection (SOP GW 001, 7/30/96, Rev.2) is presented in Appendix B. This SOP is to be strictly adhered to during the collection of groundwater samples. RIDEM has provided a recommended approach for low flow sample collection that differ slightly from the approach described in this Work Plan. The RIDEM approach is also presented in Appendix B. If sample collection is unsuccessful using the EPA method, the RIDEM method will be used. If the RIDEM method also proves unsuccessful, standard bailing techniques will be used.

1. The presence of floating product in the wells will be determined with the use of an ORS (TM) interface probe (or equivalent). The presence of product will be noted, and if appropriate, the thickness measured. The depth to water in the well will be measured and recorded to the nearest 0.01 feet.

2. The required length of tubing will be calculated and measured for attachment to either the submersible or the peristaltic pump, such that the intake (submersible pump, or tubing intake if a peristaltic pump is used) is placed at the midpoint of the saturated screened interval. Note that the tubing will be measured to allow a resistance between the well head and the discharge point (field testing equipment) to minimize temperature changes in the groundwater discharged from the well. Teflon or teflon-lined tubing will be used and disposed of after sampling is complete.

3. The pump and/or tubing will be slowly and smoothly lowered to the required depth to minimize the amount of mixing in the well. The pump cable and/or discharge tubing will be secured to the well casing (or PVC stick-up) to minimize movement.

4. The field testing equipment (and peristaltic pump head, if used) will be assembled and placed as close as possible to the well head/discharge tubing. For the

TABLE 3-2
PHASE II PROPOSED SOIL BORINGS/WELL INSTALLATIONS
BUILDING 32 STUDY AREA SCREENING EVALUATION
GOULD ISLAND, NEWPORT, RHODE ISLAND

BORING/WELL NUMBER	LOCATION	WELL SCREEN INTERVAL	PURPOSE OF WELL
SB01/MW01 (upgradient location)	Located on hill/berm southwest of electroplating shop in densely vegetated area (Refer to Figures 3-1 and 3-2)	MW01A: Unconsolidated overburden, based on field screening and soil conditions, and MW01B: shallow bedrock water quality	Establish background soil quality and groundwater quality in overburden and shallow bedrock
SB02/MW02	Through floor of electroplating shop inside Building 32	MWO1A: Unconsolidated overburden, based on field screening and MW02B: soil; shallow bedrock water quality	Assess impacts of electroplating shop and discharge pipe to soils and groundwater quality in overburden and bedrock
SB03/MW03	TO BE DETERMINED	MW03A: Unconsolidated overburden, based on field screening and soil MW03B: shallow bedrock water quality	Assess impacts from Building 32 activities
SB04/MW04 SB04/MW05 SB06/MW06 SB07/MW07 SB08/MW08 SB09/ MW09	TO BE DETERMINED	Unconsolidated overburden	Assess impacts from Building 32 activities
SB10 - SB13	TO BE DETERMINED	Unconsolidated overburden	Access impacts from Building 32 activities

peristaltic pump, the discharge tubing will be connected to the pump head with a minimum length of pharmaceutical-grade silicone tubing.

5. The pump will be connected to the power supply (generator or other power source) and the power supply will be turned on (without starting the pump).

6. The depth to water with the pump and/or tubing in the well will be re-measured and compared with the initial reading; if the readings vary by more than 0.05 feet, field personnel will wait for 5 minutes, remeasure the water, and begin pumping.

7. The pump will be started at the lowest flow setting. The pump start time will be recorded and the flow rate will be measured and recorded using a graduated measuring device and stopwatch. Note that during the initial period of pumping (an estimated 5 to 10 minutes) the depth to water in the well should be measured frequently (at an estimated frequency of approximately once per minute) to enable timely pump flow adjustments to minimize significant drawdown in the well.

8. The initial groundwater sample discharged from the tubing will be collected, and the time and field parameters (pH, temperature, conductivity, turbidity, salinity, and dissolved oxygen) will be measured and recorded.

9. These field parameters (pH, temperature, conductivity, turbidity, salinity, and dissolved oxygen) and the depth to water in the well (using the M-scope or ORS probe) will be measured at 3- to 5-minute intervals (initially the water level will be measured more frequently, as discussed in step 7). The data and the associated time will be recorded on the low-flow sampling data sheet. Attempts will be made to maintain the drawdown in the well during pumping to 0.3 feet or less, by adjusting the pump flow rate. Drawdown for each well will vary depending on the recharge capacity of the well.

10. Groundwater samples will be collected following stabilization of measured field parameters. "Stabilization" of readings will be readings within plus or minus ten percent for three consecutive 3- to 5-minute readings. Turbidity values are expected to be 10 NTUs or less at stabilization, however, the location of the well

with respect to the contaminant source may result in turbidity readings that are "naturally" above 10 NTUs.

Following purging procedures, samples will be collected directly through the tubing into appropriate sample bottles. Samples will be preserved according to requirements described in Section 4.0. All non-disposable sampling equipment will be decontaminated prior to each use, as described in Section 3.4. All pertinent sampling data will be recorded on appropriate sample log sheets and in a field logbook.

If difficulties arise during the low-flow sample collection procedures (a minimum drawdown is not obtainable, or water chemistry readings do not show a stabilization pattern), affected wells will be sampled using standard bailing techniques. This change will constitute a request for field modification, as described in Section 1.5.

Purge water from the wells will be containerized for waste characterization, as described in Section 3.4.

3.3.1.6 Groundwater Elevation Survey and Tidal Study

A tidal study will be conducted to determine if tidal patterns within Narragansett Bay influence groundwater flow on the site.

Groundwater levels in all wells will be measured to a reference point, consisting of a notch cut at the top of the PVC well riser. Continuous recording pressure transducers will be installed in the selected overburden and bedrock monitoring wells be recorded over a 48-hour period. Similarly, a near-shore monitoring point will be established and used to assess nearby tidal conditions within the same time period. If practical, the 48-hour period will be selected from the days of the month when the maximum tidal range occurs. Based on the results of the tidal study, the lag time between high and low tides and changes in groundwater heads in each well will be determined. Salinity will be determined at the corrected groundwater high and low periods.

3.3.1.7 Hydraulic Conductivity Testing

In-situ hydraulic conductivity testing will be conducted by performing variable-head slug tests in the on-site monitoring wells. The information will be used to characterize the aquifer system and evaluate contaminant transport mechanisms. Testing will be conducted only after groundwater sampling and water level measurements have been collected.

Initially water levels will be determined manually. Falling and rising head tests will be conducted in wells with screens that are totally saturated. Rising head tests will be conducted in partially saturated well screens, if necessary. No falling head test will be conducted in partially saturated well screens. During the tests, water levels will be obtained using pressure transducers set for continuous readings and recording.

3.3.2 Task 9: Evaluation of Ecological Setting

One of the goals of the SASE is to provide a determination of the presence of risk to area receptors from the contaminants on site. As a part of that determination, the receptors must be identified. This task will include an evaluation of the terrestrial and marine ecological settings.

3.3.2.1 Off-Shore Ecological Setting

The ecology of the marine environment will be evaluated by a qualified ecologist during Task 4 and 5 activities, low tide observations, and a literature review including a review of other offshore ecological risk assessments that have been performed in Narragansett Bay. Due to the proximity of the McAllister Point Landfill site to Gould Island (Figure 2-1) and the similarity of the settings between the two sites, the Marine Ecological Risk Assessment Report for the McAllister Point Landfill will be utilized to provide baseline information for the Gould Island marine ecology evaluation in addition to the bottom imaging scan performed planned for Task 4. In addition, a biologist's survey of the marine and upland areas will be performed to establish an ecological screening characterization of the site.

A qualified Ecologist will also perform a site walkover. Due to the expected limited nature of terrestrial contamination as a result of Building 32 activities, the ecological walkover will be limited to the onshore and intertidal area indicated in Figure 3-1 This walkover will involve the following evaluations:

- Identify the types and spatial extent of habitats that are present on and around the site

- Identify the species and biological communities on and adjacent to the site that may use these habitats and that may be potential receptors with regard to contaminants present in soils, sediments, and surface water at the site

- Determine the presence of contamination of environmental media with regard to potential exposure of receptor species

- Identify on-site and adjacent wetlands, if appropriate, and their approximate boundaries; provide sketch maps of the wetland boundaries relative to the site

3.3.2.2 Characterization of Habitats

The objective of the habitat characterization is to identify the nature and composition of non-marine animal and plant communities in the vicinity of the site to provide a basis for identifying potential receptors.

To characterize the habitats at and in the vicinity of the site, biologists will provide: descriptions of the nature and composition of plant and animal communities at the site and the immediate vicinity of the site; descriptions emphasizing wildlife species, their habitat, and key food habits; a description of significant habitat; and, if applicable, information on federal-or state-threatened or endangered species.

These tasks will be accomplished by conducting a literature search, a review of threatened and endangered species, and a field assessment (a qualitative survey of the flora and fauna).

3.3.2.3 Literature Review

The purpose of the literature review is to provide background information on the habitats and species of plants and animals expected to occur on the site and in nearby areas, and the use of the general area by migrating or overwintering species. The review will include the RIDEM, the US Fish and Wildlife Service (USFWS), and B&R Environmental data sources.

3.3.2.4 Review of Threatened And Endangered Species

RIDEM and USFWS, Office of Endangered Species lists will be reviewed by B&R Environmental to identify endangered, protected, or threatened species that may inhabit or use the Newport area and the environments associated with the site. This information will be checked with RIDEM and the USFWS, and maps will be provided at appropriate scales to show important habitat or nesting sites for these species. The determination of potential effects on any endangered or threatened species identified as being present in the site area will receive special consideration.

3.3.2.5 Field Assessments

The purpose of this task is to provide qualitative field verification of the types of habitat and wildlife on and near the site.

The goal of the wildlife assessment is to provide site-specific observations concerning the diversity (type) of species rather than data for assessing population structure or community analyses. Since the objective is to provide an inventory of terrestrial fauna on site, the survey will be qualitative rather than quantitative. These data will be used to provide an informed site-specific basis for selecting potential ecological components (receptors).

The survey requires a site walkover. Positioning will be by "line of site" and will therefore be approximate. A field map will be used to guide the survey and to record observations. The walkover path will be planned and modified as appropriate in the field. The path will be dictated by the types of environments encountered and their extent, based on visual observations. Obvious habitat features that may be of particular value to wildlife will be examined closely. The course of the walkover will be based on such observations as nesting sites, physical signs of wildlife, audible signs of birds, changes in vegetation patterns, obvious changes in hydrologic conditions, changes in slope, and physical accessibility.

During the survey, observations will be made on major flora in habitat areas and bird, amphibian, reptile, and mammal sightings or their physical evidence, e.g., nesting sites, tracks.

Observations will be recorded on a base map to mark the locations of major habitat types and observations and notes will be recorded in a field log book by the biologist.

Lists of flora and fauna will be produced for inclusion in the report. These lists will be species-specific where possible. The method for species identification, i.e., visual sighting, identification by tracks or other physical evidence, and audible identification, will be included on the fauna list.

3.3.2.6 Data Products

The data products from the habitat survey will include tables and maps to facilitate a qualitative biological characterization of the site and nearby areas. These will be provided in a report that will include:

- narrative descriptions of the nature and composition of plant and animal communities in the immediate vicinity of the site, referencing a combination of maps (for major vegetation and habitat types) and tables (for species composition of the communities),
- descriptions emphasizing wildlife species observed, and their habitat requirements described in available literature, and key food habits; important features of the biology of these species, such as migrations into and out of the area through pertinent literature sources,
- a description of significant habitat, wetlands, waterbodies, and other resources in the immediate vicinity of the site. As suggested by US EPA (1989) guidance, habitats that "are unique or unusual or necessary for continued propagation of key species" will be described. The USFWS and RIDEM are primary sources of this information,
- information on federal- or state-threatened or endangered species.

These data products will be used to develop an ecological assessment for the site, as described in Section 5.2.

3.3.3 TASK 10: Onshore Land Survey

Following the investigative work, a survey will be performed by a State of Rhode Island registered surveyor to identify locations of sample points, and other significant features identified during the investigation. Surveys will be performed by a subcontractor supervised by B&R Environmental working under B&R Environmental's Health and Safety Plan.

The base map presented in this Work Plan (Figure 2-2) will be used; however, locations of existing buildings and study area boundaries will be confirmed by survey.

