GZA
GeoEnvironmental, Inc.

Engineers and Scientists

August 30, 2000
File No. 22457

Mr. Robert Minicucci II, P.E.
New Hampshire Department of Environmental Services
Waste Management Division
6 Hazen Drive
Concord, New Hampshire 03301-6509

Re: Remedial Action Plan
Dover Public Works Facility
Dover, New Hampshire

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Dear Bob:

On behalf of the New Hampshire Office of State Planning and City of Dover, GZA GeoEnvironmental, Inc. (GZA) is pleased to provide the attached Remedial Action Plan for the above-referenced Site. This report was completed as part of the Coastal Piscataqua River Watershed Brownfields Assessment Demonstration Pilot Project.

GZA looks forward to continuing to work with you on this very important project.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

Nancy J. Nichols, P.E.
Project Manager

Steven R. Lamb, C.G.W.P.
Associate Principal

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Enclosure

cc: McLaughlin; OSP
Peschel; City of Dover
Jennings; EPA

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EXECUTIVE SUMMARY

GZA GeoEnvironmental, Inc. (GZA) has prepared this Brownfields Remedial Action Plan (RAP) for the New Hampshire Office of State Planning (OSP) and City of Dover (City) under the Coastal Piscataqua River Watershed Brownfields Assessment Demonstration Pilot Project. The objectives of this study were to address several unknowns concerning site contamination, investigate environmental data gaps identified from reviewing the previous site studies, and to assist in Brownfields redevelopment strategy. This report summarizes important site environmental information for the use of parties who are interested in its development, provides GZA's assessment of current (non-petroleum related) site environmental conditions, and presents environmental and regulatory issues affecting site redevelopment. GZA particularly focused on areas of buried waste, surficial soil quality, and groundwater quality data gaps. This RAP does not address petroleum issues identified in connection with underground storage tanks (USTs), because these issues are being managed under the New Hampshire Petroleum Funds. Furthermore, aboveground issues such as building materials containing or suspected to contain asbestos or other hazardous materials, as well as piled/stored materials, were not part of this study.

GZA's findings/recommendations with regard to site issues are summarized as follows:

- The site is currently used by the City's Department of Public Works (DPW) for vehicle storage and maintenance, materials storage (road salt, sand and gravel, Jersey Barriers, and so forth), and engineering offices; and is also occupied by an active sewer pump station, recycling center, and recently closed waste water treatment plant (WWTP). School buses were also maintained and parked at the site until recently. Buildings at the site currently include a DPW office and attached storage/vehicle maintenance facility, DPW garage (a.k.a., former school bus garage), pump station, three-sided salt storage shed, and metal storage building.

- Historic industrial uses of the site include soap manufacturing, a velvet mill, a coal shed, stone crushing, refuse incineration, and solid waste disposal.

- DPW and WWTP personnel reported in 1991 "that sludge from septage haul trucks is sometimes discharged into a shallow 10' x 12' pit with wooden retaining walls at the east end of the WWTF storage area in the vicinity of monitoring well MW-4. The frequency of this activity was not known." This practice reportedly ceased in 1991.

- Others identified at least seven culverts under the Site that discharge to the Cocheco River. In addition, floor drains reportedly existed in the DPW building and former school bus garage, and discharged directly to the Cocheco River. The floor drains in the DPW building were redirected to the WWTP in 1999, and the floor drains in the garage were closed in 1996. The culvert reportedly directs stream flow to the Cocheco River.

GZA performed a number of subsurface exploration programs at the site between December 1999 and April 2000 to supplement work performed for the City at the site by others. These recent explorations included 34 test pit explorations, three test borings with monitoring well installations, soil and groundwater sampling at the new monitoring wells and several of the test pits, groundwater sampling at select pre-existing monitoring wells, and

surficial soil sampling. Laboratory analytical testing was performed for volatile organic compounds (VOCs), semi-VOCs, metals, polynuclear aromatic hydrocarbons (PAHs), and/or herbicides and pesticides (one sample only). The following is a brief summary of groundwater level and analytical laboratory results:

- Depth to groundwater level measurements in December 1999 and April 2000 ranged from about 3.7 feet (April 21, 2000) at monitoring well GZ-3, which is located in the former quarry area, to 15 feet (December 20, 1999) at test pit TP-1, which is located within the upper municipal solid waste landfill.

- Based on previous and new explorations, at least one-half of the Site consists of significantly altered ground surface topography. The rear, eastern portion consists of a closed municipal landfill. Within the vicinity of the former WWTP there exist buried construction debris and foundations/structures, including six buried clarifiers and a buried sludge thickener, as well as miscellaneous solid waste (e.g., sand, bricks, glass, metal scraps, rags, paper, ash, rubber, and/or wood). The former WWTP storage area, located to the east of the former WWTP, contains similar miscellaneous waste plus tannery waste and catchbasin grit. Buried river dredgings were encountered between the former WWTP and Cocheco River.

- Chromium and lead were detected in several subsurface soil samples at elevated concentrations. Chromium is typically associated with tannery waste, and lead is typically associated with ash. The majority of subsurface soil samples contained two to four PAHs in exceedance of S-1 and/or S-2 standards. In general, the types and relative concentrations of detected PAHs typify coal ash. Mercury was detected at a concentration slightly above its S-1 standard in one soil sample.

- The majority of surficial soil samples contained arsenic in exceedance of S-1 and S-2 standards. The NHDES considers the detect concentrations indicative of background conditions. Low level PAH concentrations were detected in surficial soils, which is likely due to vehicle use and maintenance at the site, as well as possibly aboveground portable storage of waste oil. Only one soil sample, located near the landfill access road, was found to have PAH concentrations in exceedance of S-1 and S-2 standards. No herbicides or pesticides were detected in the one analyzed sample, which was from a former gardening area.

- Arsenic and cadmium were detected in several groundwater samples at concentrations exceeding GW-1 standards. Chromium was detected in only one groundwater sample at a concentration slightly above its GW-1 standard.

On-site solid waste can possibly be left in-place provided it is permitted/registered and/or closed in a manner acceptable to the New Hampshire Department of Environmental Services (NHDES) Solid Waste Management Bureau. Closure may be required, because there is at least some groundwater impact due to the presence of the solid waste. Closure may include capping with soil and/or engineered materials. Prior to site redevelopment, additional explorations will be needed to further characterize the nature and thickness of the material, and to evaluate engineering characteristics, such as compressibility and/or bearing strength. Special

considerations for construction over these materials will include the release of methane gas and settlement due to decomposition of organic materials, and presence of insects and rodents attracted to organic solid waste.

Based on existing subsurface information presented herein, GZA does not recommend removal of soil or buried solid waste prior to site redevelopment. There are no apparent source areas of groundwater contamination or localized "hot spots" separate from tank areas.

Due to detected concentrations of several metals and naphthalene above GW-1 standards and possible closure of on-site solid waste, GZA recommends groundwater quality monitoring in accordance with a Groundwater Management Permit (GMP), pursuant to Env-Wm 1403.12. A GMP is one type of de-facto Activity and Use Restriction (AUR). Solid waste permitting is another type of de-facto AUR. If no solid waste permit is required, then an excavation AUR should be implemented to provide the framework to manage solid waste and contaminated soil and groundwater that may be encountered during excavation activities.

Based on the findings presented in this report, GZA recommends that the City request the NHDES issue a Certificate of Partial Completion for site-wide hazardous waste (non-petroleum) issues. This certificate would be issued following agreement of solid waste permitting/registration and/or closure requirements, GMP modification, and specific AURs, if any, with the NHDES. After on-site petroleum issues have been abated, on-site solid waste issues have been addressed to the satisfaction of the NHDES, and specific AURs, if any, have been implemented. GZA recommends that the City request a comprehensive Certificate of Completion and/or a Certificate of No Further Action.

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1.0 INTRODUCTION

GZA GeoEnvironmental, Inc. (GZA) has prepared this Remedial Action Plan (RAP) for the New Hampshire Office of State Planning (OSP) and City of Dover (City) under the Coastal Piscataqua River Watershed Brownfields Assessment Demonstration Pilot Project. The objectives of this study were to perform environmental studies at the Dover Public Works facility on River Street in Dover, New Hampshire to address several unknowns concerning site contamination, investigate environmental data gaps identified from reviewing the previous site studies, and to assist in Brownfields redevelopment strategy.

At a meeting on February 9, 2000 with the New Hampshire Department of Environmental Services (NHDES) and City, GZA received direction to prepare RAP summarizing environmental data for the site and environmental issues relative to future site redevelopment. This RAP does not address petroleum issues identified in connection with underground storage tanks (USTs); and aboveground issues such as building materials containing or suspected to contain asbestos, and piled/stored materials. This information is intended to provide the basis for NHDES to issue a partial completion statement under the New Hampshire Brownfields Program so that the City can pursue redevelopment. GZA's work is subject to the Limitations included in Appendix A.

GZA's work plan was approved by NHDES and was collaboratively developed with GZA, OSP, the City, and NHDES. In addition, GZA's Brownfields Quality Assurance Project Plan (QAPP) and its amendment were reviewed and approved by the Environmental Protection Agency (EPA). The City has assumed responsibility for addressing tank and associated petroleum issues at the site, and intends to continue seeking reimbursement for its expenses through the New Hampshire Petroleum Funds. Jacques Whitford Company, Inc. of Portsmouth, New Hampshire is currently the City's consultant with respect to petroleum issues in connection with tanks.

2.0 SITE DESCRIPTION

The Dover Public Works property consists of approximately 35 acres located in the downtown area adjacent to the Cocheco River. The Site includes four buildings and more than 2,400 feet of frontage along the river. The site is currently used by the City's Department of Public Works (DPW) for vehicle storage and maintenance, materials storage (road salt, sand and gravel, Jersey Barriers, and so forth), and engineering offices; and is also occupied by an active sewer pump station, recycling center, and recently closed waste water treatment plant (WWTP). School buses were also maintained and parked at the site until recently. Buildings at the site currently include a DPW office and attached storage/vehicle maintenance facility, DPW garage (a.k.a., former school bus garage), pump station, three-sided salt storage shed, and metal storage building. A locus plan is provided as Figure 1. The locations of the existing buildings, former WWTP, and other existing and former site features are shown on the Site Plan, Figure 2.

A number of USTs and aboveground storage tanks (ASTs) have been removed from the site (TWM, 1996; Dunn 1991). A diesel UST and pump for filling of DPW vehicles is present adjacent to the western exterior wall of the DPW building. Portable ASTs are present within the former WWTP storage area. These ASTs are used in connection with waste oil recycling operations, which occur in an area east of the DPW building. Other materials accepted for recycling include solid materials, such as paper, cardboard, and glass.

3.0 SITE HISTORY

Beginning in the late 1800's, site use changed from agricultural to industrial. Historic industrial uses of the site include soap manufacturing, a velvet mill, a coal shed, stone crushing, and municipal facilities (Dunn, 1991). Soap manufacturing was located across River Street from the existing skate board park[1] The velvet mill was located in the area of the current DPW buildings. The coal shed was located in the area of the former WWTP. Coal was delivered to the site by barge and unloaded at the bend in the river near the northwestern corner of the former WWTP, where there are currently large stone blocks at the river edge[2]. The stone crusher was located in the vicinity of the existing pump station[1].

The area to the east of the WWTP and west of a wet area was used for storage in connection with WWTP operations. The WWTP reportedly[3] received waste from an off-site tannery. Leather wastes were encountered in a test boring (MW-6) by others along the bank of the Cocheco in the vicinity of a former pump island, and in a test boring (MW-4) in the former WWTP storage area. The WWTP discharged treated water into the adjacent segment of the Cocheco River. DPW and WWTP personnel reported (Dunn, 1991) "that sludge from septage haul trucks is sometimes discharged into a shallow 10' x 12' pit with wooden retaining walls at the east end of the WWTF storage area in the vicinity of monitoring well MW-4...The frequency of this activity was not known." This practice reportedly ceased in 1991[4].

A former quarry area is located approximately 400 feet to the southeast of the DPW garage, and has been used for periodic stockpiling of deicing sand and road salt. Waste collection was performed annually near the entrance to the DPW on River Street, and in the vicinity of an existing asphalt-paved recreation park.

A municipal landfill was operated on the east side of the property before 1962, based on viewing of 1944 topographic contours[5] and aerial photographs (see Section 6.2). This information collaborates information provided by others (Dunn, 1991) that landfilling in the eastern portion of the site stopped in the early 1950's. An incinerator building was reportedly constructed in the early 1900's for incineration of refuse. Aerial photographs show the location of the incinerator as approximately shown on Figure 2. Some of the ash was landfilled on site. The incinerator was converted to a salt storage shed prior to razing.

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[1] 1987 map included in "Phase I Archeological Assessment," by Thomas J. Morgan, dated 1984.

[2] Coal shed is depicted in the vicinity of the former WWTP on a 1905 Sanborn map.

[3] Interview with Mr. Richard Gadbois, of the Dover Department of Public Works.

[4] Telephone correspondence with Mr. Dean Peschel of the City of Dover on August 4, 2000.

[5] Topographic contours shown on USGS plan entitled "Dover East, ME.-NH.," dated 1956, photorevised 1973.

- An existing environmental report (Dunn, 1991) identified at least seven culverts under the Site that discharge to the Cocheco River. Of these, two were identified as environmental concerns, including a 30-inch concrete culvert that discharges bypass flow from the WWTP, and an abandoned pipeline that served the WWTP as an outfall discharge to the Cocheco River for chlorinated wastewater. In addition, floor drains reportedly existed in the DPW building and former school bus garage, and discharged directly to the Cocheco River. The floor drains in the DPW building were redirected to the WWTP in 1999, and the floor drains in the garage were closed in 1996. The culverts reportedly direct stream flow to the Cocheco River[6].

4.0 PETROLEUM ISSUES

Petroleum issues related to former USTs and ASTs at the site have been investigated and addressed by others for the City. Remediation of petroleum-contaminated soil and groundwater at the site is on-going. Investigations and remediation were performed by Dunn Geoscience Corporation (Dunn) in 1991 and 1992, Total Waste Management Corporation (TWM) in 1996, and Jacques Whitford Company, Inc. (JWC; f.k.a. CEH-Jacques Whitford) since 1996. The purpose of this section is to summarize, in brief, the results of Site work by others. Refer to the reports in Section 8 for additional information regarding these issues.

The findings of investigations by Dunn (1991 and 1992) indicated two Site areas that had been impacted by historical releases of petroleum product. Dunn installed eight monitoring wells at the Site (designated MW-1 through MW-8), which they sampled in May and September 1991. Groundwater samples collected from wells MW-3 and MW-6 were found to contain elevated concentrations (i.e., above Ambient Groundwater Quality Standard [AGQS]) of VOCs, base/neutral extractable compounds (semi-VOCs) or total petroleum hydrocarbons (TPH). MW-3 was installed in the vicinity of a tank field and pump island located near the southeastern corner of the DPW building. MW-6 was installed in the vicinity of another tank field and pump island near the northwestern corner of the DPW building and on the bank of the Cocheco River. On May 2, 1991, a free product seep from the toe of the Cocheco River bank was observed by Dunn at a point approximately 60 feet north of the latter pump island. Approximate UST locations shown on Figure 2.

To achieve and maintain compliance with the prevailing UST regulations at the time (NHDES Rules Env-Ws 411, Control of Underground Storage Tanks), and in consideration of future plans for the Site, the City contracted TWM to clean and remove eight USTs from five separate areas at the Site. TWM completed the UST closures during the period from December 1995 through January 1996. Based on observations and testing results during the tank closures (TWM, 1996), TWM concluded that there had been petroleum releases at each of the UST locations.

During JWC's site investigations between 1996 and 1999, JWC completed 11 borings in order to assess the magnitude and extent of subsurface soil contamination remaining at each of the former tank areas resulting from TWM's 1996 work. Additionally, JWC installed monitoring

[6] Floor drain closure and DPW culvert information was provided by Dean Peschel of the City of Dover on August 4, 2000.

wells in six of the completed borings, replaced several destroyed monitoring wells, and installed well points in the river bottom. The borings without monitoring wells (S-series), new monitoring wells (designated MW-9 through MW-14), replacement wells (MW-3A and MW-8A), and well points (WP-1 and WP-2) are shown on the plan by JWC, entitled "Water Table Map, September 30, 1998" and included in Appendix B. JWC collected groundwater samples from the monitoring wells in 1996 and 1997, as well as collected three surface water samples along the bank of the Cocheco River and in the vicinity of the former adjacent pump island. The laboratory analytical results for soil samples collected during drilling and during these groundwater sampling events are summarized in the tables included in Appendix B. The following table summarizes the identified UST information, and associated soil and groundwater quality standard exceedance information. UST Areas are shown on the JWC figure in Appendix B.

UST AREA	TANK DESCRIPTIONS	SOIL QUALITY	1996 TO 1998 GROUNDWATER QUALITY
A/B	2 Gasoline USTs	10-12 feet, NH S-1 and S-2 exceeded for benzene and MtBE	At *MW-3A*, GW-1 exceeded for benzene, naphthalene, and toluene; GW-2 exceeded for xylenes. At *MW-12*, GW-1 exceeded for benzene, ethylbenzene, naphthalene, and MtBE; and GW-2 exceeded for benzene.
D	1 Waste Oil UST		
E/F/G	2 Gasoline and 1 Diesel UST	5-7 feet, NH S-1 and S-2 exceeded for benzene, ethylbenzene, naphthalene, toluene, and xylenes	At *MW-6*, GW-1 exceeded for benzene, ethylbenzene, naphthalene, and MtBE. At *MW-9*, GW-1 exceeded for benzene, and naphthalene . At *WP-1*, GW-1 exceeded for benzene and MtBE. At *WP-2*, GW-1 exceeded for benzene and MtBE.
H	#2 Fuel Oil UST		
J	#2 Fuel Oil UST		At *MW-11*, GW-1 exceeded for benzene and naphthalene. At *MW-13*, GW-1 exceeded for Naphthalene.

Note: This information is from JWC's RAP, dated May 3, 1999. For groundwater quality information, the most recent groundwater analytical results are shown. A blank indicates no exceedances.

In their RAP, JWC concluded that the applicable cleanup goals for soil are the NH S-2 standards. They reasoned that the NH S-2 standards are applicable, because:

Current and potential future site use is expected to yield a high adult frequency of use and low frequency of use by children as they pertain to site workers and visitors, respectively. For the construction worker, the intensity of use may be high.

For all but the construction worker, the intensity of use is expected to be low. For the construction worker, the intensity of use may be high.

Contaminated soil is expected to be located between 5 and 15 feet below ground level. Therefore, it is considered potentially accessible.

They also concluded that the applicable cleanup goals for groundwater are GW-1 standards, although GW-2 would be applicable for the future "establishment of basement domiciles."

JWC estimated that the volume of soil exceeding Cleanup Goals in Tank Area is 110 cubic yards, and in Tank Area E/F/G is 120 cubic yards. JWC concluded that soil excavation and off-site disposal is the most cost-effective option for reaching soil Cleanup Goals. Also in their RAP, JWC selected monitored natural attenuation as the remedial alternative for groundwater at UST Area A/B; and in situ bioremediation as the remedial alternative for groundwater at UST Area E/F/G.

GZA understands that a Groundwater Management Permit (GMP), which was prepared by Jacques Whitford Company, for petroleum issues is currently under review by the NHDES. Excavation of petroleum-containing soils was performed in accordance with a NHDES-approved RAP. During excavation activities, more petroleum-containing soil was encountered than expected, and the NHDES has requested that additional subsurface information be collected prior to continuing remedial measures.

5.0 HISTORIC NON-PETROLEUM ENVIRONMENTAL INFORMATION

5.1 WETLANDS AND ENDANGERED SPECIES

Dunn subcontracted with Natural Resource Consulting Services of Concord, New Hampshire to perform wetland and endangered or threatened species survey. Four wetlands were identified at the site. Dunn indicated that "All of these wetland areas have been disturbed to varying degrees by past site activities." Dunn also reported that "No threatened or endangered species were identified on the site. However, it is possible that short-nosed sturgeon (a protected species) could occur in the Cocheco River adjacent to the Site."

5.2 ASBESTOS-CONTAINING BUILDING MATERIALS

Dunn (1991) performed a preliminary survey to determine the nature, location, and approximate quantity of accessible suspect asbestos-containing material (ACM) and develop an approximate cost range for abatement. Dunn did not, however, investigate ACM around underground piping for outdoor WWTP facilities. ACMs were identified in the DPW office building and WWTP building (razed) and in a white house (razed) adjacent to the DPW office building. In November 1995, Northeast Test Consultants prepared a report entitled "Specification for Asbestos Abatement at Waste Water Treatment Building, River Street, Dover, NH." ACMs were removed by Venture Asbestos Abatement of Salem, New Hampshire in the Spring of 1996.

5.3 BRIEF SUMMARY OF HISTORICAL SOIL AND GROUNDWATER QUALITY-UNRELATED TO STORAGE TANKS

5.3.1 Former WWTP

Dunn perform a single boring (B-1) in the WWTP area in 1991. A soil sample (depth of 9.8 to 10.5 feet) collected from natural silt below the fill was analyzed for total metals including arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Barium and chromium were the only compounds detected, and were reported at concentrations of 32 milligrams per kilogram (mg/kg) and 13 mg/kg, respectively. These concentrations are well below current S-1 standards 750 mg/kg, and 130 mg/kg (Chromium VI), respectively. The fill was found to contain ash, rubber, bricks, and coal, and extended to a depth of about 8 feet.

5.3.2 Former WWTP Storage Area

A test boring (MW-4) advanced in the former WWTP storage area encountered leather in fill at depths greater than 12 feet and well below the groundwater table, which was observed at a depth of about 6 feet in April 2000. Groundwater samples collected from MW-4 in May of 1991 contained cadmium (7 ug/L) and lead (1,200 ug/L) at concentrations in exceedance of 1991 Maximum Contaminant Levels and current GW-1 standards (5 ug/L and 15 ug/L, respectively). Cadmium and lead were not detected in a second groundwater sample collected from MW-4 in September of 1991. A composite soil sample from test pits (TP-2, TP-3, TP-4, and TP-7) excavated in 1991 in the same area was analyzed for by EP Toxicity for the metals barium, cadmium, chromium, lead, and mercury. Only barium was detected at the relatively low concentration of 0.57 mg/L. Leather hides mixed with layers of solid waste fill are also noted on the logs for TP-3 and TP-7 below depths of 12 and 8 feet, respectively. The logs note the top of original ground in the former and latter test pits at approximately 14 and 10 feet, respectively.

5.3.3 Municipal Solid Waste Landfill

Dunn performed a single boring (B-2) in the municipal solid waste landfill and adjacent to its access road, as shown on Figure 3. The fill was found to contain ash, cinders, glass, and sand; and extended to a depth of about 15 feet. A soil sample of sandy loam collected from below the fill was analyzed for total metals including arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. No metals were detected in the sample, except barium (32 mg/kg) and chromium (13 mg/kg) at concentrations below S-1 standards. The sample was also analyzed for VOCs and TPH. No VOCs were detected. TPH (S-1 of 10,000 mg/kg) was detected at the low concentration of 3.6 mg/kg.