The survey will be conducted to establish relative locations of sample points. Survey control will be maintained by tying into either the State of Rhode Island or United States Geological Survey (USGS) grid systems. Elevations will be referenced to a USGS benchmark and the mean low water level. Horizontal and vertical measurements will be made relative to on-site control points.

All surveyed features will be horizontally located to within plus or minus 0.1 foot. Tops of PVC well risers will be located to plus or minus 0.01 foot vertically.

It is expected that the following tasks will provide points that will require surveys. These tasks and the features that will be surveyed are described below:

- Expected discharge outfall points at the seawall related to Building 32
- Manholes and catch basins near and inside the building
- Boring locations and monitoring well elevations
- Other onshore sample locations
- Three GPS control points from sediment sampling

In addition, any sample collection points that are established during the investigation will be surveyed.

Surveyed points will be mapped with AutoCAD V14.0 or a compatible system. The survey subcontractor will provide hard-copy prints and disk versions of the survey information for each survey operation. Survey points for each task will be set on different "lay" of the AutoCAD data such that printouts of sample collection points can be made specific to each task or any group of tasks.

3.4 SUPPORT OPERATIONS

3.4.1 Management of Investigation-Derived Waste (IDW)

Waste materials that will be generated during the field investigation may include drill cuttings and fluids, well purge and development water, decontamination fluids, wash water from steam cleaning, disposable sampling equipment, and used personal protective equipment (PPE).

B&R Environmental will be responsible for removing and disposing of all investigative waste materials (well purge water, soil cuttings, and PPE) following completion of the field investigation program. This waste disposal program will be conducted following each element of work described in the previous sections. In this manner, large quantities of wastes will not be stockpiled for disposal at the end of the investigation program.

Containers of IDW will be labeled as to their point of origin and date collected. Containers of IDW that are found to be hazardous will be characterized and disposed of within 90 days.

3.4.1.1 Solid Wastes

Personal protective equipment (gloves, tyvek coveralls, and disposable boots) will be decontaminated, double bagged, and disposed of in an off-site industrial dumpster.

3.4.1.2 Soil Wastes

Excess drill cuttings, discarded sample material, and other soil wastes will be containerized. Laboratory analysis of samples collected during the investigation program will be used to further characterize the materials, as required by state and federal disposal requirements. Soils that are found to not contain elevated concentrations of contaminants will be replaced on site as general fill. Soils that are confirmed by laboratory analysis to contain elevated concentrations of contaminants will be characterized further for off-site disposal.

Additional samples will be analyzed for other parameters to characterize the waste. Typical disposal parameters are listed below.

- TCLP Volatile Organic Compounds
- TCLP PCB Pesticide Compounds
- Flash Point, Reactivity, Corrosivity
- Free Liquid

Analysis of representative samples of waste materials for disposal parameters will be the responsibility of an outside disposal subcontractor. All soil wastes will be shipped off site by this same subcontractor.

3.4.1.3 Aqueous Wastes

Decontamination fluids, well purge and development water, and drilling fluids will be initially contained in 55-gallon drums. Drums of drilling water, purge water, and development water originating from wells that are found to not contain elevated concentrations of contaminants through laboratory analysis will be discharged on site. Containers of water that are confirmed by laboratory analysis to contain elevated concentrations of contaminants will be characterized further for off-site disposal. The wastes will be sampled for RCRA disposal parameters based on the findings of the field investigation, and in accordance with state waste generation and disposal requirements. Samples may be analyzed for, but not limited to VOCs, SVOCs, metals, PCBs, pesticides, TPH, and flash point. This material will be combined at the conclusion of the project and shipped off site for disposal in accordance with RIDEM, USEPA, and DOT Regulations.

3.4.2 Decontamination Procedures

Decontamination procedures are summarized below:

3.4.2.1 Monitoring Equipment

All monitoring equipment will, to the extent possible, be wrapped and sealed in plastic with only the controls, readouts, and intake and exhaust ports open to the atmosphere. If monitoring equipment decontamination is required the following procedure will be utilized:

- remove gross contamination with potable water
- scrub with potable water/liquinox
- rinse lightly with potable water
- remove plastic covering
- wipe dry immediately with disposable towels

3.4.2.2 Drilling, Excavation, and Other Heavy Equipment

Drill rigs and excavation equipment will be decontaminated by steam cleaning following their arrival on site and prior to beginning work at each location.

Drilling casing, rods, and augers, as well as the affected portions of the drilling rigs, will be decontaminated before beginning each borehole. Excavation equipment used for investigations will be decontaminated before operating at each location. Excavation equipment used to clean catch basins will be decontaminated between each location.

Heavy equipment decontamination will be performed at a temporary, centrally located decontamination pad constructed specifically for this purpose. The decontamination pad will be large enough to capture all wash water and channel it into a sump. The fluids in the sump will be containerized after each use.

3.4.2.3 Sampling Equipment

All non-disposable sampling equipment that comes in contact with the sample medium will be decontaminated to prevent cross contamination between sampling points. This includes equipment such as soil sampling spatulas, split spoons, and hand auger buckets, etc. The following decontamination sequence will be employed:

- remove gross contamination by scrubbing with potable water
- scrub with potable water/liquinox
- rinse with potable water
- rinse with 10 percent nitric acid
- rinse with 2-propanol

- rinse with deionized water
- air dry (to extent possible)
- wrap with aluminum foil, dull side toward equipment.

3.4.2.4 Submersible Pump

The following decontamination sequence will be employed for submersible pumps (the electrical wires must be rinsed with the decontaminating solutions as well):

- Upon removal of the pump from the well following sample collection, the pump will be submersed in a 4-inch diameter PVC tube/bucket (or equivalent) containing potable water and the exterior surface scrubbed. At least 1 to 2 gallons of water will be pumped through (start pump at a low-flow rate, as in sampling, and increase to a high speed).

- Submerse pump in a bucket containing a potable water and detergent (Alconox or Liquinox) solution. At least 1 to 2 gallons of detergent will be pumped through (start pump at a low-flow rate, as in sampling, and increase to a high speed).

- Remove the pump, and rinse or spray with potable water to minimize transfer of soap to the rinse bucket.

- Submerse the pump in a bucket of a potable water rinse and pump least 1 to 2 gallons through (start pump at a low-flow rate, as in sampling, and increase to a high speed).

- Submerse the pump in a bucket of a deionized/distilled water rinse and pump least 1 to 2 gallons through (start pump at a low-flow rate, as in sampling, and increase to a high speed).

- Submerse the pump in a bucket of 10 percent nitric acid rinse and pump least 1 to 2 gallons through.

- Submerse the pump in a bucket of a deionized/distilled water rinse and pump least 1 to 2 gallons through (start pump at a low flow rate, as in sampling, and increase to a high speed).

- Submerse the pump in a bucket of isopropyl alcohol (2-propanol) rinse and pump least 1 to 2 gallons through.

- Submerse the pump in a bucket of a deionized/distilled water rinse and pump least 1 to 2 gallons through (start pump at a low flow rate, as in sampling, and increase to a high speed).

- Air dry and wrap the pump in aluminum foil (dull side toward the pump).

4.0 QUALITY ASSURANCE/QUALITY CONTROL

This section provides technical guidelines and procedures for maintaining an appropriate level of quality for data collected during field work performed. This section references the B&R Environmental Standard Operating Procedures (SOPs) for specific protocols for procedures discussed in Section 3.0.

Pertinent SOPs are included in this Work Plan as Appendix B. These SOPs include, but are not limited to:

SOP	DESCRIPTION
GH-1.3	Soil Sampling
GH-1.3	Soil and Rock Drilling
GH-1.5	Borehole and Sample Logging
GH-2.8	Groundwater Monitoring Well Point Installation
GH-2.5	Groundwater Contour Maps and Flow Rates
SA-1.1	Groundwater Sample Acquisition and Onsite Water Quality Testing
SA-1-2	Surface Water and Sediment Sampling
SA-6.1	Non Radiological Sample Handling
SA-6.3	Field Documentation
ME-15	Photovac MicroFID Handheld Flame Ionization Detector
RIDEM	Required Monitoring Well Construction Standards and Abandonment Procedures
EPA-GW-001	Low- Flow Groundwater Sampling
EPA-Draft 1.4	Draft Standard Operation Procedure for Soil sample collection and Handling for the Analysis of Volatile Organic Compounds (March 1997)

Sampling objectives are to provide sufficient data to identify and characterize of contaminants released into the environment from past operations at Building 32. This determination is necessary to support a baseline risk assessment, and to provide waste characterization data for making remedial decisions. To accomplish these objectives, samples of six different media (concrete chips, surface soil, subsurface soil, sediment, residue and groundwater) will be collected for laboratory analyses including TCL VOSs, SVOCs, TAL Metals, Cyanide, TCLP Metals, and Total Petroleum Hydrocarbons.

Achieving these objectives requires that the data collected from the field conform to an appropriate level of quality. The quality of a data set is measured by certain characteristics of the data, namely the precision and accuracy, representativeness, completeness, and comparability (PARCC) parameters. Some of the parameters are expressed quantitatively, while others are expressed qualitatively. The PARCC goals for a particular project are determined by the intended use of the data, defined as a part of the Data Quality Objectives (DQOs). DQOs are discussed in Section 2.6; the PARCC parameters are discussed below.

4.1 PARCC PARAMETERS

The PARCC goals for the work covered by this quality assurance plan are discussed in the following sections.

4.1.1 Precision and Accuracy

Field and laboratory precision and accuracy performance can affect the attainment of project objectives, particularly when compliance with established criteria is based on laboratory analysis of environmental samples.

Analytical precision and accuracy will be evaluated upon receipt of the analytical (field screened and laboratory) data. Analytical precision will be measured as the relative percent difference from duplicate measurements and relative standard deviation from three or more replicates. Analytical accuracy measures the bias as the percent recovery from matrix spike and matrix spike duplicate samples.

Field sampling precision and accuracy are not easily measured. Field contamination, sample preservation, and sample handling will affect precision and accuracy. By following the appropriate B&R Environmental SOP, precision and accuracy errors associated with field activities can be minimized. Field duplicates and blanks (field, trip, and rinsate) will be used to estimate field sampling precision and accuracy for soil samples submitted for laboratory analysis.

Field duplicate and field quality control blank analyses results will be used to review the laboratory-analyzed results and determine the usability of the data with respect to its intended use. In general, results that are rejected by the data review process will be disqualified from application to the intended use. Qualified data will be used to the greatest extent practicable.

4.1.2 Representativeness

Representativeness describes the degree to which analytical data accurately and precisely define the population being measured. Several elements of the sampling and sample handling process must be controlled to maximize the representativeness of the analytical data (appropriate number of samples collected, physical state of the samples, site-specific factors, sampling equipment, containers, sample preservation and storage, holding times, sample identity, and chain of custody will be defined to ensure that the samples analyzed represent the population being measured). The sampling program is designed to provide analytical data that is representative of the existing contaminant levels.

Every effort will be made to collect soil samples that represent the soil under investigation. For the headspace screening procedure, the type and concentration of the contaminants in the samples screened on site depends on the type of contaminants present in the soil samples and their concentration. The volatile contaminants in the headspace represent the volatile contaminants of the soil in the container. The sample with the highest concentration of volatile contaminants of the soil will deliver the highest concentration of volatile contaminants to the headspace container.

Headspace screening data (FID) will not be used to make determinations of the true nature or extent of contamination. The screening data will be used to aid in determining monitoring well screen installation selection. The laboratory samples alone will support future laboratory analysis to determine the nature and extent of contamination as part of the remedial investigation.

Representativeness of data is also affected by sampling techniques. Sampling techniques are described in Section 3.0 and in the B&R Environmental SOPs included in Appendix B.

4.1.3 Completeness

Completeness describes the amount of data generated that meets the objectives for precision, accuracy, and representativeness versus the amount of data expected to be obtained. For relatively clean, homogeneous matrices, 100 percent completeness is expected. However, as matrix complexity and heterogeneity increase, completeness may decrease. Where analysis is precluded or where data quality objectives are compromised, effects on the overall investigation must be considered. Whether or not any particular sample is critical to the investigation will be evaluated in terms of the sample location, the parameter in question, the intended data use, and the risk associated with the error.

The sampling and analysis program for the site is sufficiently broad in scope to prevent a single data point or parameter from jeopardizing attainment of the monitoring objectives. Each medium is critical to assessing contaminant migration. Consequently, there exists some critical data requirement below which the objectives of the monitoring program will be compromised.