5.3.4 Former Recycling Area

Monitoring well MW-1 was installed generally downgradient of the former recycling area and in River Street by Dunn (1991). Groundwater samples collected from this well in May and September 1991 indicated the presence of the chlorinated solvents trichloroethylene (high of 2 mg/L) and cis-1,2-dichloroethylene (high of 2 mg/L) at concentrations below 1991 Maximum Contaminant Levels and current GW-1 standards (5 and 70 mg/L, respectively).

5.3.5 Hill Adjacent to Existing Recycling Area

Granite State Explorations conducted about 15 test borings in this area between 1976 to 1978 as part of geotechnical explorations for expansion of the WWTP. Test boring logs do not indicate the presence of solid waste or other suspect fill. In general, clay or silt was encountered overlying glacial till. The explorations did not penetrate the glacial till.

5.3.6 Southwest Hill Area

Dunn (1992) completed four hand-auger probes in the hill area located in the southwestern corner of the site and northeast of the former recycling area. No solid waste or suspect fill was encountered. One composite sample was analyzed by Toxicity Characteristics Leaching Procedure for arsenic, barium, cadmium, chromium, lead, and mercury. No metals were detected. Dunn reported that "The surface observations, reported site history data and preliminary soil test results from the summit area, suggest that there is a low probability of a significant adverse environmental condition in this area of the Site. Based strictly on the apparent good environmental quality of the summit area, it would be a satisfactory location for a residential land use. It should be noted, however, that other site conditions such as shallow bedrock may make the area less suitable for excavation and construction."

5.3.7 River Bank Adjacent to DPW Buildings

A number of explorations have been conducted between the DPW buildings and river for assessment of petroleum contamination associated with the former tank field. Boring logs for these explorations indicate the presence of miscellaneous solid waste. In particular, material identified as "ash fill, cinders w/ f-c sand (with fine to coarse sand)" is noted on the log for MW-7 in this area.

6.0 CURRENT INVESTIGATIONS

6.1 HISTORIC AERIAL PHOTOGRAPHS AND MAPS REVIEWED BY GZA

Prior to performing subsurface explorations at the site, GZA performed a review of aerial photographs and maps made available by the City and the New Hampshire Department of Transportation, and available in our in-house files. GZA reviewed five photographs, dated 1951, 1962, 1979, 1981, and 1989. GZA also reviewed a topographic map that was based on a November 30, 1967 aerial photograph, and U.S. Geologic Survey (USGS) topographic maps dated 1956 (photo-revised 1973 and 1988). GZA's objective was to assess Site areas with the greater potential for landfilling and subsurface contamination.

Review of the photographs and maps suggest that the municipal landfill was in operation after 1944[7] and before 1962. The 1951 photograph showed filling operations in the landfill area in progress. Photographs dated 1962 and later show disturbance of the landfill area, which was probably due to covering and grading operations. The 1979 photograph shows the incinerator, while the 1989 photograph clearly does not show it.

[7] The ground surface topography on the 1956 USGS maps were based on planetable surveys in 1944.

The northern limit of the municipal landfill, as depicted on Figure 3, is based on the comparison of existing (Figure 2) and 1944 topographic contours, which shows a ravine within the central and northern portion of the existing landfill area. The western and southern limits were approximated based on observation of existing site features, and test pits performed during the current study. On the 1956 USGS plan, the landfill access road appears to head towards and terminates in the area of the pre-existing ravine.

The 1962 photograph shows the WWTP with its fenceline, of which existing remnants are similarly located. The area of the WWTP appeared covered with brush and traversed by apparent vehicle tracks in the 1951 photograph. None of the photographs reviewed clearly showed filling operations in progress within the former WWTP area or its storage area.

The 1956 USGS plan shows the access road to the municipal landfill continuing over a bridge to the western bank of the Cocheco River. Five buildings are shown on the 1956 plan, including four at the northeastern corner of the intersection of River Street and the landfill access road, and one at the northern corner and adjacent to the Cocheco River. These five buildings do not appear in later photographs.

6.2 SUBSURFACE EXPLORATIONS

The tasks performed by GZA during this study were developed collaboratively between GZA, NHDES, the City, and OSP to address non-petroleum related environmental issues at the site. GZA particularly focused on areas of buried waste, surficial soil quality, and groundwater quality data gaps. While GZA performed several investigations to assess the southwestern limits of municipal solid waste landfill, GZA did not perform explorations within municipal landfill areas identified by photographs and maps, as agreed upon by the parties mentioned above, because the City indicated that future development on the landfill would not be part of their Brownfields initiatives. GZA also did not perform investigations in the southwestern hill area, which Dunn concluded was apparently of "good environmental quality." GZA's tasks are outlined in our Scope of Work dated November 22, 1999, and its addendum dated February 22, 2000. Data collection activities generally followed the procedure in the QAPP prepared by GZA dated November 1999; revised December 10, 1999; and amended March 15, 1999.

A number of subsurface exploration programs were performed at the site between December 1999 and April 2000 to supplement work performed for the City at the site by others. The approximate locations of the explorations are shown on Figure 3. These recent explorations included 34 test pit explorations that were completed at the site by the Dover DPW. TP-series test pits were excavated in December 1999, and TP2-series test pits were excavated in April 2000. Moreover, three test borings (designated GZ-1, GZ-2 and GZ-3) with monitoring well installations were completed at the site by New Hampshire Boring, Inc. of Londonderry, New Hampshire in April 2000. Soil and groundwater samples collected from these test pits and monitoring wells, as well as from pre-existing monitoring wells, were analyzed for VOCs, semi-VOCs (or subset of polynuclear aromatic hydrocarbons [PAHs], and/or the eight Resource Conservation and Recovery Act (RCRA) metals. GZA also collected 11 surficial soil samples for laboratory analysis.

GZA's selection of test pit and test boring areas was based on our understanding of site history, and field observations as summarized below.

- *Former recycling area located along River Street.* Test pits were not performed in this area due to the presence of an asphalt-paved recreation park. An existing well (MW-1) was sampled for laboratory analysis to assess groundwater quality downgradient of the area. Previous sampling and analytical testing for this well indicated the presence of chlorinated VOCs at elevated concentrations.

- *Former incinerator area and access road to municipal landfill.* Five test pits (TP-1, TP-2, TP-3, TP-16, and TP-17) were conducted in this area to assess the nature and northern extent of buried waste and/or ash.

- *Existing recycling area.* Two test pits (TP-4 and TP-5) were performed in this area to assess environmental impact due to recycling operations or former historical use in vicinity of razed structures. An existing monitoring well (MW-14) was sampled for laboratory analysis to assess groundwater quality relative to recycling operations, as well as the migration of possible groundwater contamination from the upgradient municipal landfill.

- *Former WWTP Storage Area.* Includes buried waste and former sludge dewatering pit adjacent to wetland. Seven test pits (TP-10 through TP-13, and TP2-1 through TP2-3) and one test boring/monitoring well (GZ-1) were performed in this area to further determine the extent of the waste, and to collect soil and groundwater samples for laboratory analysis. A test pit was not conducted in the former sludge dewatering pit, which was identified on a plan by Dunn (1992), based on the materials encountered in test pits (TP-10 and TP2-1) conducted in this area. Access to the general vicinity of the former sludge dewatering pit was limited due to the presence of obstructions, such as large concrete blocks and other surficial debris. The monitoring well MW-4, which was installed by Dunn in this area, was not observed by GZA.

- *Former waste water treatment facility area.* Includes adjacent bank of Cocheco River. A total of 20 test pits and one test boring/monitoring well (GZ-2) were completed in this area to assess nature and extent of buried materials, and to collect soil and groundwater samples for analytical testing. One test pit (TP-9) was performed in area identified as the former sludge thickener.

- *Former quarry area.* One test boring/monitoring well (GZ-3) was performed in this area for groundwater quality assessment, including possible groundwater contamination from the upgradient municipal landfill.

- *Hill between site buildings and former prison.* Due to historic subsurface information in this area (*i.e.*, logs by Granite State Explorations) indicating no significant environmental issues and inaccessibility at time of test pit explorations, no subsurface explorations were performed in this area. GZA did, however, collect two surface soil samples (TP-19 and SS-10) for laboratory analysis.

In general, the test pit excavations were advanced to the approximate groundwater table encountered during the excavations, and test borings were advanced to approximately 5 feet below the water table for the installation of monitoring wells. Test borings were advanced using standard hollow-stem auger drilling techniques without the use of water. Soil samples were obtained from test pits by first using an excavator to scrape the pit sidewall and to form a

mini-stockpile, which was then sampled for containerization using a precleaned trowel. Groundwater samples were collected from test pits by dipping the sample container directly into the water. Groundwater samples from test pits collected for metals analysis were subsequently field filtered and recontainerized in a pre-preserved container. Soil samples were collected at test borings continuously with a split-spoon sampler.

Groundwater samples were collected from eight existing monitoring wells and from the three new wells for analysis of VOCs, semi-VOCs (or subset of PAHs), and/or the eight RCRA metals. Existing monitoring wells were chosen for sampling to supplement the results of previous sampling rounds by others, and to fill data gaps with respect to non-petroleum environmental issues. New monitoring wells were installed and sampled for the objectives identified above.

GZA also collected surficial soil samples from across the site for analysis of herbicides and pesticides[8] (TP-19 only); and the eight RCRA metals and/or PAHs (SS-1 through SS-10). The sampling locations were intended to be random, with the exception of TP-19, which was located in a suspect former gardening area[9]. The objective of the random sampling was to assess the quality of surficial soils in consideration of future site planning and development. Surficial soil samples were collected with a pre-cleaned trowel to depths of about 5 to 12 inches below ground surface, as indicated on Table C-1 in Appendix C, and composited in the field prior to containerization for the lab.

Soil samples from test pits and test borings were screened in the field for VOCs with a TEI model 580B photoionization detector (PID). Test pit and test boring/monitoring well installations logs prepared by GZA are included in Appendix C, together with a table summarizing soil and groundwater analytical testing and a table summarizing collection and description of surficial soil samples. All laboratory analytical testing was performed by Eastern Analytical, Inc. as described in the QAPP, except as otherwise noted herein. Additional information about soil and groundwater sampling, laboratory testing techniques, and quality assurance can be found in the QAPP.

GEOLOGY

Based on previous test borings performed by Granite State Explorations from 1976 to 1978, Dunn and JWC from 1991 to 1997, and recent explorations by GZA, the site stratigraphy generally consists of fill overlying natural sand, clay, till, and bedrock. Descriptions of the geologic units encountered are as follows, in general order of occurrence below ground surface:

- Fill: Fill has been encountered across much of the site, with the exception of the relatively undisturbed sloped area (elevations above about 30 feet, NGVD) located east of the DPW garage, within the former quarry area, and within the southwest hill area. The fill consists predominantly of miscellaneous solid waste and construction debris, with areas having layers or pockets of catchbasin grit, river dredgings, and tannery

[8] The analysis for herbicides was performed by Environmental Science Corporation of Middletown, Connecticut by EPA Method 8151A, and or pesticides by Eastern Analytical, Inc. of Concord, New Hampshire by EPA Methods 8081A/8082.

[9] Based on review of aerial photographs.

waste, as generally described below. The approximate limits of areas containing these materials are shown on Figure 3. The thickness of the fill commonly ranged from approximately 5 to 15 feet in thickness, and was moderately stiff requiring medium excavation effort.