Critical data points may not be evaluated until all the analytical results are evaluated. Additionally, several sampling points, in aggregate, may be considered to be critical either by location or by analysis. A subsequent sampling event may be necessary if it becomes apparent that the data for a specific medium are of insufficient quality, either with respect to the number of samples or based on an individual analysis.

For the purposes of this effort, a data point will be determined to contribute to the completeness of the data set if the information provided is meaningful, useful, and contributes to the project objectives.

4.1.4 Comparability

One of the objectives of the sampling effort is to provide analytical data that is characterized by a level of quality that is comparable between sampling points. By specifying the use of standard analytical procedures (as well as standardizing field sampling procedures by employing B&R Environmental and others SOPs), the potential for variables to affect the final data quality will be effectively minimized. Analytical methods for this work are shown in Table 4-1; SOPs appear in Appendix B.

4.2 QUALITY CONTROL SAMPLES

QC samples to be used during the sampling effort are identified below, and include field duplicates or replicates, laboratory duplicates or replicates, rinsate blanks, trip blanks, and field blanks. Each type of field quality control sample defined below will undergo the same preservation, holding times, etc., as the field samples. Table 4-2 presents a summary of the QC samples to be collected during this field sampling event.

4.2.1 Field Duplicates

Field duplicates will be submitted at the rate of one for every ten samples per matrix, or at a rate greater than one per ten samples if fewer than ten are shipped to the laboratory on a given day. Field personnel will note on the sample summary form and in the logbook which samples are field duplicates. Duplicate samples will be shipped blind to the laboratories, and shipping paperwork will be completed accordingly.

Field personnel will note in the remarks block on the chain-of-custody form which of the samples is to be used for internal laboratory matrix spike/matrix spike duplicate analysis. Field duplicates and multiple sample aliquots are collected by mixing a double portion of the required volume of sample and dividing it into two sample containers. Aliquots for VOC analysis are always removed prior to homogenization. Field duplicates provide precision information regarding homogeneity, handling, shipping, storing, preparation, and analysis.

4.2.2 Rinsate Blanks

Rinsate blanks are obtained under representative field conditions by running analyte-free deionized water through sample collection equipment after decontamination, immediately before sampling and placing it in the appropriate sample containers for analysis. These samples are used to assess

TABLE 4-1
SAMPLE CONTAINER, PRESERVATIVE, AND HOLDING TIME REQUIREMENTS
BUILDING 32 STUDY AREA SCREENING EVALUATION
GOULD ISLAND, NEWPORT, RHODE ISLAND

SAMPLE MEDIUM	ANALYSIS	SAMPLE CONTAINER	PRESERVATIVE	HOLDING TIME
Soils	TCL VOCs (CLP SOW OLM03.0)	2 oz VOA vial	Cool to 4°C/methanol(4)	14 Days (Analysis)
Sediments	TCL SVOCs (CLP SOW OLM03.0)	8 oz wide mouth jar	Cool to 4°C	7 Days (Extraction)
Residue	TCL PCBs/Pesticides (CLP SOW	8 oz wide mouth jar	Cool to 4°C	7 Days (Extraction) 14 Days
Concrete	OLM03.0)			(Analysis
	TAL Metals (CLP SOW ILM03.0)	4 oz wide mouth jar	Cool to 4°C	
	Cyanide (CLP SOW 1LM04.4)	4 oz wide mouth jar	Cool to 4°C	Hg 28 Days, Others 6 months
	TCLP Metals (SW/1311 40 CFR	20 oz amber wide mouth jar	Cool to 4°C	6 months
	Part 261)			Hg 28 days, others 6 months
	TOC (CLP SOW 1LM03.0)	2 oz VOC jar	Cool to 4°C	
	Grain Size (ASTM D422-63)	16 oz wide mouth jar	not required	14 days
	AVS/SEM[3]	4 oz VOC jar	Cool to 4°C	None
				14 days
Groundwater	TCL VOCs (CLP SOW OLM03.0)	2 - 40 ml VOA vials	HCl to pH <2/Cool to	14 Days (Analysis)
	TCL SVOCs (CLP SOW OLM03.0)	80 oz amber bottle	4°C	7 Days (Extraction)
	TCL PCBs/Pesticides (CLP SOW	80 oz amber bottle	Cool to 4°C	7 Days (Extraction)
	OLM03.0)			
	TAL Metals (CLP SOW ILM02.1)	1 liter PE bottle	HNO_3 to pH <2	Hg 28 Days, Others, 6 months
	Cyanide (CLP SOW ILM04.4)	1 liter PE bottle	NaOH to pH>12	14 days
	Specific Conductance (EPA 120.1)	Field Measurement	Not Applicable	Not Applicable
	pH (EPA 150.1)	Field Measurement	Not Applicable	Not Applicable
	Temperature (EPA 170.1)	Field Measurement	Not Applicable	Not Applicable
	Dissolved Oxygen (EPA 360.1)	Field Measurement	Not Applicable	Not Applicable
	Turbidity (EPA 180.1)	Field Measurement	Not Applicable	Not Applicable
	Salinity (Standard Methods)	Field Measurement	Not Applicable	Not Applicable
Soil Gas	VOCs - Modified 8260A	n/a	Cool to 4°C	14 Days (Analysis)
	SVOCs - Modified 8270B	n/a	Cool to 4°C	14 Days (Analysis)
Waste Characteristics	Corrosivity (9040)(1)	8 oz jar(2)	Cool 4°C	As soon as possible
	Ignitability (1010)(1)	8 oz jar(2)	Cool 4°C	7 Days
	Reactivity (SW 7.3.3 and 7.3.4)(1)	8 oz jar(2)	Cool 4°C	7 Days

Notes:
(1) *SW-846 Test methods for evaluating solid waste. Volume 1C, Nov. 1986.*
(2) One 16 oz. jar can be used for waste characterization.
(3) Draft Analytical Method for Determination of Acid Volatile Sulfide in Sediment, U.S. EPA Environmental Research Laboratory, Narragansett, Rhode Island.
(4) For specifics see Region I, EPA-New England Draft Standard Operating Procedure for Soil Sample Collection and Handling for the Analysis of Volatile Organic Compounds.

TABLE 4-2
FIELD QUALITY CONTROL SAMPLE SUMMARY
BUILDING 32 STUDY AREA SCREENING EVALUATION
GOULD ISLAND, NEWPORT, RHODE ISLAND

SAMPLE TYPE	MEDIA	ANALYSIS	FIELD SAMPLES[1]	FIELD DUPLICATES (1 PER 10 FIELD SAMPLES)	RINSATE BLANKS (1 PER DAY)[2]	FIELD BLANKS (1 PER WATER SOURCE PER EVENT)	TRIP BLANKS (1 PER 10, 1 PER SHIPMENT)	TOTAL QUANTITY[3]
Concrete Slab Floor Samples Task 2	Concrete	TCL VOCs	8	1	1	0	1	11
		TCL SVOCs	8	1	1	0	0	10
		TCL Pesticides/PCBs	8	1	1	0	0	10
		TAL Metals	8	1	1	0	0	10
		Cyanide	8	1	1	0	0	10
		TCLP Metals	8	1	1	0	0	10
		TPH (GRO-DRO)	8	1	1	0	0	10
	SubSoil	TCL VOCs	8	1	1	0	1	11
		TCL SVOCs	8	1	1	0	0	10
		TCL Pesticides/PCBs	8	1	1	0	0	10
		TAL Metals	8	1	1	0	0	10
		Cyanide	8	1	1	0	0	10
		TCLP Metals	8	1	1	0	0	10
		TPH (GRO-DRO)	8	1	1	0	0	10
	Residue	TCL VOCs	18	2	1	0	5	26
		TCL SVOCs	18	2	1	0	0	21
		TCL Pesticides/PCBs	18	2	1	0	0	21
		TAL Metals	18	2	1	0	0	21
		Cyanide	18	2	1	0	0	21
		TPH (GRO-DRO)	18	2	1	0	0	21
Sediment Samples Task 5	Sediment	TCL VOCs	24	3	2	0	2	31
		TCL SVOCs	24	3	2	0	0	29
		TCL Pesticides/PCBs	24	3	2	0	0	29
		TAL Metals	24	3	2	0	0	29
		Cyanide	24	3	2	0	0	29
		TPH (GRO-DRO)	24	3	2	0	0	29
		TOC	24	3	0	0	0	27
		Grain Size	24	3	0	0	0	27
		AVS/SEM	24	3	0	0	0	27

TABLE 4-2
FIELD QUALITY CONTROL SAMPLE SUMMARY
BUILDING 32 STUDY AREA SCREENING EVALUATION
GOULD ISLAND, NEWPORT, RHODE ISLAND

SAMPLE TYPE	MEDIA	ANALYSIS	FIELD SAMPLES[1]	FIELD DUPLICATES (1 PER 10 FIELD SAMPLES)	RINSATE BLANKS (1 PER DAY)[2]	FIELD BLANKS (1 PER WATER SOURCE PER EVENT)	TRIP BLANKS (1 PER 10, 1 PER SHIPMENT)	TOTAL QUANTITY[3]
Soil Gas Sampling Task 6	Passive Sorbers	TCL VOCs	70	7	0	0	7	84
		TPH (GRO-DRO)	70	7	0	0	7	84
Surficial Soils Task 7	Soils	TCL VOCs	7	1	1	0	2	11
		TCL SVOCs	7	1	1	0	0	9
		Pesticides/PCBs	7	1	1	0	0	9
		TAL Metals	7	1	1	0	0	9
		Cyanide	7	1	1	0	0	9
		TPH (GRO-DRO)	7	1	1	0	0	9
Geologic/ Hydrogeologic Investigation, Task 8	Soils	TCL VOCs	26	3	7	1	8	45
		TCL SVOCs	26	3	7	1	0	37
		Pesticides/PCBs	26	3	7	1	0	37
		TAL Metals	26	3	7	1	0	37
		Cyanide	26	3	7	1	0	37
		TPH (GRO-DRO)	26	3	7	1	0	37
	Groundwater	TCL VOCs	12	2	3	1	3	21
		TCL SVOCs	12	2	3	1	0	18
		Pesticides/PCBs	12	2	3	1	0	18
		TAL Metals	12	2	3	1	0	18
		Cyanide	12	2	3	1	0	18
		TPH (GRO-DRO)	12	2	3	1	0	18
IDW Waste Characterization[4]	Soil	Corrosivity	8	1	0	0	0	9
		Ignitability	8	1	0	0	0	9
		Reactivity	8	1	0	0	0	9
	Groundwater	Corrosivity	10	1	0	0	0	11
		Ignitability	10	1	0	0	0	11
		Reactivity	10	1	0	0	0	11

Notes:

(1) Refer to Table 3-1 for number of field samples anticipated.
(2) Per NEESA guidance, only rinsate blank samples obtained from every other day are analyzed unless significant contaminant detections are recorded. The Field crew will denote on the associated chain-of-custody form which rinsate blanks are to be "held".
(3) In order to accommodate laboratory quality control analyses (i.e., matrix spike, matrix spike duplicate, laboratory duplicate) the field crew will provide multiple aliquots of samples (as applicable) with a frequency of one per 20 samples of similar matrix.
(4) Estimated number of samples.

the effectiveness of decontamination procedures. Rinsate blanks will be prepared at the rate of one per day during the sampling event, and will be analyzed for the same parameters as the related samples. All rinsate samples will be sent to the laboratory. However, only rinsate samples collected from every other day will be analyzed; the other rinsate samples will be marked "hold" on the chain-of-custody forms. "Hold" samples will not be analyzed unless significant contamination is noted in the preceding rinsate blank analyses.

4.2.3 Field Blanks

Field blanks will consist of the source water used in decontamination (includes analyte-free deionized water, potable water from each source, and other waters used in decontamination operations). Field blanks will be prepared at the rate of one per source of water per sampling event.

4.2.4 Trip Blanks

Trip blanks consist of aqueous VOC samples prepared by the laboratories. One VOC trip blank sample will accompany sample containers in the field throughout the sampling process and with each shipment of VOC samples to the laboratories. If more than ten VOC samples are in one shipment, one trip blank sample will be provided for each ten field samples. If fewer than ten VOC samples are in one shipment, one trip blank will be provided. If there are multiple sampling crews out at one time, trip blanks will accompany each sampling team. If the samples are "pooled" in a single cooler for shipment, then the trip blanks accompanying each respective sampling team will be submitted for VOC analysis.