Miscellaneous solid waste is generally described as sand with varying amounts of bricks, glass, metal scraps, rags, paper, ash and/or cinders, rubber, concrete, and/or wood.

Construction debris was generally described as a mix of sand, brick, wood, concrete, tarps, shingles, asphalt, boulders, and/or blasted rock.

Catchbasin grit consists of materials removed from City catchbasins, and is generally described as black or gray sand with silt or clay. It was encountered mixed with gravel and/or cobbles. The catchbasin grit has a distinctive sewage-type odor.

River dredgings is generally described as black or gray, loose sand or soft silt and/or clay with organic material (*e.g.,* organic silt, leaves, twigs, logs). River dredgings were commonly associated with solid waste fill and/or tannery wastes.

Tannery waste was generally described as leather cuttings or hides mixed with sand. The tannery waste was encountered as layers or pockets within construction debris, miscellaneous solid waste fill, and/or river dredgings. Tannery waste was encountered within numerous explorations in the former WWTP storage area. The approximate limits of the waste within the latter area based on previous and recent explorations are shown on Figure 3. Tannery waste was encountered at all depths within the fill.

Municipal solid waste landfill was explored with four test pits (TP-1, TP-2, TP-3 and TP-16). Material encountered in these test pits consisted of layers and pockets of miscellaneous solid waste, construction debris, tannery waste, and river dredgings.

- Sand Naturally occurring fluvial sand generally consists of brown or gray, fine to medium sand. In some explorations, the sand deposit contained gravel. Where encountered, the sand stratum ranged between five and forty feet or more below ground surface.

- Clay and Silt Naturally occurring fluvial clay and silt deposits were generally encountered along the northern portion of the site approximately 4 to 40 feet below ground surface.

- Glacial Till Glacial till was encountered near ground surface to 23.5 feet below ground surface on the hill to the east of the recycling center. The glacial till is generally described on logs by Granite State Explorations as "grayish brown, compact, gravelly, silty, sand."

- Bedrock Refusal on probable bedrock was encountered at shallow depths (*i.e.,* less than 10 feet) in the vicinity of the former quarry (GZ-3, refusal at 8 feet), behind the DPW maintenance garage (TP-18, refusal at 8 feet), and along the access road to the

municipal solid waste landfill (TP-16, refusal at 7 feet). Shallow bedrock is anticipated in the southwest hill area.

Bedrock outcrops along River Street and behind the DPW garage belong to the Kittery Formation. The Kittery Formation is generally described as gray, brownish-gray, or dark green, fine-grained, banded impure quartzite that is often interbedded with slate, phyllite, or fine-grained schist (Novotny, 1969).

Deeper bedrock occurs nearer the Cocheco River. Depth to drilling refusal at boring A-21, located in the former WWTP storage area, was about 40 feet. Boring MW-12, located in the area of existing pump island, was terminated with refusal on possible bedrock at a depth of 17 feet. Previous explorations on the hill adjacent to the recycling area were not extended through the glacial till to bedrock. Based upon our review of the existing information, there have been no bedrock cores collected during drilling.

GROUNDWATER

Depth to groundwater level measurements in December 1999 and April 2000 ranged from about 3.7 feet (April 21, 2000) at monitoring well GZ-3, which is located in the former quarry area, to 15 feet (December 20, 1999) at test pit TP-1, which is located within the upper municipal solid waste landfill. Depth to water measurements in GZ-1 and GZ-2 (April 21, 2000), located in the former WWTP and adjacent storage area, were 6.0 and 9.6 feet, respectively.

Based on groundwater elevation contours developed by CEH (1997) for measurements obtained on June 4, 1997, groundwater flow at the site and in the vicinity of the existing buildings is directed towards the Cocheco River. In the western portion of the site, groundwater flows towards the west and in the northern portion of the site, groundwater flows towards the north. No groundwater elevation data is available for the eastern and southern portions of the site.

CEH-Jacques Whitford completed a tidal effect evaluation over a period of three days in 1997 at five on-site monitoring wells. CEH-Jacques Whitford concluded that "Although tidal variations in the Cocheco River were measured at about 8 feet (from high to low tide,...), effects on water levels in the site monitoring wells was minor....MW-9 and MW-6, located on the bank adjacent to the river, recorded only about 0.5 feet and 0.2 feet, respectively of tidally influenced water level change."

6.3 LABORATORY ANALYTICAL RESULTS FOR SUBSURFACE SOIL SAMPLES

A table summarizing laboratory analytical results for subsurface soil samples collected from test pits is provided in Table 1. Laboratory testing was not performed for samples collected from test borings, because the soil encountered in the test borings was similar to that encountered in nearby test pits for which sampling and analytical testing had been performed. The analytical results reported for subsurface soil samples are compared with S-1 and S-2 standards provided in the NHDES Risk Characterization and Management Policy (RCMP, 1998). The S-1 standards are most restrictive and should be applied for most intensive and frequent site use (*e.g.*, residential). The S-2 standards are somewhat less restrictive, and may be applicable depending on soil accessibility, and intensity and frequency of site use.

Laboratory analytical results for samples (TP-2, 5 to 7 feet and TP-3, 11 to 11.5 feet) collected in the municipal solid waste landfill indicated the presence of elevated (*i.e.*, above S-1 standards) concentrations of lead (S-1 of 400 mg/kg) and PAHs (various S-1 standards). Elevated concentrations of lead and PAHs were also detected in a sample collected from TP-4 (5 to 6 feet), located about 200 feet downslope of the western limit of the landfill. All three samples contained ash, and their fingerprints of detected elevated and low PAH concentrations were typical for coal ash. The detected concentrations of lead ranged from 450 mg/kg (TP-4) to 1,600 mg/kg (TP-3). Elevated PAHs detected in all three samples included benzo(a)anthracene (0.8 to 63 mg/kg; S-1 of 0.7 mg/kg and S-2 of 2 mg/kg), and benzo(a)pyrene (1 to 37 mg/kg; S-1 and S-2 of 0.7 mg/kg). The PAHs benzo(b)fluoranthene and indeno(1,2,3-cd)pyrene were detected at elevated concentrations in only the sample from TP-4[10]; benzo(b)fluoranthene was detected at 35 mg/kg (S-1 of 7 mg/kg and S-2 of 20 mg/kg), and indeno(1,2,3-cd)pyrene was detected at 21 mg/kg (S-1 of 0.7 mg/kg and S-2 of 2 mg/kg).

Other metals detected at somewhat high concentrations in soil samples included chromium (S-1[11] for Cr VI of 130 mg/kg) and mercury (S-1[12] of 1 mg/kg). Chromium was detected in three soil samples (TP-10, TP-12, and TP-14) from the former WWTP and adjacent fill areas at concentrations ranging from 240 mg/kg (TP-10, 6 to 7 feet) to 1800 (TP-12, 4 to 5 feet) mg/kg. Mercury was detected in one soil sample above its S-1 standard of 1 mg/kg; namely, 1.2 mg/kg in the sample from TP-14 (7 to 9 feet), which is located in the former WWTP area.

Elevated PAHs were also detected in three samples collected from locations across the site, including test pits TP-5 (vicinity of the former A/B/C tank field and a former building), TP-6 and TP2-16 (northwest of the former WWTP), and TP-10 (area of filled wetland). Test pit TP-5 was terminated with refusal at a depth of 6 feet on an apparent foundation covered with a thin layer of oily soil. The sample from TP-5 (5.5 to 6 feet), which consisted of the oily soil, was found to contain 8.7 mg/kg of naphthalene (S-1 and S-2 of 5 mg/kg), 1.6 mg/kg of benzo(a)anthracene (S-1 of 0.7 mg/kg and S-2 of 2 mg/kg), 1.7 mg/kg of benzo(a)pyrene (S-1 and S-2 of 0.7 mg.kg), and 0.8 mg/kg of indeno(1,2,3-cd)pyrene (S-1 of 0.7 mg/kg and S-2 of 2 mg/kg). The sample from TP-5 also contained alkylbenzenes at concentrations greater than the S-1 and S-2 standard (59 mg/kg). The soil sample from TP2-16 (3 to 5 feet) contained solid waste fill with leather clippings, and also appeared to contain oil. The TP2-16 sample contained 0.8 mg/kg of benzo(a)anthracene (S-1 of 0.7 mg/kg and S-2 of 2 mg/kg). The soil sample from TP-10 (6 to 7 feet) consisted of asphalt cuttings, and was found to contain four PAHs at concentrations above S-1 standards, including 12 mg/kg of benzo(a)anthracene, 9.4 mg/kg of benzo(b)fluoranthene (S-1 of 7 mg/kg and S-2 of 20 mg/kg), 10 mg/kg of benzo(a)pyrene, and 4.7 mg/kg of indeno(1,2,3-cd)pyrene. All three samples from TP-5, TP2-16, and TP-10 contained low concentrations of a number of other PAHs typical for petroleum products.

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[10] Duplicate sample contained 24 mg/kg of benzo(b)fluornathene, and 8 mg/kg of indeno (1,2,3-cd)pyrene. Note that duplicate sample also contained elevated concentration of dibenz(a,h)anthracene at its detection limit of 3 mg/kg, although it was not detected in the original sample.

[11] The S-1 standard for Chromium III is 1, 000 mg/kg. Note that since the S-1 standards for chromium are specific to Cr VI and Cr III, these standards do not strictly apply to the samples, which were analyzed for total chromium.

[12] The S-1 standard is for inorganic mercury.

The soil sample from TP-6 (4 to 5 feet) consisted of sand with pockets of river dredgings and construction debris, and was found to contain 21 mg/kg of benzo(a)anthracene (S-1 of 0.7 mg/kg and S-2 of 2 mg/kg), and 9 mg/kg of benzo(a)pyrene (S-1 and S-2 of 0.7 mg.kg). Other PAHs detected at low concentrations in this sample had a fingerprint typifying coal ash.

6.4 LABORATORY ANALYTICAL RESULTS FOR SURFICIAL SOIL SAMPLES

Table 1 summarizes laboratory analytical results for surficial soil samples. The analytical results reported for surficial soil samples are also compared with S-1 and S-2 standards.

GZA analyzed all of the surficial soil samples, except TP-19, for the eight RCRA metals. GZA did not detect the presence of metals in surficial soil samples above S-1 standards, with the exception of arsenic (S-1 and S-2 of 12 mg/kg) which was detected at concentrations ranging from 13 to 25 mg/kg in nine of the 11 samples analyzed for the eight RCRA metals. The highest concentration (25 mg/kg) was detected in the sample SS-10 collected from the suspect former garden area on the hill adjacent to the DPW garage. It is GZA's experience that background concentrations of arsenic in New Hampshire have been found within this range, and may be associated with agriculture.

GZA analyzed five surficial soil samples (SS-1, SS-4, SS-5, SS-6, and SS-7) for PAHs. Low level PAHs were detected in all of the samples. Benzo(a)anthracene and Benzo(a)pyrene were detected slightly above S-1 and S-2 standards in the sample SS-7, which was collected in an area adjacent to the access road to the municipal landfill. The low level detected PAHs is likely due to vehicle use and maintenance at the site, as well as possibly aboveground portable storage of waste oil, which was observed in the vicinity of SS-1 during GZA's explorations. No other PAHs were detected above S-1 or S-2 standards.

Herbicides and pesticides were not detected in sample TP-19, which was collected from the hill adjacent to the recycling area, and in a former gardening area.