4.2.5 Matrix Spike/Matrix Spike Duplicates

A matrix spike sample will be identified by field teams at a frequency of 1 in 20 field samples (per matrix) collected. Samples for aqueous matrix spike analyses are collected in triplicate volume, such that there are three containers for each analyte group (with the exception of TAL metals, which only requires double volume). In order to provide homogeneous aqueous matrix spike volumes, a portion of each of the sample containers (except for VOC samples) are each filled sequentially (e.g. each container is filled one-third of it's volume at a time until all containers are filled to capacity). One aliquot is analyzed as a field sample in a manner consistent with the other field samples. The second aliquot is spiked and analyzed to determine spike recoveries. The third is spiked also and analyzed as a duplicate to the second aliquot. Additional sample volume is not required for soil, sediment, or concrete sample matrices.

4.3 SAMPLING PROCEDURES

Field sampling will be conducted in accordance with Section 3.0 of this document and the B&R Environmental SOPs presented in Appendix B. Allowable sample holding times and preservation requirements are shown in Table 4-1.

4.4 SAMPLE DESIGNATION AND CUSTODY

Samples collected will be tracked by sample number and date collected. The sample number will be the basis for maintaining chain of custody. These procedures are described below.

4.4.1 Sample Numbering

Samples will be labeled as soon as they are collected. Sample numbers will reflect the source, medium, and location. An alpha numeric numbering system will be used to describe this information. This system is detailed below:

AA	-	A -	AANN	-	NNNN
(Site Identifier) -		(Medium) -	(Sample Location)	-	(Depth)

The site identifier for the Building 32 investigation will be G32. Medium indicates solid (S) or aqueous (A). Sample locations will be noted as:

concrete chip sample - CS
soil boring - SB
sediment - SD
groundwater - MW
soil gas - SG

drainway residue sample - RS; residue samples will have an additional identifier added which will aid in locating the sample origin (i.e., MH for manhole sample; CO for cleanout, CB for catch basin, WW for wash water, etc.)

This designation is followed by the location number. Monitoring wells will have "S" indicator for shallow overburden and "B" indicator for bedrock attached to the location number.

For example, a soil boring sample collected from 2-4 feet below ground surface from SB01 will be identified as G32-S-SB01-0204. The first groundwater sample (Round 1) collected from the bedrock well will be identified as G32-A-MW01B-01. The residue sample collected from a cleanout in the electroplating shop may be identified as G32-S-RSCO01.

Blind duplicate samples will be designated such that the location designation will be replaced with a chronological number:

Duplicates: G32-S-SD-DUP##

Field blanks will be designated such that they can clearly be identified as field blanks. The designation must be able to be referenced to the source (DIUF or HPLC water) using the field paperwork.

Field Blanks: G32-A-DIUF-FB##

Rinsate blanks will be identified using the code for the sample for which the tool was last used, the identifier (RB), and its chronological number.

Rinsate Blanks: G32-A-SB01-0204-RB##

Trip blanks will be designated so that they can clearly be identified as aqueous trip blanks using an identifier (TB) and its chronological number.

Trip Blanks: G32-A-TB##

Matrix spike samples are simply marked as such on the sample containers and on the chain-of-custody record.

4.4.2 Sample Chain of Custody

Custody of samples must be maintained and documented at all times. To ensure the integrity of a sample from collection through analysis, an accurate written record is necessary to trace the possession and handling of the sample. This documentation is referred to as the "chain of custody". Chain of custody begins when samples are collected in the field, and is maintained by storing the samples in secure areas until custody can be passed on. All samples will be accompanied by a chain-of-custody form that will describe the analytical parameters, and the persons who are responsible for their integrity.

Samples will be placed on ice and attended by B&R Environmental personnel or placed in locked vehicles or designated storage areas until analysis or shipment to an off-site laboratory. Chain-of-custody procedures are described in further detail in the SOPs presented in Appendix B.

4.5 CALIBRATION PROCEDURES

Field equipment normally requiring calibration will be calibrated and operated in accordance with the manufacturer's instructions and manuals. A log will be kept on site, documenting the periodic calibration results for each field instrument.

Calibration procedures for laboratory equipment used in the analysis of environmental samples will be performed in accordance with NFESC requirements and contract requirements under the Basic Ordering Agreements (BOA), i.e., CLP requirements for Level IV.

4.6 LABORATORY ANALYSIS

Samples collected will be analyzed for various parameters described in previous sections and Table 3-1 and 4-1.

The environmental samples collected for laboratory analysis during the field investigation will be analyzed by a laboratory previously approved by the Navy. Standard EPA analytical procedures will be employed, as depicted in Table 4-1. Validation of data equivalent to EPA Tier III Validation will be performed as is appropriate for data used to evaluate of risk under CERCLA, described in Section 2.6 of this Work Plan.

4.7 DATA REDUCTION, REVIEW, AND REPORTING

Laboratory analytical data will be reviewed by qualified B&R Environmental technical staff. Laboratory data will undergo a data validation equivalent to EPA Tier III validation. Data validation memoranda will be prepared and submitted to the project manager as a part of that activity. Data validation procedures are described in Section 4.11.

Field data will be periodically reviewed by technical lead personnel and the B&R Environmental PM to ensure that the data collected is well documented, clearly described, and meets a standard appropriate for the investigation and its ultimate use.

4.8 INTERNAL QUALITY CONTROL

Section 4.1.3 discussed the types and frequency of quality control samples that will be prepared during the field investigation activities for those samples that undergo laboratory analysis. The quantities of various types of QC samples are shown in Table 4-2. Laboratory analysis will follow the QC criteria described in the analytical procedures.

4.9 PERFORMANCE AND SYSTEM AUDITS

System audits will be performed as appropriate to ensure that the work is being implemented in accordance with the approved project SOPs and in an overall satisfactory manner.

- The FOL will supervise and on a daily basis check to ensure that the equipment is thoroughly decontaminated, samples are collected and handled properly, and the field work is accurately and neatly documented.

- The data reviewer(s) will review the data to ensure it was obtained through the approved methodology, and that the appropriate level of QC effort and reporting were conducted. The data validation effort will be supervised by the B&R Environmental CLEAN Quality Assurance Manager or designee.

- The PM will oversee the FOL and data reviewer, and check that management of the acquired data proceeds in an organized and expeditious manner.

4.10 PREVENTATIVE MAINTENANCE

B&R Environmental has established a field equipment maintenance program to ensure the availability of equipment in good working order when and where it is needed. This program consists of the following elements:

- The equipment manager maintains an inventory of the equipment by model and serial number, quantity, and condition. Each item of equipment is signed out when in use, and its operating condition and cleanliness is checked upon return.

- The equipment manager conducts routine checks on the status of equipment and is responsible for stocking spare parts and equipment readiness.

- The equipment manager maintains the equipment manual library and trains field personnel in the proper use and care of equipment.

- The FOL is responsible for working with the equipment manager to ensure that the equipment is tested, cleaned, charged, and calibrated in accordance with the manufacturer's instructions before being taken to the job site.

- While the equipment is in the field, the FOL takes responsibility for the equipment, maintains calibration records, and performs maintenance operations and checks.

4.11 DATA ASSESSMENT PROCEDURES

The following paragraphs describe the procedures used to evaluate data prior to inclusion and description in the deliverable reports described elsewhere in this Work Plan.

4.11.1 Representativeness, Accuracy, and Precision

All laboratory data generated in the investigation will be assessed for representativeness, accuracy, and precision, as described in Section 4.1. The completeness of the data will also be assessed by comparing the acquired data to the project objectives to see that these objectives are being addressed and met. The specific information used to determine data precision, accuracy, and completeness will be provided in the laboratory data packages.

The PARCC parameter assessment will be conducted by qualified B&R Environmental personnel. The representativeness of the data will be assessed by determining if the data are consistent with known or anticipated chemical conditions and accepted principles.

Field measurements will be checked for completeness of procedures and documentation of procedures and results.

Precision and accuracy will be determined using replicate samples, and blank and spiked samples, respectively. PARCC parameters are addressed in more detail in Section 4.1.

4.11.2 Data Validation

Samples will be analyzed for parameters described on Table 4-1. Results will be validated using a Tier III validation protocol as specified in the "National Functional Guidelines for Organic/Inorganic Data Review" (U.S. EPA December 1990, revised February 1994 [organic] and February 1993 [inorganic]). Use of these validation protocols is allowed under the NFESC (formerly NEESA) guidelines and is described in the Navy Installation Restoration Laboratory Quality Assurance Guide, Interim Document (revised February 1996), and the NEESA 20.2047B; June 1988 guidelines.

This level of validation is appropriate for data used to evaluate risk under CERCLA, as described in Section 2.6.

4.11.3 Data Evaluation

The evaluation of the data collected during the field investigation will include analysis of chemical concentrations in samples collected from the field. Further evaluation of the data will be performed in conjunction with the preparation of the RI report.

4.12 CORRECTIVE ACTION

The QA program will enable problems to be identified, controlled, and corrected. Potential problems may involve non-conformance with the SOPs and/or analytical procedures established for the project, or other unforeseen difficulties. Any person identifying an unacceptable condition will notify the FOL and the PM. The PM, with the assistance of the Quality Assurance Manager and the project QA/QC officer, will be responsible for developing and initiating appropriate corrective action and verifying that the corrective action has been effective.

Corrective actions may include re-sampling and/or re-analysis of samples or modifying project procedures. If warranted by the severity of the problem (for example, if a change in the approved Work Plan is required), the Navy will be notified in writing and their approval will be obtained prior to implementing any change. Additional work that is dependent on a nonconforming activity will not be performed until the source of the problem has been addressed.

4.13 QUALITY ASSURANCE REPORTS/DOCUMENTS

A bound/weatherproof field logbook will be maintained by the FOL. The FOL or designee will record all information related to sampling or field activities. This information may include sampling time, weather conditions, unusual events, field measurements, description of photographs, etc. The site logbook maintained by the FOL will contain a summary of the day's activities and will reference the other field logbooks when applicable.

At the completion of field activities, the FOL will submit to the PM all field records, data, field notebooks, logbooks, chain-of-custody receipts, sample log sheets, etc., as presented in Appendix C. The PM will ensure that these materials are entered into the project file.

5.0 REPORTING

Following the completion of the field sampling and analytical work described in Section 3, the results will be described in the form of a Site Assessment Screening Evaluation (SASE) report. The SASE report will contain seven major sections to reflect the general outline of a Remedial Investigation report. This outline has been selected because much of the data collected during the SASE will be used to help support a future remedial investigation report and a baseline human health risk assessment.

5.1 BACKGROUND AND FINDINGS OF THE INVESTIGATIONS

Section 1.0 of the SASE report will describe the history of the site and the purpose of the report. The site background sections will include information from the previous studies conducted at Building 32. Additional background information discovered during this investigation and activities at the site since the publication of the previous investigations will be described in detail and incorporated into the site background section.

Section 2.0 will describe the site investigations that are the focus of this Work Plan. Specifically, this section will be based on Section 3.0 of the Work Plan and on the modifications of the field work, if any are made, during the period of activity.

Section 3.0 will describe the physical characteristics of the study area as they exist at the time of the investigation. This description will address the major surface features (buildings, pipelines, roadways, fences, etc). The subsurface features, including the geology, hydrogeology, soil textures, soil depths, and discharge pipelines, will be described as determined by field work explorations. The cultural and ecological settings of the site will be summarized in this section with an expanded, and more detailed ecological characterization presented in Section 7.0. Offshore features, including discharge outfall locations and bottom sediment descriptions in the study area, will be characterized. Figures will be prepared depicting aerial and/or cross sectional views of site features including geology, maximum and minimum water table elevations, depth to bedrock, ecological setting, and sample locations.

Section 4.0 report will describe the contaminants found. This section will be based on Section 3.0 of the Work Plan. Potential source areas have already been identified in previous studies, and the field work is designed around these findings. During the field work, additional source areas may be identified or some of those originally targeted may be eliminated. All the chemical analytical data generated from the field work will be presented in this section. Preliminary identification of primary site contaminants will be made.

Due to the industrialized nature of the surrounding properties, other contaminants may be found that are not necessarily a direct effect of plating operations. Therefore, the contaminant group detected in the source areas (within the discharge pipe and under the electroplating shop floor slab) will be identified as primary site contaminants. Risk-based selections of COPCs and COPECs will be performed separately, as discussed in later sections.

"Background" contaminant concentrations will be determined by sample collection and analysis. An upgradient sample of surface soil and groundwater (if available) will be collected from the boring/well location described in Section 3.5.

Summary tables will be included in Section 4.0 of the SASE report for all of the matrices sampled. In these tables, the contaminant concentrations that exceed background concentrations, regulatory standards, and/or risk based criteria will be identified, as appropriate.

Pertinent information such as contaminant concentrations and sample locations will be included in Section 4.0 figures.

Section 5.0 will describe the expected transport mechanisms available to the primary site contaminants. The focus of the discussion will center around the discharge and leachability of metal contamination and degreasing associated with the operations at Building 32. The direct discharge of the contaminants through the drainage system, as well as the possibility of transport of these contaminants to groundwater (from leaks, discharges, or spills) and subsequently into off-shore waters and sediments will be discussed. An evaluation of the contaminants' propensity to bioaccumulate, their persistence, and mobility, will be included. In addition, other relevant contaminant migration pathways identified for organic compounds will be discussed if they are identified.

Section 5.0 will also describe the persistence of the contaminants after release to the environment.

5.2 HUMAN HEALTH RISK ASSESSMENT

Section 6.0 of the RI report will consist of a preliminary human health risk assessment. This assessment will provide a data evaluation, a toxicity assessment, an exposure assessment, and a risk characterization.

The chemicals detected at the site will be grouped by applicable (to potential receptors) media. All media sampled will be screened in the human health risk assessment. However, for instance, subsurface soils may not be screened for recreational trespassers, and off-shore sediments may not be screened for industrial workers as the exposure scenarios limit expected interaction with these media. Statistical analysis will be performed on the data to determine representative concentrations. A risk-based selection of COPCs will be made based on comparing them to risk-based criteria (RBC). Applicable RBCs will include EPA Region III industrial RBCs (EPA, 1997a) and/or any designated Region I industrial RBCs, and applicable state industrial RBCs for media sampled at the site. The RBCs will be set at a level of 1E-06 for carcinogens and 0.1 for noncarcinogens. A chemical will be eliminated as a COPC for the site if the representative concentration for the chemical is less than applicable screening criteria. Chemicals that lack toxicity values will be evaluated qualitatively in the risk assessment. A qualitative evaluation will include a discussion of the presence of the chemical at the specific sample stations where it was detected, a discussion of the toxicity of similar chemicals found at these stations or elsewhere at the site (if applicable) and an opinion of the impact of this chemical on the risk assessment results (i.e. will the omission of this chemical from the risk assessment be significant or not).

Chemicals that are breakdown products of selected COPCs or chemicals that are in the same family as selected COPCs (carcinogenic PAHs) will also be included as COPCs. The final list of COPCs will be evaluated in the following sections.

The Toxicity Assessment will present available reference doses (RFDs), cancer slope factors (SFs), EPA weights of evidence, response parameter adjustments, and any other relevant information pertaining to COPCs selected in Data Evaluation. Quantitative toxicity indices, where available, will be presented in this section (EPA, 1995 and 1997b). Additionally, a toxicological profile will be developed for each COPC.

An exposure assessment will be prepared to identify potential exposures to receptors. Exposure scenarios will be used for the recreational and trespassing receptors using basic scenarios. Current and future exposures will be evaluated using these scenarios.

- Current Trespasser (adolescent and adult) - A trespasser is an adult or adolescent assumed to trespass at the site at a stated frequency in days per year. Typically 45 days per year is used, although at this site, fewer days are likely to be more realistic, considering the remoteness of the island and the restricted nature of the site. Trespassing receptors can possibly be exposed to COPCs in surface soil through dermal contact and inhalation of fugitive dust and to COPCs in sediment only through dermal contact.

- Future Recreational receptor - The recreational receptor can be an adult, child, or adolescent using the site for passive recreation, including walking, hiking, picnicking, hunting, or fishing. Recreational exposures are based on a given frequency of visitation in days per year. For a remote location such as this, a low frequency such as 7 days per year is appropriate. Recreational exposures can occur through ingestion, dermal contact, and inhalation of COPCs in surface soil and sediment.

- Future Industrial Worker - The industrial worker will be an adult, working at the site for a period of 10 years at a frequency of 246 days per year. This person can have limited contact with surface soil only.

- Future Construction Worker - The construction worker receptor will be an adult, working at the site for a limited period of time (one year) on a frequency of 130 days per year (one half of the available working time in a year). This receptor can be exposed to surface soil, subsurface soil and (if it is available) groundwater through ingestion, dermal contact, and inhalation of COPCs.

Risk Characterization will present the approaches and results of the estimation of carcinogenic and noncarcinogenic risks. The risk characterization will evaluate the potential for adverse health effects from exposure to COPC concentrations in site media by integrating information developed during the toxicity and exposure assessments. Applicable receptor risks will be presented in a tabular format, with accompanying text to interpret the results of the estimation of risks from selected COPCs.

The risk assessment will be prepared in accordance with current U.S. EPA guidance. This guidance is contained in various documents that include, but are not limited to, the following:

- "Risk-Based Concentration Table, March 1997," Region III EPA, 1997a.

- "Integrated Risk Information System (IRIS)," Computer Database, EPA, Washington, D.C., 1997b.

- Health Effects Assessment Summary Tables (HEAST), Annual Update FY 1995, EPA 540-R-95-036, prepared by the Office of Health and Environmental Assessment for the Office of Solid Waste and Emergency Response and the Office of Water, Washington, D.C.

- Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). December 1989. EPA/540/1-89/002.

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- Exposure Factors Handbook. May 1989. EPS/600/8-89/043.

- Development of Statistical Distributions or Ranges of Standard Factors Used in Exposure Assessments. August 1985. EPA/600/4-41/041.

- Superfund Exposure Assessment Manual. April 1988. EPA/540/1-88/001.

- Dermal Exposure Assessment: Principles and Applications. January 1992. EPA/600/8-91/011B.

- Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual - Supplemental Guidance - "Dermal Risk Assessment". August 18, 1992.

- Draft Soil Screening Level Guidance. September 1993.

- Region I Supplemental Risk Assessment Guidance for the Superfund Program. June 1989.

5.3 ECOLOGICAL ASSESSMENT

The approach for the screening ecological assessment will follow the U.S. EPA guidance document Ecological Risk Assessment Guidance for SUPERFUND, Process for Designing and Conducting Ecological Risk Assessments, Interim Final, dated June 7, 1997. The following summarizes the approach to be employed.

The screening assessment will include a problem formulation, a toxicity evaluation, an exposure estimate, and a risk calculation. Screening-level risk assessments are simplified risk assessments that can be conducted with limited data by assuming values for parameters for which data are lacking. At this level, a biased approach in the direction of overestimating risk will be taken to ensure sites that might pose an ecological risk are studied further.

The screening ecological risk assessment will utilize a two-step process. The first step in the assessment includes the screening-level problem formulation and ecological effects evaluation. The second step in the screening ecological risk assessment includes the screening-level exposure estimate and risk calculation and these are the last two phases of the screening risk assessment.

STEP 1: Screening-Level Problem Formulation and Ecological Effects Evaluation

Screening-Level Problem Formulation - A conceptual model for the site will be developed that addresses five issues: the environmental setting and contaminants at the site; contaminant fate and transport mechanisms; the mechanisms of ecotoxicity and potential receptors; complete exposure pathway evaluation; and selection of endpoints to screen for ecological risk. A thorough compilation and evaluation of the environmental setting, chemical contamination onsite, contaminant pathways will be performed. The environmental checklist presented in *Representative Sampling Guidance Document, Volume 3: Ecological* (U.S. EPA, 1997; Appendix B) will be used and a site visit will be conducted as described in Section 3.3.2 of this Work Plan. Complete potential exposure pathways will be identified for all organisms where contaminants can travel from the source to ecological receptors and could be taken up via one or more exposure routes.

As described in Section 2.0 of this Work Plan, the site is an abandoned industrial facility. During an initial site walkover, a shrub/scrub habitat with opportunistic vegetation was observed encroaching on the deteriorating building and concrete surfaces. Similarly opportunistic animal species, such as gulls, pigeons, and rodents, are suspected to use the site for feeding and nesting. However, a detailed ecological characterization of the site will be conducted, as described in Section 3.0 of this Work Plan, which will serve to identify the potential ecological receptors associated with the site. If such receptors exist or are potentially present at the site and/or the surrounding area, the ecological assessment will ascertain if viable exposure scenarios exist by which site-related contaminants may pose a risk to ecological receptors.

Screening-Level Ecological Effects Evaluation - A preliminary ecological effects evaluation and the establishment of contaminant exposure levels that represent conservative thresholds for adverse ecological effects will be performed. The conservative thresholds, also called screening ecotoxicity values, will be developed for each complete exposure pathway and contaminant. The screening ecotoxicity values represent a no-observed-adverse-effect-level (NOAEL) for chronic exposures to a contaminant, or in their absence, a lowest-observed-adverse-effect-level (LOAEL) value or other applicable published values will be used. The LOAEL value, when used, will be multiplied by a factor of 0.1. Literature resources will be limited to the use of primary reference sources only. An evaluation of any uncertainties and limitations regarding the use of extrapolations and professional judgment, will be presented prior to the screening-level risk calculation.

Information to be considered for the ecological assessment of the on-shore environment associated with the site will include, but not be limited to, the following: on-shore ecological characterization of the site (see Section 3.0 of this Work Plan); analytical data for surface soils (depth range: 0-1 feet) and marine sediments (depth range 0-12 inches); literature review of detected site-related contaminants (fate, transport, and ecotoxicological characteristics) and identification of available ecological screening benchmarks; and literature review of potential ecological receptors (habitats, natural history, and distribution). Screening benchmarks for soil will be selected from appropriate literature review sources (e.g. for water pathways - ambient water quality criteria (AWQC); for sediment pathways - EPA criteria and National Oceanic and Atmospheric Administration (NOAA) values; and for soil pathways - the EPA Ecotoxicity Database, the Oak Ridge National Laboratory toxicology benchmark documents, and US FWS synoptic review documents by Eisler), and will be used only if supporting primary references are identified in such sources. Site-related contaminants for which appropriate screening benchmarks cannot be identified will still be discussed qualitatively in the ecological assessment.

STEP 2: Screening-Level Exposure Estimate and Risk Calculation

The risk will be estimated by comparing maximum documented exposure concentrations with the ecotoxicity screening values from Step 1. At the conclusion of Step 2, the exposure pathways and preliminary contaminants of concern will have been identified and could be used for performing a baseline risk assessment.

Screening-Level Exposure Estimates - On-site contamination levels and general information on the types of biological receptors that might be exposed will be used to estimate exposures for the screening-level ecological risk calculation. The parameters that will be used to estimate exposures include: area-use factor, bioavailability, life stage, body weight and food ingestion rates, bioaccumulation, and dietary composition. Parameters where site-specific information is lacking or difficult to develop, conservative assumptions supported by published values or other literature will be used. For estimated exposures, an uncertainty assessment will be determined using professional judgment and stated where applicable.

Screening-Level Risk Calculation - *A screening-level risk will be determined using the exposure* estimates and the screening ecotoxicity values developed as part of the previous steps. The hazard quotient (HQ) approach, which compares point estimates of screening ecotoxicity values and exposure values risk calculation, will be used to estimate risk. Therefore, for each contaminant and environmental medium, the HQ will be expressed as the ratio of a potential exposure level to the NOAEL. A HQ of less than one (unity) indicates that the contaminant alone is unlikely to cause adverse ecological effects. If multiple contaminants of potential ecological concern exist at the site, the HQ will be summed for receptors that could be simultaneously exposed to the contaminants that produce effects by the same toxic mechanism. The sum of the HQ is called a hazard index (HI) and an HI of less than one indicates that the group of contaminants is unlikely to cause adverse ecological effects.

As discussed earlier in this section, the screening-level risk calculation is a conservative estimate to ensure that potential ecological threats are not overlooked. At the end of Step 2, one of the following three possible decisions will be made:

1) There is adequate information to conclude that ecological risks are negligible and therefore no need for remediation on the basis of ecological risk;

2) The information is not adequate to make a decision at this point, and the ecological risk assessment process will continue to the next step (Step 3); or

3) The information indicates a potential for adverse ecological effects, and a more thorough assessment is warranted.

This screening-level risk calculation does not support setting a preliminary cleanup goal as it would not be technically defensible. However, contaminants and exposure pathways can be eliminated where results indicate they are unlikely to pose a substantive risk. In summary, at the conclusion of this screening ecological risk assessment, the following information will be compiled:

1) Exposure estimates based on conservative assumptions and maximum concentrations documented; and

2) Hazard quotients (or hazard indices) indicating which, if any, contaminants and exposure pathways might pose ecological threats.