6.5 LABORATORY ANALYTICAL RESULTS IN GROUNDWATER

Table 2 summarizes laboratory analytical results for groundwater samples collected from test pits and monitoring wells. The analytical results reported below are compared with GW-1 and GW-2 standards, if applicable, provided in the RCMP. The GW-1 standards are equivalent to AGQSs (*i.e.*, drinking water standards), which are enforceable by the State of New Hampshire. The GW-2 standards are used to assess potential health risks due to inhalation of vapors containing groundwater contaminants.

Three metals were detected at elevated concentrations in groundwater samples collected by GZA in December 1999 and/or April 2000, including arsenic (GW-1 of 0.05 mg/L), cadmium (GW-1 of 0.005 mg/L), and chromium (GW-1 of 0.1 mg/L). Arsenic was detected at concentrations ranging from 0.06 to 0.29 mg/L in two grab samples from test pits (TP-6 and TP-12), and in two samples from monitoring wells (MW-8A and MW-12), which are widely spaced across the site. Chromium was also detected in the grab groundwater sample from TP-12 (Cocheco River bank and northwest of former WWTP) at a concentration of 0.14 mg/kg. Cadmium was detected in groundwater samples from three wells including WP-1

(Cocheco River bank-and near former school bus garage) at a concentration of 0.007 mg/L, MW-13 (former WWTP area) at a concentration of 0.013 mg/L, and GZ-3 (former quarry area, and likely downgradient of municipal landfill) at a concentration of 0.006 mg/L.

The PAH naphthalene (GW-1 of 0.02 mg/L and GW-2 of 6 mg/L) was detected above its GW-1 standard in the grab groundwater sample from test pit TP-14 (0.076 mg/L), and groundwater sample from well MW-12 (0.26 mg/L). No other elevated concentrations of PAHs were detected in the sample from TP-14, which is located in the former WWTP area, or in the sample from MW-12, which is located adjacent to the existing pump and UST area. While 6 to 14 other PAHs were detected in the groundwater samples from five wells (WP-1, MW-10, MW-12, MW-13, and GZ-2), and grab samples from three test pits (TP-4, TP-12, and TP-14), none of the detected concentrations were above GW-1. Bis(2-ethyhexyl)phthalate was detected at a low concentration (0.008 to 0.035 mg/L) in three (TP-10, MW-5, and MW-8A) of the four samples analyzed for ABNs. No other ABNs were detected.

7.0 ENVIRONMENTAL ISSUES AND SITE DEVELOPMENT CONSIDERATIONS

7.1 ASBESTOS-CONTAINING BUILDING MATERIALS

ACMs that remain within Site buildings, if any, will require proper abatement prior to any demolition or renovation of the Site buildings.

7.2 WETLANDS

Filling, construction, or any other disturbance of identified wetlands is restricted in the State of New Hampshire, and can occur only with the approval of the NHDES under a wetlands permit. Two wet areas observed by GZA and previously identified as wetlands are shown on the Site plan, Figure 2. One area is located east of the former WWTP storage area and downslope of the existing municipal solid waste landfill. The second area is shown south of the municipal solid waste landfill. Landfill material may extend into these wet areas.

7.3 BURIED SOLID WASTE

Buried solid waste is a primary issue affecting site redevelopment. Solid waste can be expected within the limits of the municipal solid waste landfill, in the vicinities of the former WWTP and its storage area, and, to a more limited extent, between the existing DPW buildings and Cocheco River. Historical information indicates that the solid waste was placed prior to 1981, which is when current New Hampshire Solid Waste Rules became effective. Consequently, the solid waste can possibly be left in-place provided it is permitted/registered and/or closed in a manner acceptable to the NHDES Solid Waste Management Bureau. Closure may be required, because there is at least some groundwater impact due to the presence of the solid waste, as indicated by the exceedance of the GW-1 standard for groundwater collected from test pit TP-12. Closure may include capping with soil and/or engineered materials.

As part of future building and utilities layout and design in these areas, additional explorations will be needed to further characterize the nature and thickness of the material, and to evaluate engineering characteristics, such as compressibility and/or bearing strength. Special

considerations for construction over these materials will include the release of methane gas and settlement due to decomposition of organic materials, and presence of insects and rodents attracted to organic solid waste. A qualified geotechnical engineer should be engaged to assess feasible foundation alternatives and pavement/capping design, as the project requires. If encountered during excavation activities for building foundations and utilities, the solid waste should be disposed off site at an authorized facility.

7.4 BURIED HAZARDOUS WASTE-CONTAINING OR PETROLEUM-CONTAINING SOILS OR SOLID WASTE, SEPARATE FROM TANK AREAS

Based on existing subsurface information presented herein, GZA does not recommend removal of soil or buried solid waste prior to site redevelopment. There are no apparent source areas of groundwater contamination or localized "hot spots" separate from tank areas. However, GZA does recommend field screening of soils excavated during site redevelopment activities for metals using a hand-held x-ray fluorescence analyzer and for VOCs using a PID to segregate excavated materials for characterization and determination of final disposition. Laboratory analytical testing for metals, PAHs, and VOCs should be performed in connection with characterization of excavated soils.

7.5 SURFICIAL SOILS

Based on correspondence with Mr. Robert Minicucci of the NHDES, the arsenic concentrations detected in surficial soil samples are representative of background concentrations.

7.6 GROUNDWATER QUALITY MONITORING,PERMITTING, AND GROUNDWATER MANAGEMENT ZONE

Due to detect concentrations of several metals and naphthalene above GW-1 standards and possible closure of the on-site solid waste area, GZA recommends groundwater quality monitoring in accordance with a GMP, pursuant to Env-Wm 1403.12. The Groundwater Management Zone (GMZ) identified in the GMP should include the area of the existing buildings, and former WWTP and adjacent storage. A proposed limit for the GMZ is shown on Figure 2. While the term of a GMP is typically five years, groundwater quality monitoring under a GMP can be expected to continue indefinitely with GMP renewal every five years due to the presence of solid waste.

In consideration of the incongruent timing of the petroleum and non-petroleum investigations and remedial measures, and early stage of site redevelopment planning, GZA recommends that a GMP for petroleum issues be implemented initially without inclusion of monitoring for non-petroleum issues. At a later date, tentatively late Summer of 2001, when solid waste issues have been addressed and site redevelopment plans are better defined, then the petroleum-related GMP can be revised to include non-petroleum-related groundwater quality monitoring.

7.7 ACTIVITY AND USE RESTRICTIONS

Activity and Use Restrictions (AURs) are site controls that protect human health and the environment when potential hazards, such as buried solid waste and contaminated groundwater, are present on site. A GMP to establish a program to monitor contaminated groundwater is one type of de-facto AUR that should be implemented at the site, as described above. Solid

waste permitting is another type of de-facto AUR. If no solid waste permit is required, then an excavation AUR should be implemented to establish protocols for managing solid waste or contaminated soils and groundwater that may be encountered during future excavations. The excavation AUR would address excavation procedures (including health and safety), and environmental testing and management of materials excavated during site development or maintenance. Based on correspondence with Mr. Minicucci of the NHDES, formulation of AURs should wait until after the solid waste permitting issues are addressed.

7.8 PARTIAL LIABILITY OF RELEASE

Based on the findings presented in this report, GZA recommends that the City request the NHDES issue a Certificate of Partial Completion for site-wide hazardous waste (non-petroleum) issues. This certificate would be issued following agreement of solid waste permitting/registration and/or closure requirements, GMP modification, and specific AURs, if any, with the NHDES. After on-site petroleum-issues have been abated, on-site solid waste issues have been addressed to the satisfaction of the NHDES, and specific AURs, if any, have been implemented, GZA recommends that the City request a comprehensive Certificate of Completion and/or a Certificate of No Further Action.

8.0 REFERENCES

DOCUMENTS

- Novotny, Robert F., "The Geology of the Seacoast Region, New Hampshire," 1969.
- Morgan, "Phase I Archeological Assessment, Cocheco River Dredging Project, Dover, NH," September 1984.
- Dunn, "Draft Environmental Site Assessment Report," dated July 24, 1991;
- Dunn, "Follow-Up Phase I Environmental Site Assessment Report," dated February 7, 1992;
- TWM, "Assessment for UST Closure," dated February 8, 1996;
- CEH-JW, "Site Investigation Report," dated November 1997;
- JWC, "Remedial Action Plan," dated May 3, 1999; and
- Granite State Explorations' test boring logs for proposed WWTP expansion (not realized), performed 1976 to 1978.

PHOTOGRAPHS

- Obtained from New Hampshire Department of Transportation

  1. November 1962, #124423 369, scale: 1 inch = 200 feet
  2. March 1979, USDA #33017 374 29, scale: 1 inch = 200 feet
  3. 1981, USDA #33017-180-48A, scale: 1 inch = 400 feet

4. April 11, 1989, #B52 635, scale 1 inch = 400 feet

- Obtained from The City, Engineer's Office

5. August 17, 1951, No identification number, scale: 1 inch = 100 feet.

MAPS

- Obtained from The City, Engineer's Office

1. 1967 Topographic map, Sheets 86 and 97, Compiled and Controlled by James W. Sewall Company of Old Town, Maine by photogrammetric methods from aerial photographs dated November 30, 1967, Scale 1 inch = 100 feet

- Obtained from GZA's in-house files

2. 1956 (Photorevised 1973 and 1988) USGS Quadrangle, Dover East, ME - NH,

Scale: 1:24,000 Culture and drainage in part compiled from aerial photographs taken 1943. Topography by planetable surveys 1944. Culture revised by the Geological Survey 1956