The screening ecological risk assessment would be complete at this step if there are sufficient data to determine that ecological threats are negligible.

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Photograph No. 8
March 3, 1998
Gould Island, Building 32
Suspected location of OF-03, at eroded seawall

Photograph No. 9
March 3, 1998
Gould Island, Building 32 (west)
Suspected location of OF-04 at seawall

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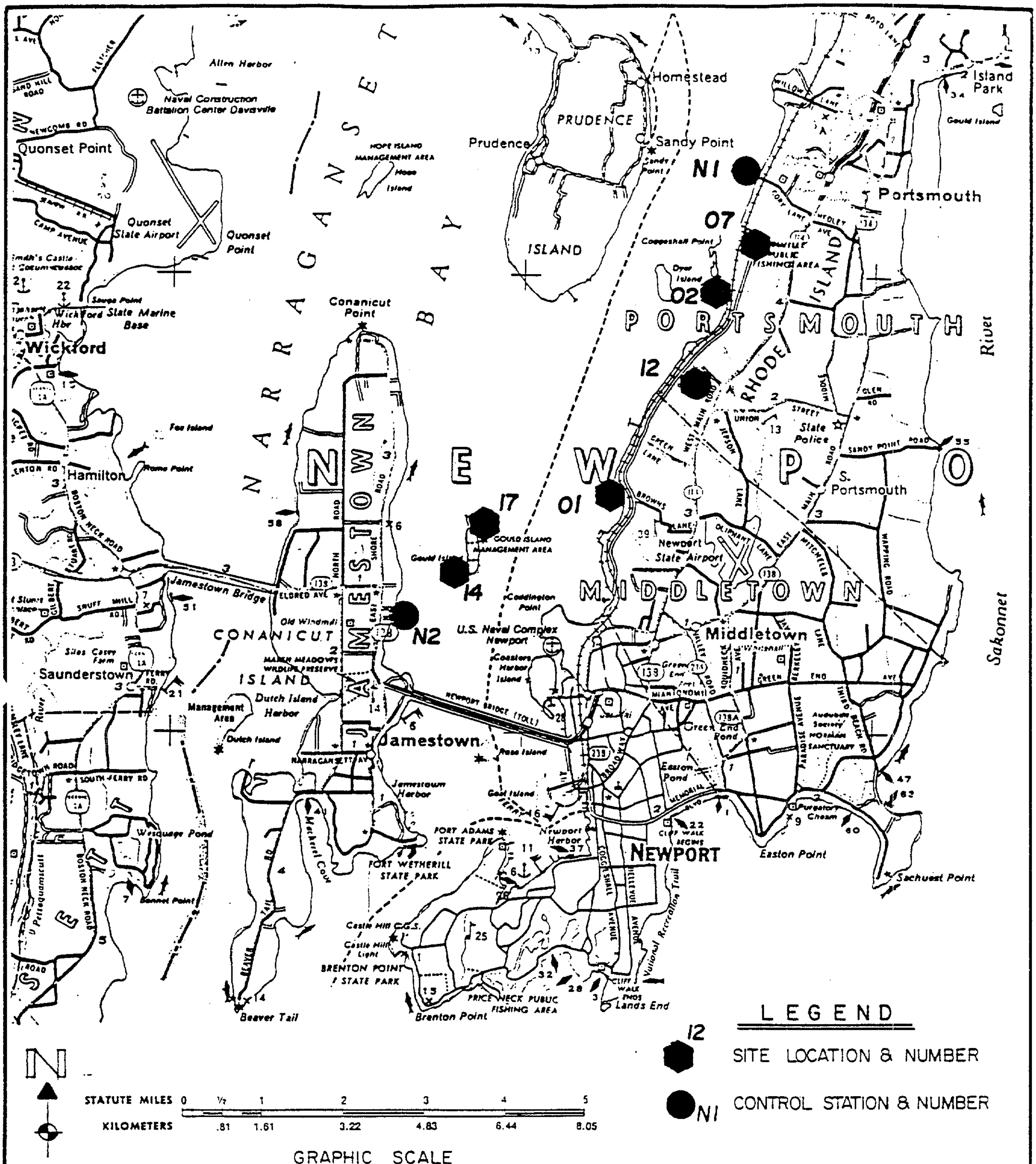
Photo No. 10
March 3, 1998
Gould Island, Building 32
Location of former out-fall OF-06 (note detiorated sheetpiling wall)

Photo No. 11
March 3, 1998
Gould Island, Building 32
Suspected former locations of OF-01 and OF-02

Photo No. 12
March 3, 1998
Gould Island, Building 32
Interior of central portion of overhaul shop

Photo No. 13
March 3, 1998
Gould Island, Building 32
Sub-floor tank in overhaul shop



CONFIRMATION STUDY ON HAZARDOUS WASTE SITES NEWPORT NAVAL EDUCATION & TRAINING CENTER	VERIFICATION STEP SITES INVESTIGATED & CONTROL SAMPLING STATIONS	
YWC York Wastewater Consultants, Inc. Stamford, Connecticut	LEA LOUREIRO ENGINEERING ASSOCIATES a professional corporation CONSULTING ENGINEERS AVON, CT.	FEB. 28, 1984 FIG. NO. 2

John L. Chumetski, P.E.
Donald W. Sanderson, R.A.
Willard G. Kresge, P.E.
Lee W. Eckert, P.E
James P. Palumbo, P.E.
Eugene M. Ogozalek, R.A.

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Quad Three Group
Incorporated

SITE INVESTIGATION REPORT (GROUNDWATER INVESTIGATION)

NAVAL EDUCATION AND TRAINING CENTER

BUILDING 44 - GOULD ISLAND

NEWPORT, RHODE ISLAND

Q3G PROJECT NO. 5496.95

PREPARED FOR: NAVAL EDUCATION TRAINING CENTER
NEWPORT, RHODE ISLAND

PREPARED BY: QUAD THREE GROUP, INC.
37 NORTH WASHINGTON STREET
WILKES-BARRE, PA 18701
TELEPHONE (717) 829-4200

DATE: MAY 19, 1995

Architects• Engineers• Environmental Scientists
37 North Washington Street, Wilkes-Barre, PA 18701
717-829-4200 • FAX 717-829-0302

HAZLETON PITTSBURGH WILKES-BARRE

Q3G

TABLE 1

NETC - BUILDING 44 - GOULD ISLAND
SOIL BORING SAMPLE RESULTS
(PARTS PER MILLION - PPM)

SAMPLE LOCATION	TPH-DRO
SB 1 (10'-12')	**2,200**
SB2 (18'-20')	ND
SB3 (18'-20')	ND
SB4 (10'-12')	**260**
SB5 (10'-12')	**46**
SB6 (15'-17')	ND
SB7 (15'-17')	ND
SB8 (15'-17')	**23**
SB9 (10'-12')	**560**

TPH-DRO = Total Petroleum Hydrocarbons - Diesel Range Organics
ND = Not Detected

Based on the soil boring sample results presented in Table 1, TPH-DRO concentrations were detected in five (5) out of nine (9) soil samples above the laboratory reporting limit of 20 ppm. Specifically, TPH-DRO concentrations were detected in the following soil boring samples: SB1 (10'-12') at 2,200 ppm; SB4 (10'-12') at 260 ppm; SB5 (10'-12') at 46 ppm; SB8 (15'-17') at 23 ppm and SB9 (10'-12') at 560 ppm. Based on this information, it appears the highest TPH-DRO concentrations are located at the 10 to 12 foot sample depth (assumed base of 20,000 gallon USTs), and significantly decrease with depth. With the exception of soil boring sample SB8 (15'-17'), no TPH-DRO concentrations were detected below the 12 foot sample interval.

4.2 GROUNDWATER SAMPLE RESULTS

Table 2, presented below, summarizes the groundwater quality analytical results of the three (3) samples collected from the three (3) monitoring wells on April 26, 1995 and May 3, 1995. The groundwater samples were collected in accordance with the specifications previously described in this text. Laboratory analytical reports are presented in Appendix 4.

Q3G

TABLE 2
NETC - BUILDING 44 - GOULD ISLAND
GROUNDWATER SAMPLE RESULTS
(PARTS PER MILLION - PPM)

MONITORING WELL	TPH-DRO
MW1	35.7*
MW2	3.1*
MW3	1.9*

TPH-DRO - Total Petroleum Hydrocarbons - Diesel Range Organics
ND = Not Detected
*TPH-Fingerprint analysis conducted on the three (3) samples identified degraded No. 2 fuel oil in each sample.

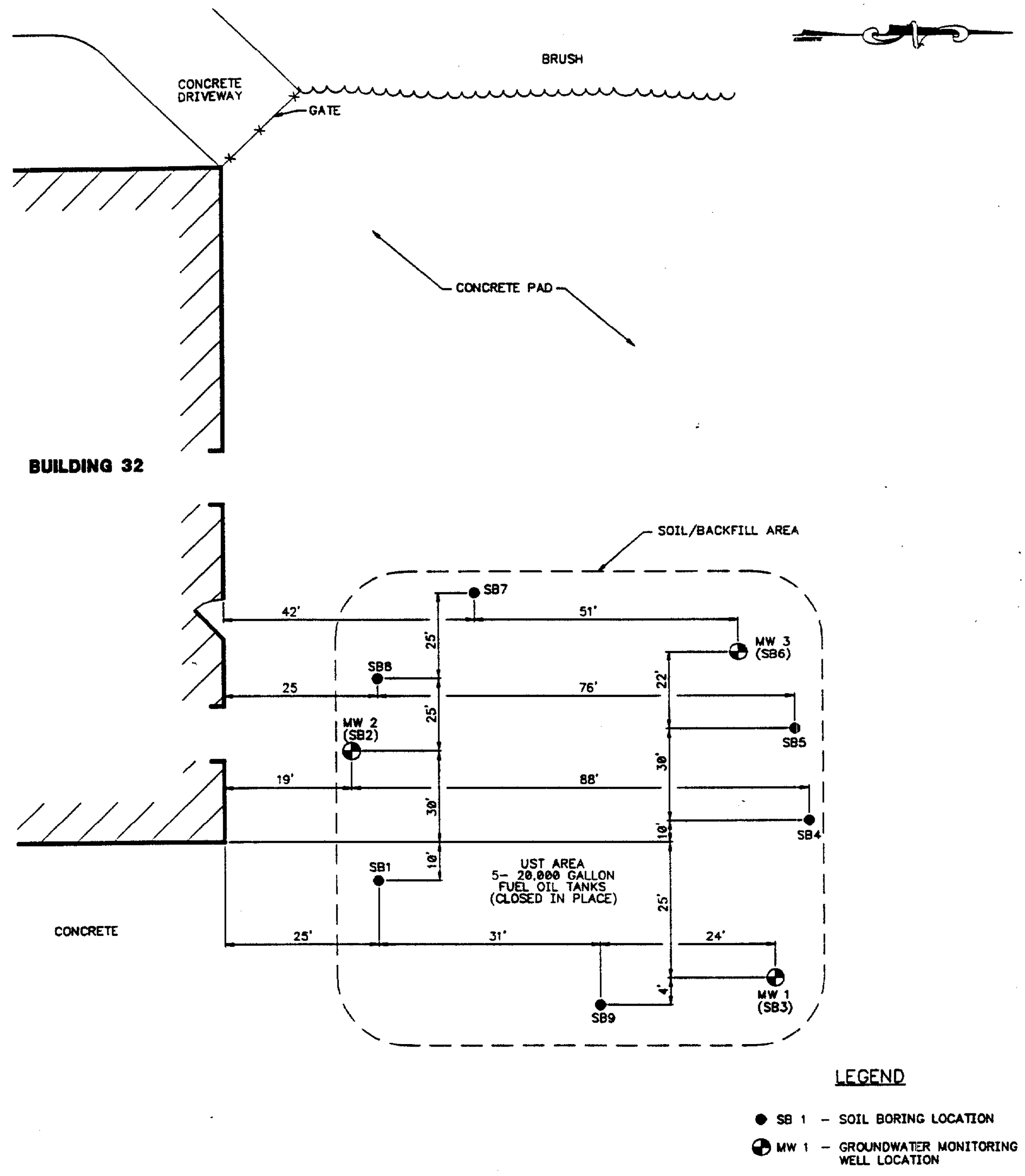
Based on the groundwater laboratory data presented in Table 3, degraded No. 2 fuel oil was identified in each monitoring well ranging from 1.9 parts per million (ppm) to 35.7 ppm.

5.0 CONCLUSIONS AND RECOMMENDATIONS

A technical evaluation and interpretation of existing site conditions through the installation of nine (9) soil borings, three (3) groundwater monitoring wells and laboratory analysis provide the basis for the following comments:

CONCLUSIONS

- The surficial material encountered in the area of former Building 44 consists of 10-12 feet of fill material (i.e. sand, silt, gravel and cobbles), underlain by sand and trace clay.
- Groundwater exists in the study area approximately 6 feet below grade.
- Due to the study area being located on an island situated in Narragansett Bay, the newly installed monitoring wells were not surveyed. As such, groundwater flow direction is anticipated to be radial in the study area.



SITE SKETCH/BORING LOCATION SKETCH

5496C159

Q3G Quad Three Group Incorporated 37 N. Washington Street Wilkes-Barre, Pa. 18701	NAVAL EDUCATION AND TRAINING CENTER BUILDING 44–GOULD ISLAND NEWPORT, RHODE ISLAND	Date: APRIL, 1995 Drawn By: R.B.M. Scale: NONE Project No. 5496.95 **FIG. 2**

Q3G

SUPPLEMENTAL SITE INVESTIGATION

NAVAL EDUCATION AND TRAINING CENTER

BUILDING 44 - GOULD ISLAND

NEWPORT, RHODE ISLAND

Q3G PROJECT NO. 5782.08

PREPARED FOR: NAVAL EDUCATION TRAINING CENTER
NEWPORT, RHODE ISLAND

PREPARED BY: QUAD THREE GROUP, INC.
37 NORTH WASHINGTON STREET
WILKES-BARRE, PA 18701
TELEPHONE (717) 829-4200

DATE: JANUARY, 1997

5.2 SOIL QUALITY SAMPLE RESULTS

On September 19 and 20, 1996 and October 3, 1996 a total of seven (7) soil samples were randomly obtained from within the grid area established in the vicinity of former Building 44 for analytical quantification. Tables 2, 3 and 4 presented below summarize the soil quality analytical results. The soil sample numbers correspond to the Gore-Sorber soil gas module locations presented on Figures 2 through 6. Soil quality laboratory data for the seven (7) soil samples are presented in Appendix 4.

TABLE 2

SOIL QUALITY SAMPLE RESULTS
VOLATILE AND SEMI VOLATILE ORGANIC ANALYSIS
(PARTS PER BILLION - PPB)

SAMPLE NO.	127409	127430	127440	127450	127459	127464	127466
Compound							
Methyl t-butyl ether	ND	ND	19.7	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND
cis-1,2,Dichloroethane	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	14.8	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	44.6	ND	ND	ND	ND
Octane	ND	ND	ND	ND	ND	ND	36.8
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	16.2	ND	7.06	5.55	4.62	ND
m, p -Xylene	ND	17.0	113	7.73	6.12	ND	ND

	127409	127430	127440	127450	127459	127464	127466
o-Xylene	ND	8.77	54.9	3.93	3.24	ND	ND
1,3,5-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND
Undecane	ND	ND	ND	ND	ND	ND	94.6
Naphthalene	ND	ND	12.2	2.60	ND	2.85	ND
Tridecane	ND	ND	ND	ND	ND	ND	167
2-Methyl naphthalene	ND	ND	ND	ND	ND	ND	ND
Pentadecane	ND	ND	ND	ND	ND	ND	366
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND	ND	ND	ND

ND = Not detected above the laboratory report limit

Based upon the soil quality results presented above, small concentrations of Methyl t-butyl ether (MTBE), BTEX, Octane, Undecane, Tridecane, Pentadecane and Naphthalene were identified in several of the soil boring samples obtained from the study area. However, based on the soil concentrations identified in Table 2, the levels do not warrant action at this time.

As discussed previously, the Gore-Sorber modules are designed to adsorb vapor gases released from the surrounding soils and groundwater. As such, by comparing the Gore-Sorber sample results (Appendix 3) with the soil quality results presented in Table 2, other than sample location 127466, there is no direct correlation (i.e. similarities) between the two (2) sample media (i.e. soil vs. vapor gas). Therefore, the source of contaminants identified by the Gore-Sorber soil gas survey modules appears to be associated with impacted groundwater. Groundwater had been previously measured to exist approximately 6 feet below grade in the study area.

TABLE 3

SOIL QUALITY SAMPLE RESULTS
RCRA METALS
(Parts Per Million - PPM)

SAMPLE NO.	127409	127430	127440	127450	127459	127464	127466
Compound							
Arsenic	ND	ND	ND	ND	ND	ND	ND
Barium	ND	ND	ND	ND	ND	ND	ND
Cadmium	ND	ND	ND	ND	ND	ND	3.4
Chromium	35.3	171	71	158	163	134	46.9
Lead	ND	ND	30	93	63	30	ND
Mercury	ND	ND	ND	ND	ND	ND	ND
Selenium	ND	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND	ND

Based on the soil quality sample results presented above, Chromium was identified in each soil sample. Elevated Chromium levels (i.e. above 100 ppm) were identified in soil boring locations 127430, 127450, 127459, and 127464. Additionally, an elevated concentration of Cadmium (i.e. above 2 ppm) was identified in soil boring 127466. Lead was identified in four (4) of the seven (7) soil boring samples. However, the lead concentrations are well within acceptable ranges.

Based on the historical storage of petroleum related substances in the USTs formerly located in the study area, it is likely the Cadmium and Chromium had originated from another source(s) other than the USTs, possibly from former electroplating shop activities.

immediately on ice in sample coolers. On October 7, 1996, the sample coolers were shipped to Gore's Laboratory, located in Elkton, Maryland by overnight carrier for analytical quantification of the chemical parameters presented below in Table 1.

TABLE 1
GORE-SORBER SOIL SURVEY
ANALYTICAL PARAMETERS

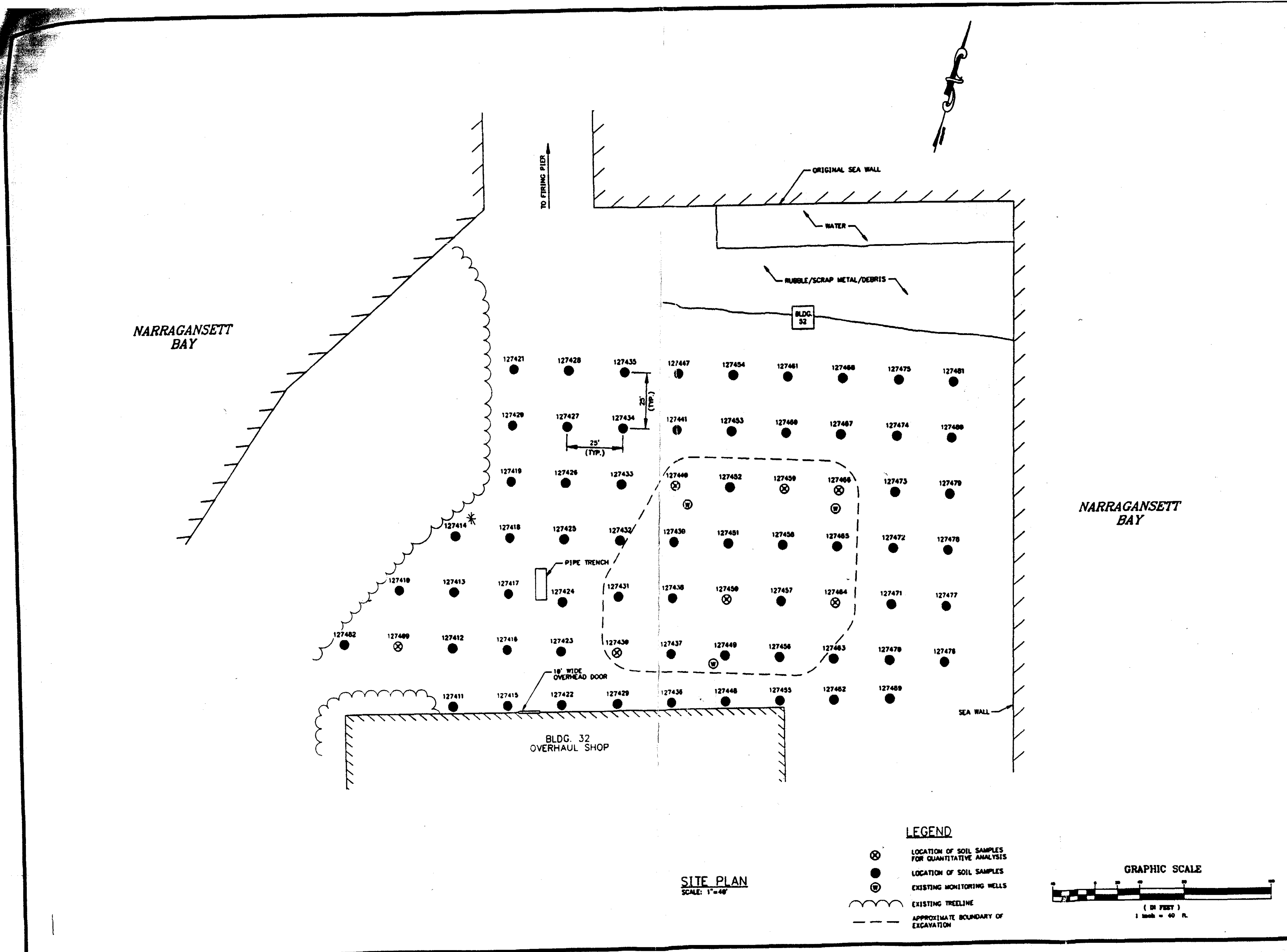
Methyl t-butyl ether	1,2-Dichloroethane	o-Xylene	Pentadecane
trans-1,2-Dichloroethene	Trichloroethene	1,3,5-Trimethylbenzene	Acenaphthylene
1,1-Dichloroethane	Toluene	1,2,4-Trimethylbenzene	Acenaphthene
cis-1,2-Dichloroethane	Octane	1,4-Dichlorobenzene	Fluourene
Chloroform	Tetrachloroethene	Undecane	Phenanthrene
1,1,1-Trichloroethane	Chlorobenzene	Naphthalene	Anthracene
Benzene	Ethylbenzene	Tridecane	Fluoranthene
Carbon tetrachloride	m,p-Xylene	2-Methyl naphthalene	Pyrene

A Chain of Custody Form was completed and accompanied each set of samples to Gore's Laboratory to provide documentation of overnight delivery, identify the samples designated for each analysis and comply with standard QA/QC protocol. The Gore Sorber Soil Gas Screening Survey results are reviewed in Section 5.0 - RESULTS OF INVESTIGATION.

4.2 SOIL QUALITY SAMPLING

On September 19 and 20, 1996 and October 3, 1996, a total of seven (7) soil samples were randomly obtained from within the grid area of former Building 44 and analyzed for the same chemical parameters presented in Table 1, as well as RCRA Metals and Petroleum Hydrocarbons. Obtained with a stainless steel hand auger, each soil boring sample was collected approximately 2.5 - 3.0 feet below grade.

The approximate location of each soil boring sample is shown on Figure 2 - Gore Sorber / Soil Survey Boring Plan (See Appendix 2). The soil quality sample results are reviewed in Section 5.0 - RESULTS OF INVESTIGATION.