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TABLES

TABLE 1
LABORATORY ANALYTICAL RESULTS - SOIL, mg/kg

Dover Department of Public Works
River Street, Dover, New Hampshire

Chemical Name	Standard (mg/kg)		TEST PIT SAMPLES																SURFICIAL SOIL SAMPLES										
	S-1	S-2	TP - 1 11-12 ft.	TP - 2 5-7 ft.	TP - 3 11-11.5 ft.	TP - 4 5-6 ft.	TP-4A DUP TP-4	TP - 5 5.5-6 ft.	TP - 6 4-5 ft.	TP - 8 3-4 ft.	TP - 9 2-3 ft.	TP - 10 6-7 ft.	TP - 11 4-5 ft.	TP - 12 4-5 ft.	TP - 13 2-3 ft.	TP - 14 7-9 ft.	TP - 18 2-3 ft.	TP2-5 5.5-7.5 ft.	TP2-16 3-5 ft.	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SS-6A DUP SS-6	SS-7	SS-8	SS-9	SS-10	Equipment Blank
Metals																													
Arsenic	12	12	-	3	9	8	<2	-	5	<2	<2	<2	<2	<2	-	<2	-	3	4	17	19	21	14	6	13	14	16	14	11	25	0.02
Barium	750	2500	-	380	730	64	66	-	18	58	48	67	37	74	-	150	-	63	83	43	17	47	31	16	24	24	22	37	13	76	0.13
Cadmium	32	230	-	2.6	1.8	0.5	0.5	-	0.4	0.4	0.6	7.3	5.7	0.8	-	4.6	-	1.5	1.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.001
Chromium	Note 7	Note 7	-	77	65	24	25	-	23	48	62	240	43	1800	-	260	-	55	40	36	27	32	15	9.2	14	13	11	13	2.9	20	0.002
Lead	400	400	-	1300	1600	450	870	-	71	200	250	180	36	140	-	630	-	97	250	49	10	42	31	22	34	35	100	56	26	37	< 0.01
Mercury	1	7	-	0.5	0.5	0.8	0.6	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	1.2	-	<0.2	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.0002
Selenium	260	2500	-	<2	<2	<2	<2	-	<2	<2	<2	<2	<2	<2	-	<2	-	<2	<2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 0.05
Silver	45	200	-	2.1	2.1	0.2	<0.2	-	<0.2	<0.2	0.4	0.9	<0.2	0.3	-	1	-	<0.2	<0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.005
PAHs/ABNs																													
Naphthalene	5	5	-	<0.2	<0.2	<3	<2	8.7	<4	<0.2	<0.2	4.4	-	<0.3	<0.2	-	-	0.7	0.8	<0.040	-	-	<0.040	<0.040	<0.080	<0.080	<0.400	-	-	-	<0.0001
2-methylnaphthalene	150	150	-	<0.2	<0.2	<3	<2	8.3	<4	<0.2	<0.2	1.4	-	<0.3	<0.2	-	-	0.2	1.6	<0.040	-	-	<0.040	<0.040	<0.080	<0.080	<0.400	-	-	-	<0.0001
Acenaphthylene	300	300	-	0.3	<0.2	<3	3	0.3	<4	<0.2	0.4	<0.3	-	<0.3	<0.2	-	-	<0.2	<0.3	<0.040	-	-	0.16	<0.040	<0.080	<0.080	<0.400	-	-	-	<0.0001
Acenaphthene	270	270	-	<0.2	<0.2	<3	3	<0.2	<4	<0.2	<0.2	3.2	-	<0.3	<0.2	-	-	<0.2	0.4	<0.040	-	-	<0.040	<0.040	<0.080	<0.080	0.5	-	-	-	<0.0001
Fluorene	810	2500	-	<0.2	<0.2	4	5	0.3	<4	<0.2	0.2	4.3	-	<0.3	<0.2	-	-	<0.2	0.6	<0.040	-	-	<0.040	<0.040	<0.080	<0.080	0.5	-	-	-	<0.0001
Phenanthrene	Note 5	Note 5	-	0.3	0.9	41	37	0.8	5	0.7	2.2	23	-	0.5	<0.2	-	-	1.2	2.3	0.19	-	-	0.15	<0.040	0.2	0.2	5	-	-	-	<0.0001
Anthracene	1000	1700	-	<0.2	0.3	12	12	0.4	<4	0.2	0.7	6.8	-	<0.3	<0.2	-	-	0.2	0.5	0.05	-	-	0.07	<0.040	<0.080	<0.080	1.1	-	-	-	<0.0001
Fluoranthene	810	2500	-	0.8	2	73	49	2.3	16	1.1	6.1	22	-	0.7	<0.2	-	-	<0.2	2	0.42	-	-	0.33	0.09	0.49	0.45	5.5	-	-	-	<0.0001
Pyrene	Note 5	Note 5	-	1.1	1.9	120	44	2.8	24	1.1	5.4	19	-	0.7	<0.2	-	-	1.1	0.8	0.41	-	-	0.57	0.14	0.53	0.53	4.4	-	-	-	<0.0001
Benzo[a]anthracene	0.7	2	-	0.8	1	63	24	1.6	21	0.6	3.1	12	-	0.4	<0.2	-	-	0.5	0.8	0.23	-	-	0.23	0.06	0.28	0.25	2.2	-	-	-	<0.0001
Chrysene	70	200	-	0.9	1	60	23	1.6	18	0.6	3	12	-	0.4	<0.2	-	-	0.6	0.9	0.22	-	-	0.22	0.06	0.28	0.27	1.9	-	-	-	<0.0001
Benzo[b]fluoranthene	7	20	-	1	1	35	25	2	7	0.6	2.4	9.4	-	0.4	<0.2	-	-	0.4	1	0.29	-	-	0.46	0.12	0.39	0.44	2.7	-	-	-	<0.0001
Benzo[k]fluoranthene	7	20	-	1.4	0.8	26	20	1.4	9	0.4	2.5	8.6	-	<0.3	<0.2	-	-	0.2	0.8	0.23	-	-	0.28	0.09	0.36	0.29	1.7	-	-	-	<0.0001
Benzo[a]pyrene	0.7	0.7	-	1.3	1	37	24	1.7	9	0.5	2.6	10	-	0.4	<0.2	-	-	0.4	0.6	0.2	-	-	0.27	0.07	0.26	0.25	2.1	-	-	-	<0.0001
Indeno[1,2,3-cd]pyrene	0.7	2	-	0.5	<0.2	21	8	0.8	<4	<0.2	1.4	4.7	-	<0.3	<0.2	-	-	<0.2	<0.3	0.05	-	-	0.1	<0.040	<0.080	<0.080	0.7	-	-	-	<0.0001
Dibenz[a,h]anthracene	0.7	0.7	-	<0.2	<0.2	<3	3	<0.2	<4	<0.2	<0.2	<0.3	-	<0.3	<0.2	-	-	<0.2	<0.3	<0.040	-	-	0.07	<0.040	<0.080	<0.080	<0.400	-	-	-	<0.0001
Benzo[g,h,i]perylene	Note 5	Note 5	-	0.4	0.5	21	8	0.8	<4	<0.2	1.3	4.3	-	<0.3	<0.2	-	-	<0.2	<0.3	0.04	-	-	0.1	<0.040	<0.080	<0.080	0.7	-	-	-	<0.0001
VOCs																													
Toluene	100	100	<0.05	-	<0.05	<0.05	<0.05	2.7	<0.05	-	<0.06	<0.05	<0.05	-	<0.06	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	2	2	<0.05	-	0.49	<0.05	<0.05	<0.5	0.11	-	0.16	<0.05	<0.05	-	<0.06	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	NA	NA	<0.05	-	<0.05	<0.05	<0.05	<0.5	<0.05	-	<0.06	<0.05	0.07	-	<0.06	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	NA	NA	<0.05	-	0.36	<0.05	<0.05	<0.5	<0.05	-	<0.06	<0.05	<0.05	-	<0.06	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	140	140	<0.05	-	<0.05	<0.05	<0.05	6	<0.05	-	<0.06	<0.05	<0.05	-	<0.06	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xylenes	500	1000	<0.05	-	<0.05	<0.05	<0.05	66	<0.05	-	<0.06	<0.05	<0.05	-	<0.06	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
iso-Propylbenzene	123	123	<0.05	-	<0.05	<0.05	<0.05	53	<0.05	-	<0.06	<0.05	<0.05	-	<0.06	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
n-Propylbenzene (AB)	Note 6	Note 6	<0.05	-	<0.05	<0.05	<0.05	4.1	<0.05	-	<0.06	<0.05	<0.05	-	<0.06	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene (AB)	Note 6	Note 6	<0.05	-	<0.05	<0.05	<0.05	19	<0.05	-	<0.06	<0.05	<0.05	-	<0.06	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
sec-Butylbenzene (AB)	Note 6	Note 6	<0.05	-	<0.05	<0.05	<0.05	0.9	<0.05	-	<0.06	<0.05	<0.05	-	<0.06	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
p-isopropyltoluene (AB)	Note 6	Note 6	<0.05	-	<0.05	<0.05	<0.05	0.7	<0.05	-	<0.06	<0.05	<0.05	-	<0.06	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	6	9	<0.05	-	<0.05	<0.05	<0.05	<0.5	<0.05	-	<0.06	<0.05	0.06	-	<0.06	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	5	5	<0.3	-	<0.3	<0.3	<0.3	4	<0.3	-	<0.4	<0.3	<0.3	-	<0.3	-	<0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene (AB)	Note 6	Note 6	<0.05	-	<0.05	<0.05	<0.05	61	<0.05	-	<0.06	<0.05	<0.05	-	<0.06	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

1. GZA GeoEnvironmental, Inc. collected grab samples from all test pits during the period from December 20 through December 22, 1999 (TP-series), and on April 11, 2000 (TP2-series). GZA collected surficial soil samples on April 21, 2000. "DUP" refers to a duplicate sample for the indicated exploration.
2. The samples were analyzed by Eastern Analytical, Inc. of Concord, New Hampshire for the eight RCRA metals by EPA Method 6010B, (7174 for Mercury), polynuclear aromatic hydrocarbons (PAHs) and acid/base/neutral extractable (ABNs) compounds (TP-2 and TP-6 only) by EPA Method 8270C and volatile organic compounds (VOCs) by 8260B. Parameters not detected in any samples are not shown.
3. Concentrations are given in units of milligrams per kilogram (mg/kg). "<" indicates not detected for the limit shown. "-" indicates not analyzed.
4. The S-1 and S-2 standards are from the New Hampshire Department of Environmental Services Risk Characterization and Management Policy, dated January 1998. "NA" indicates not applicable or no standard available.
5. The S-1 and S-2 standards for the sum total of the three compounds Benzo (g, h, i) perylene, phenanthrene, and pyrene are 480 and 2,400 mg/kg.
6. The S-1 and S-2 standards for the sum total of alkybenzene compounds (AB) are both 59 mg/kg.
7. The S-1 and S-2 standard for Chromium III are 1,000 and 2,500 mg/kg, respectively. The S-1 and S-2 standard for Chromium VI are 130 and 460 mg/kg, respectively. The detected concentrations are for total Chromium so the S-1 and S-2 standards do not strictly apply.
8. Shading and bolding indicates exceedances of the S-1 standard. Underlining indicates exceedance of the S-2 standard.

TABLE 2
LABORATORY ANALYTICAL RESULTS - GROUNDWATER AT TEST PITS AND MONITORING WELLS, mg/L

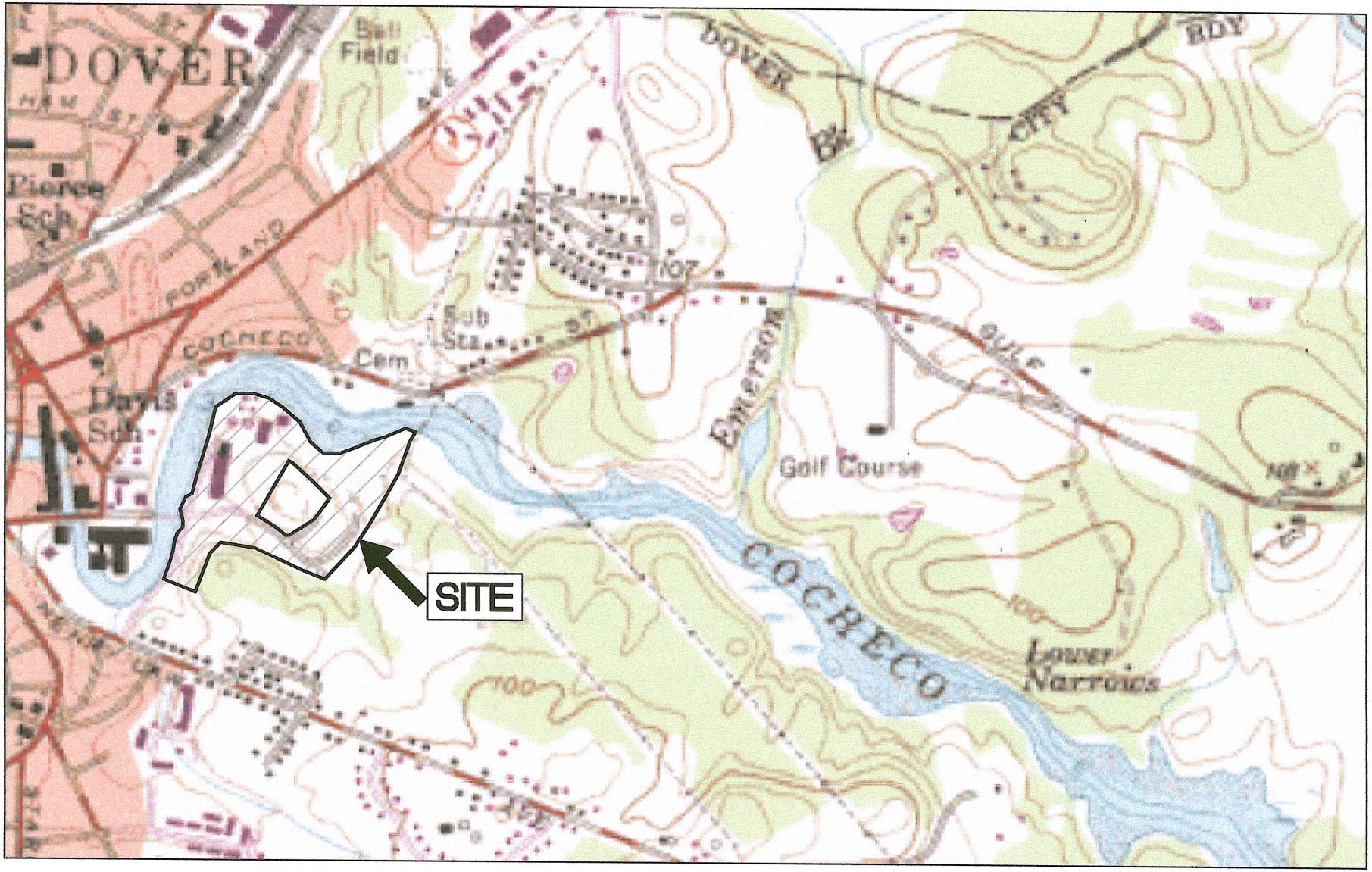
Dover Department of Public Works
River Street, Dover, New Hampshire