QUAD THREE GROUP, INC. architects engineers environmental scientists 37 north washington street wilkes-barre, pa. 18701 717-829-4200

SOIL SAMPLE LOCATION PLAN

GORE SORBER SOIL SURVEY BORING PLAN

FIG. 2

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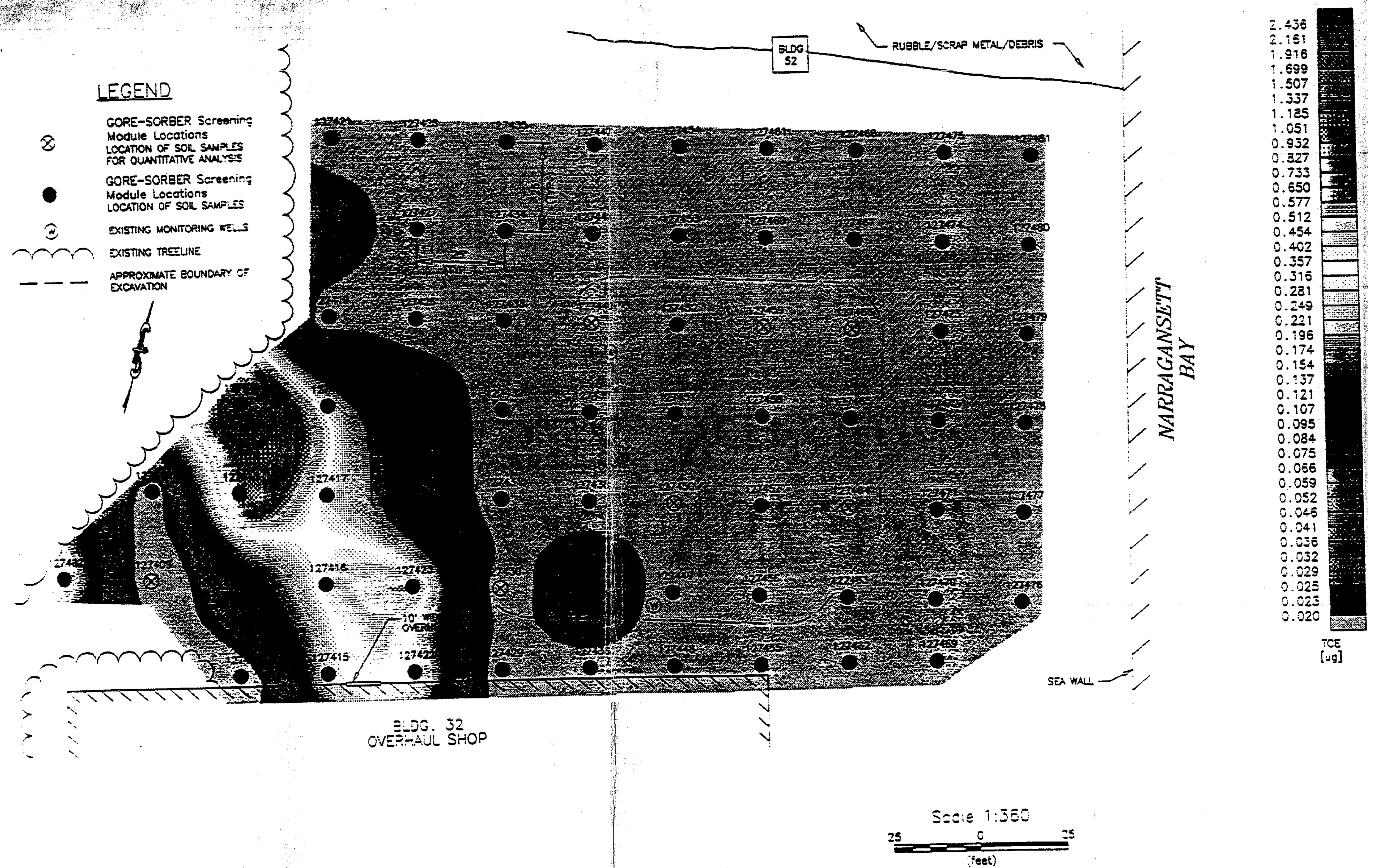
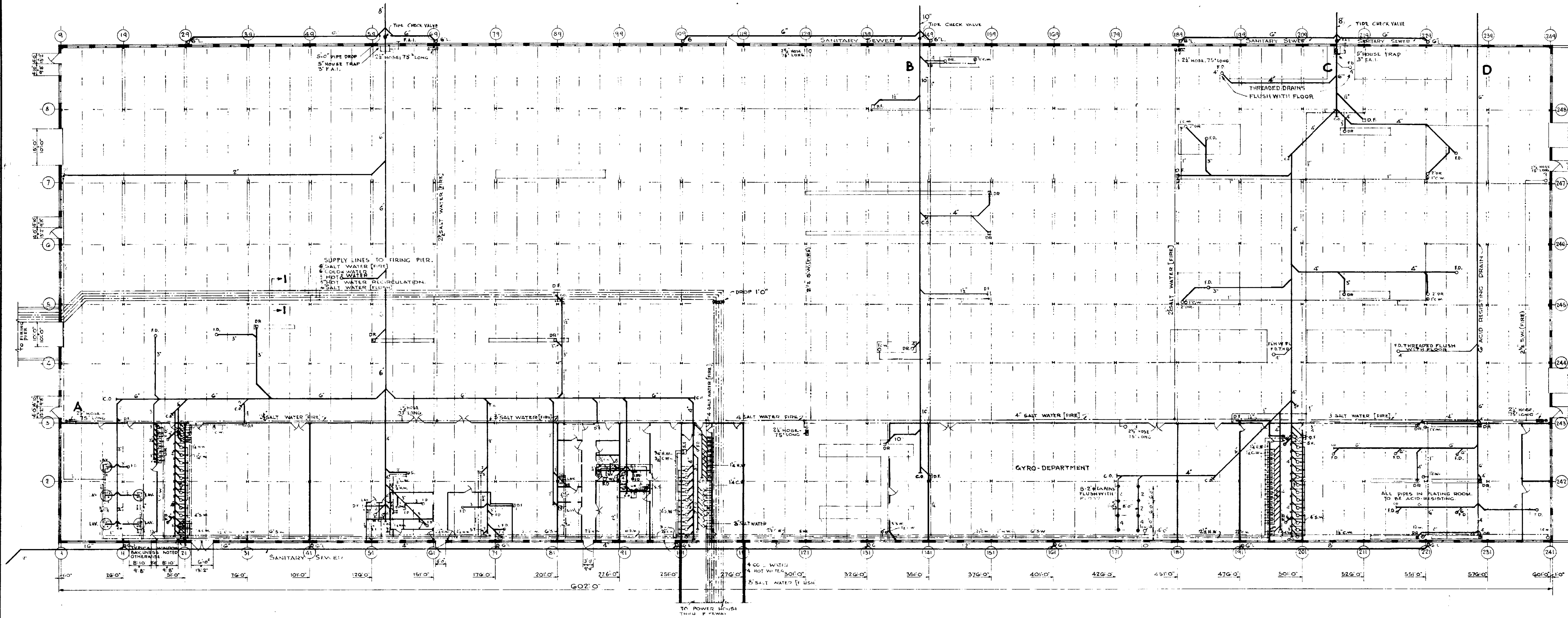
TRICHLOROETHENE

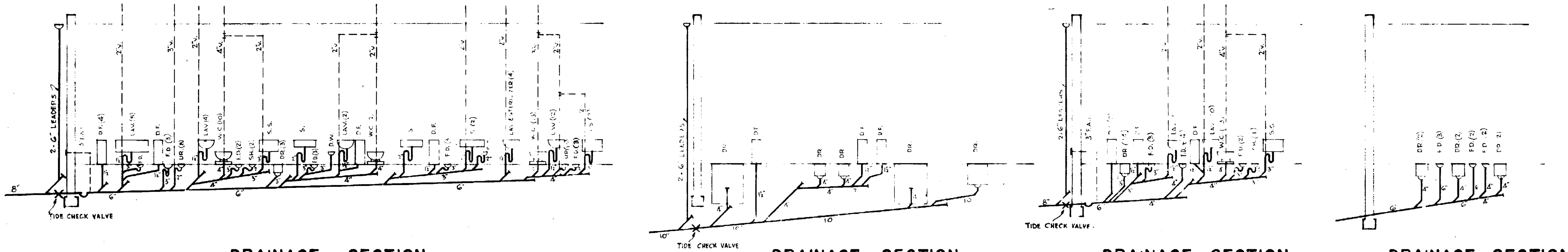
Building 44 (Former Pumphouse) Site, Gould Island, Jamestown, RI



QUAD THREE GROUP INCORPORATED

Figure 6



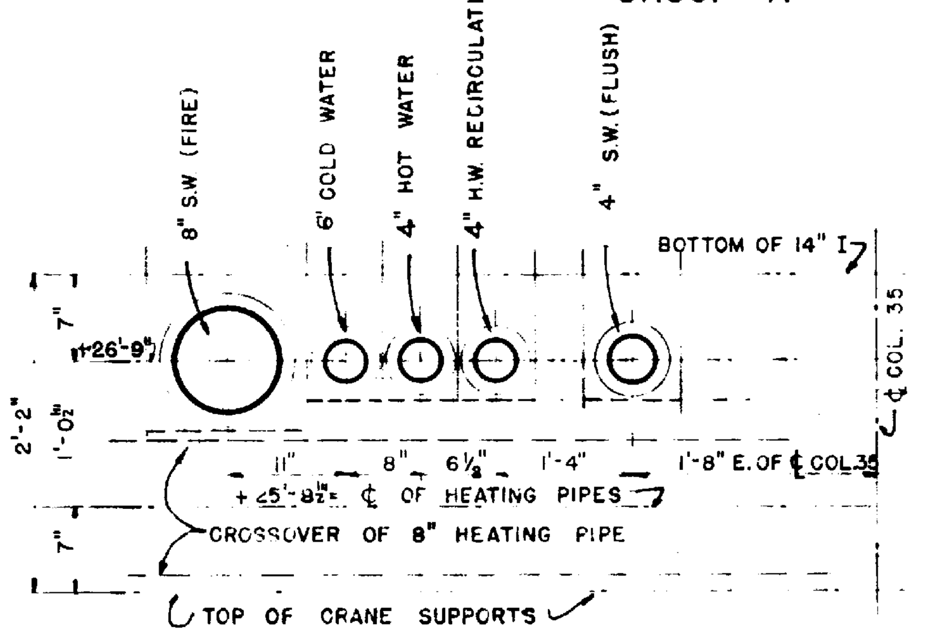


DRAINAGE SECTION
GROUP "A"

DRAINAGE SECTION
GROUP "B"

DRAINAGE SECTION
GROUP "C"

DRAINAGE SECTION
GROUP "D"



SECTION "1-1"

ABBREVIATIONS

C.W. = COLD WATER
H.W. = HOT WATER
S.W. = SALT WATER
C.O. = CLEANOUT
F.A.I. = FRESH AIR INTAKE
D.F. = DRINKING FOUNTAIN
F.D. = FLOOR DRAIN
DR. = DRAIN
LAV. = LAVATORY
UR. = URINAL
W.C. = WATER CLOSET
S. = SINK
S.S. = SLOP SINK
S.T. = STEAM TABLE
D.W. = DISH-WASHING MACHINE
SH. = SHOWER

NOTE: ALL HORIZONTAL PIPE RUNS SHOWN IN SOLID LINES ARE TO BE RUN UNDER FLOOR OR GRADE.
LOCATION OF SALT WATER (FIRE) HOSE RACKS ARE TO BE FINALLY DETERMINED BY OFFICER-IN-CHARGE.

SYMBOLS

SALT WATER
COLD WATER
HOT WATER

NOTE
SUPERCEDED BY THE FOLLOWING DRAWINGS
SECTION NO. 1 P.W. DRAWING NO. 7607-83
SECTION NO. 2 P.W. DRAWING NO. 7608-83
SECTION NO. 3 P.W. DRAWING NO. 7609-83
SECTION NO. 4 P.W. DRAWING NO. 7610-83

REVISION	DATE	BRIEF	BY
3	5/20/42	FIXTURES ADDED & GENERAL REVISIONS	C.H.F.
2	4/14/42	CHANGES MADE AT DYNOMETER ROOM FLOOR DRAINS ADDED	C.D.V.
1	3/28/42	PIPES RESIZED	B.B.

REVIEWED P.W.D. A.C.R.
P.W. DRAWING NO. 4313-50

P.W. DEPARTMENT — BUREAU OF YARDS & DOCKS
APPROVED: [signature] MARCH 23, 1942
PUBLIC WORKS OFFICER
Y. & D. DRAWING NO. 190913

DRAWN BY R.A.
TRACED BY R.A.
CHECKED BY J.B.
CHIEF DFT'M'N C.D.V.
IN CHARGE C.D.V.
SHEET ... OF ... ACCOMPANYING SPECIFICATION NO. ...
J.B.(P) CONT. NO. NOy 4994
DRAWING NO. P-201

U. S. NAVAL OPERATING BASE, NEWPORT, R. I.
TORPEDO STATION GOULD ISLAND

OVERHAUL SHOP PLUMBING FLOOR PLAN

SUBMITTED: MARCH 14, 1942 [signature: John Brackett]
JOHN BRACKETT, CONSULTING ENGINEER
1860 BROADWAY, NEW YORK

SCALE 1" = 20'-0" AND AS NOTED

00053 I/