Chemical Name	Standard (mg/L) GW-1	Standard (mg/L) GW-2	TEST PITS TP - 2	TP - 3	TP - 4	TP - 4 Dup	TP - 6	TP - 9	TP - 10	TP - 11	TP - 12	TP - 13	TP - 14	TP - 17	MONITORING WELLS WP-1	MW-1	MW-5	MW-8A	MW-8A Dup	MW-10	MW-10 Dup	MW-12	MW-13	MW-14	MW-14 Dup	GZ-1	GZ-2	GZ-3
Metals																												
Arsenic	0.05	NA	0.03	<0.01	<0.01	<0.01	**0.06**	0.05	0.02	--	**0.26**	<0.01	0.05	<0.01	0.03	< 0.01	0.01	**0.06**	--	<0.01	<0.01	**0.29**	0.02	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Barium	2	NA	0.11	0.27	<0.05	<0.05	0.08	0.1	<0.05	--	<0.05	<0.05	0.45	<0.05	0.31	< 0.05	0.07	0.54	--	<0.05	<0.05	0.49	0.83	0.10	< 0.05	< 0.05	0.41	0.28
Cadmium	0.005	NA	0.001	<0.001	<0.001	<0.001	0.004	<0.001	<0.001	--	<0.001	0.002	0.001	<0.001	**0.007**	< 0.001	0.001	0.004	--	<0.001	<0.001	0.003	**0.013**	0.001	0.002	< 0.001	0.004	**0.006**
Chromium (total)	0.1	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	--	**0.14**	0.002	0.007	<0.002	0.018	< 0.002	<0.002	<0.002	--	<0.002	<0.002	<0.002	<0.002	0.002	< 0.002	0.002	0.003	< 0.002
Lead	0.015	NA	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	--	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.01	<0.01	--	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	0.002	<0.001	<0.001
Selenium	0.05	NA	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.05	0.004	<0.05	<0.05	--	<0.05	<0.05	<0.05	<0.05	<0.001	<0.001	<0.005	0.001	<0.001
Silver	0.05	NA	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	--	<0.005	<0.005	<0.005	<0.005	<0.005	< 0.005	<0.005	<0.005	--	<0.005	<0.005	<0.005	<0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
PAHs/ABNs																												
Naphthalene	0.02	6	<0.005	<0.0001	<0.0001	<0.0001	0.0009	0.0021	<0.005	--	0.015	<0.0001	**0.076**	<0.0001	<0.0001	<0.0001	<0.005	<0.01	<0.01	<0.0001	--	**0.26**	0.0085	<0.0001	<0.0001	0.015	0.0031	<0.0001
2-methylnaphthalene	0.28	10	<0.005	<0.0001	0.0002	0.0001	0.0003	0.0001	<0.005	--	0.0019	<0.0001	0.0041	<0.0001	<0.0001	<0.0001	<0.005	<0.01	<0.01	<0.0001	--	0.065	<0.0001	<0.0001	<0.0001	0.02	0.0002	<0.0001
Acenaphthylene	0.42	NA	<0.005	<0.0001	0.0003	0.0002	0.0018	<0.0001	<0.005	--	0.0003	<0.0001	<0.0001	<0.0001	0.0007	<0.0001	<0.005	<0.01	<0.01	0.0001	--	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	0.0005	<0.0001
Acenaphthene	0.42	NA	<0.005	<0.0001	<0.0001	<0.0001	0.0003	<0.0001	<0.005	--	<0.0001	<0.0001	0.01	<0.0001	<0.0001	<0.0001	<0.005	<0.01	<0.01	<0.0001	--	0.007	0.017	<0.0001	<0.0001	<0.0001	0.0088	<0.0001
Fluorene	0.28	NA	<0.005	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.005	--	<0.0001	<0.0001	0.0038	<0.0001	<0.0001	<0.0001	<0.005	<0.01	<0.01	<0.0001	--	0.004	0.0069	<0.0001	<0.0001	<0.0001	0.0062	<0.0001
Phenanthrene	0.21	NA	<0.005	<0.0001	0.001	0.0007	0.0017	0.0003	<0.005	--	<0.0001	<0.0001	0.0043	<0.0001	0.0025	<0.0001	<0.005	<0.01	<0.01	<0.0001	--	0.006	0.0045	<0.0001	<0.0001	0.0006	0.0058	<0.0001
Anthracene	2.1	NA	<0.005	<0.0001	0.0005	0.0004	0.0025	<0.0001	<0.005	--	<0.0001	<0.0001	<0.0001	<0.0001	0.0007	<0.0001	<0.005	<0.01	<0.01	<0.0001	--	0.001	<0.0001	<0.0001	<0.0001	<0.0001	0.0034	<0.0001
Fluoranthene	0.28	NA	<0.005	0.0001	0.0013	0.001	0.0095	0.0002	<0.005	--	0.0031	<0.0001	0.0013	0.0001	0.0052	<0.0001	<0.005	<0.01	<0.01	0.0007	--	0.001	0.0009	<0.0001	<0.0001	<0.0001	0.0052	0.0002
Pyrene	0.21	NA	<0.005	0.0002	0.0013	0.0009	0.0091	0.0003	<0.005	--	0.003	<0.0001	0.0011	0.0001	0.0054	<0.0001	<0.005	<0.01	<0.01	0.0007	--	<0.001	0.001	<0.0001	<0.0001	<0.0001	0.0038	0.0002
Benzo[a]anthracene	0.01	NA	<0.005	<0.0001	0.0009	0.0006	0.0078	<0.0001	<0.005	--	0.0017	<0.0001	<0.0001	<0.0001	0.003	<0.0001	<0.005	<0.01	<0.01	0.0005	--	<0.001	0.0005	<0.0001	<0.0001	<0.0001	0.0017	<0.0001
Chrysene	0.01	NA	<0.005	<0.0001	0.0011	0.0008	0.0067	<0.0001	<0.005	--	0.0017	<0.0001	<0.0001	<0.0001	0.0032	<0.0001	<0.005	<0.01	<0.01	0.0005	--	<0.001	0.0005	<0.0001	<0.0001	<0.0001	0.0013	<0.0001
Benzo[b]fluoranthene	0.01	NA	<0.005	<0.0001	0.001	0.0009	0.0075	0.0002	<0.005	--	0.0016	<0.0001	0.0003	0.0001	0.0029	<0.0001	<0.005	<0.01	<0.01	0.0005	--	<0.001	0.0004	<0.0001	<0.0001	<0.0001	0.001	<0.0001
Benzo[k]fluoranhene	0.01	NA	<0.005	<0.0001	0.0008	0.0006	0.0058	0.0002	<0.005	--	0.0013	<0.0001	0.0002	<0.0001	0.0023	<0.0001	<0.005	<0.01	<0.01	0.0004	--	<0.001	0.0003	<0.0001	<0.0001	<0.0001	0.0009	<0.0001
Benzo[a]pyrene	0.01	NA	<0.005	0.0001	0.001	0.0008	0.007	0.0002	<0.005	--	0.0014	<0.0001	0.0003	<0.0001	0.0026	<0.0001	<0.005	<0.01	<0.01	0.0005	--	<0.001	0.0004	<0.0001	<0.0001	<0.0001	0.0009	<0.0001
Indeno[1,2,3-cd]pyrene	0.01	NA	<0.005	<0.0001	<0.0001	<0.0001	0.0037	<0.0001	<0.005	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.005	<0.01	<0.01	<0.0001	--	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Benzo[g,h,i]perylene	0.21	NA	<0.005	<0.0001	0.0014	0.001	0.0033	<0.0001	<0.005	--	0.0008	<0.0001	<0.0001	<0.0001	0.0017	<0.0001	<0.005	<0.01	<0.01	0.0003	--	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	0.0004	<0.0001
bis(2-Ethylexyl)phtalate	NA	NA	<0.005	--	--	--	--	--	0.008	--	--	--	--	--	--	--	0.035	0.01	<0.01	--	--	--	--	--	--	--	--	--
VOCs																												
Ethylbenzene	0.7	30	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	--	--	--	--	<0.001	--	<0.001	<0.001	--	<0.001	<0.001	--	--	--	--	--	--	--
Isopropylbenzene	0.28	NA	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	--	--	--	--	<0.001	--	<0.001	<0.001	--	<0.001	<0.001	--	--	--	--	--	--	--
Tetrachloroethene	0.005	3000	0.004	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	--	--	--	--	<0.002	--	<0.002	<0.002	--	<0.002	<0.002	--	--	--	--	--	--	--
1,2,4-Trimethylbenzene	0.05	NA	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	--	--	--	--	<0.001	--	<0.001	<0.001	--	<0.001	<0.001	--	--	--	--	--	--	--

Notes:
1. GZA GeoEnvironmental, Inc. collected grab samples from test pits and monitoring wells during the period from December 20 through December 22, 1999. "Dup." refers to a duplicate sample for the indicated well. The sample designation for the duplicate for MW-10 is "MW-01." The sample designation for the duplicate for MW-8A is "MW-8A-DUP."
2. The samples were analyzed by Eastern Analytical, Inc. of Concord, New Hampshire for the eight RCRA metals by EPA Method 6010B (7174 for Mercury), polynuclear aromatic hydrocarbons (PAHs) and acid/base/neutral extractable (ABNs) (TP-2, TP-10, MW-5, and MW-8A only) compounds by EPA Method 8270, and volatile organic compounds (VOCs) by EPA Method 8260B or 8021B. Parameters not detected in any samples are not shown.
3. Concentrations are given in units of milligrams per liter (mg/L), which are approximately equivalent to parts per million. "<" indicated not detected for the limit shown. "-" indicates not analyzed.
4. The GW-1 and GW-2 standards are from the New Hampshire Department of Environmental Services Risk Characterization and Management Policy, dated January 1998. GW-1 standards are equivalent to Ambient Groundwater Quality Standards. "NA" indicates not applicable or no standard available.
5. **Shading and bolding** indicates exceedance of the GW-1 standard.

FIGURES

FILE INFO: 22457\CAD\LOCUS



PROJECT No.: 22457	DOVER PUBLIC WORKS	DES'D BY : J.L.H.	GRAPHIC SCALE 1000' 0' 1000' 2000'
FIGURE No.: 1	RIVER STREET	CHK'D BY : N.J.N.	
	DOVER, NEW HAMPSHIRE	APP'D BY : S.R.L.	
		DRAWN BY: M.A.N.	
	LOCUS PLAN	SCALE : 1"=1000'	
		DATE : AUG. 2000	

GZA GeoEnvironmental, Inc.
Engineers and Scientists
380 HARVEY ROAD
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APPENDIX A

HYDROGEOLOGIC LIMITATIONS

HYDROGEOLOGICAL LIMITATIONS

1. The conclusions and recommendations submitted in this report are based in part upon the data obtained from a limited number of soil samples from widely spaced subsurface explorations. The nature and extent of variations between these explorations may not become evident until further investigation. If variations or other latent conditions then appear evident, it will be necessary to reevaluate the recommendations of this report.

2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil transitions are probably more gradual. For specific information, refer to the boring logs.

3. Water level readings have been made in the test pits, borings and/or observation wells at times and under conditions stated on the exploration logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall and other factors different from those prevailing at the time measurements were made.

4. Except as noted within the text of the report, no quantitative laboratory testing was performed as part of the site assessment. Where such analyses have been conducted by an outside laboratory, GZA GeoEnvironmental, Inc. (GZA) has relied upon the data provided, and has not conducted an independent evaluation of the reliability of these data.

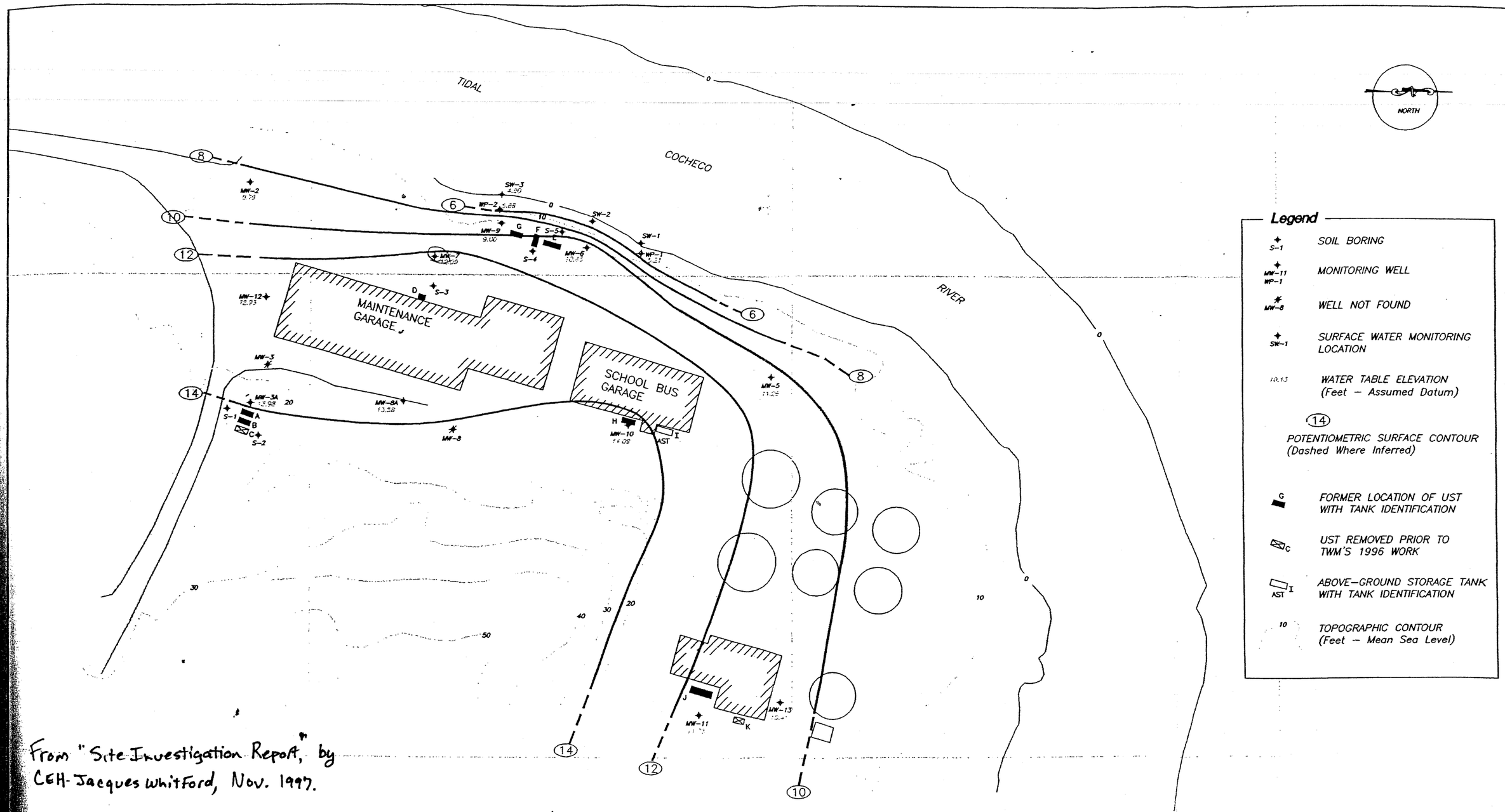
5. The conclusions and recommendations contained in this report are based in part upon various types of chemical data and are contingent upon their validity. These data have been reviewed and interpretations made in the report. As indicated within the report, some of these data are preliminary "screening" level data, and should be confirmed with quantitative analyses if more specific information is necessary. Moreover, it should be noted that variations in the types and concentrations of contaminants and variations in their flow paths may occur due to seasonal water table fluctuations, past disposal practices, the passage of time, and other factors. Should additional chemical data become available in the future, these data should be reviewed by GZA, and the conclusions and recommendations presented therein modified accordingly.

6. Chemical analyses have been performed for specific parameters during the course of this study, as detailed in the text. It must be noted that additional constituents not searched for during the current study may be present in soil and groundwater at the site.

7. It is recommended that this firm be retained to provide further engineering services during design, implementation, and/or construction of any remedial measures, if necessary. This is to observe compliance with the concepts and recommendations contained herein and to allow design changes in the event that subsurface conditions differ from those anticipated.

APPENDIX B

INFORMATION FROM REFERENCED REPORTS



Legend

- S-1 — SOIL BORING
- MW-11 / WP-1 — MONITORING WELL
- MW-8 — WELL NOT FOUND
- SW-1 — SURFACE WATER MONITORING LOCATION
- 13.13 — WATER TABLE ELEVATION (Feet – Assumed Datum)
- (14) — POTENTIOMETRIC SURFACE CONTOUR (Dashed Where Inferred)
- G — FORMER LOCATION OF UST WITH TANK IDENTIFICATION
- C — UST REMOVED PRIOR TO TWM'S 1996 WORK
- AST I — ABOVE-GROUND STORAGE TANK WITH TANK IDENTIFICATION
- 10 — TOPOGRAPHIC CONTOUR (Feet – Mean Sea Level)

From "Site Investigation Report" by CEH-Jacques Whitford, Nov. 1997.

100 0 100
Scale in Feet

NOTE: Base plan adapted from Dunn, 1991

Caswell, Eichler & Hill, Inc.

CEH

CEH OFFICE: PORTSMOUTH, NEW HAMPSHIRE				
DATE PREPARED: 10-6-97	DESIGNED BY: CMT	DRAWN BY: CMT	CHECKED BY: CRG	REVIEWED BY: CRG
REVISION DATE:	REVISION NO:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
FILE NAME: DOVER DPW\BWLMAP	PROJECT NAME/NUMBER: RIVER ST DPW – RI/PET	DRAWING SCALE: 1"=100'	PREPARED FOR: CITY OF DOVER	

DRAWING TITLE:

WATER TABLE MAP

– JUNE 4, 1997 –

FIGURE NO. 3

TABLE 3

CITY OF DOVER
DPW SITE - ENVIRONMENTAL ASSESSMENT

WATER QUALITY DATA (2)

ANALYTES (1)	MCL (3) Nov-91	MW-1 5/21/91	MW-1 9/5/91	MW-2 5/21/91	MW-2 9/5/91	MW-3 5/21/91	MW-3 9/5/91	MW-4 5/21/91	MW-4 9/5/91	MW-5 5/21/91	MW-5 9/5/91	MW-6 5/21/91	MW-6 9/5/91	MW-7 9/5/91 (5)	MW-8 9/5/91 (5)	SW-1 9/5/91	SW-2 9/5/91	SW-3 9/5/91	TP-8 9/19/91	TP-9 9/19/91
VOCs (ug/l)																				
Trichloroethylene	5	2	1.1	BD	BD	BD	BD	BD	BD	BD	BD	BD	BD	BD	BD	ANP	ANP	ANP	BD	BD
1,2 - Dichloroethylene	70	2	1	BD	BD	BD	BD	BD	BD	BD	1.4	BD	BD	BD	BD	ANP	ANP	ANP	BD	BD
Benzene	5	BD	BD	BD	BD	6870	5470	BD	58.1	BD	BD	5480	>3400	BD	BD	ANP	ANP	ANP	BD	13.6
Toluene	1000	BD	BD	BD	BD	>7500	20200	BD	BD	BD	BD	5300	300	BD	BD	ANP	ANP	ANP	BD	BD
Ethylbenzene	700	BD	BD	BD	BD	3847	1440	BD	BD	BD	BD	2810	510	BD	BD	ANP	ANP	ANP	BD	BD
Total Xylenes	10000	BD	BD	BD	BD	19870	32410	323.9	818	BD	BD	12620	>5000	BD	BD	ANP	ANP	ANP	4.4	3.7
Chlorobenzene	100	BD	BD	BD	BD	BD	BD	58.1	48.1	BD	BD	BD	BD	BD	BD	ANP	ANP	ANP	1.3	3.5
Methyl t-butyl Ether	NE	BD	BD	BD	BD	2800	2320	BD	BD	BD	BD	13500	3300	BD	BD	ANP	ANP	ANP	BD	<3.0
TPH (mg/l)	NE	BD	BD	BD	BD	153	110	10.3	1.4	BD	BD	80	10	BD	BD	ANP	ANP	ANP	0.1	0.1
BASE/NEUTRALS (ug/l)																				
2-Methylnaphthalene	NE	ANP	ANP	ANP	BD	ANP	ANP	ANP	BD	ANP	BD	ANP	50	ANP	ANP	ANP	ANP	ANP	ANP	ANP
Naphthalene	~~NE~~ 20	ANP	ANP	ANP	BD	ANP	ANP	ANP	20	ANP	BD	ANP	200	ANP	ANP	ANP	ANP	ANP	ANP	ANP
METALS (ug/l) (4)																				
Arsenic	50	ANP	ANP	BD	ANP	BD	ANP	BD	ANP	BD	ANP	BD	ANP	ANP	ANP	ANP	ANP	ANP	ANP	ANP
Barium	2000	ANP	BD	160	BD	680	BD	550	360	470	BD	1600	BD	BD	BD	ANP	ANP	ANP	190	210
Cadmium	5	ANP	BD	BD	BD	8	BD	7	BD	BD	BD	BD	BD	BD	BD	ANP	ANP	ANP	BD	BD
Chromium	100	ANP	BD	BD	BD	BD	BD	BD	BD	BD	BD	BD	BD	BD	BD	ANP	ANP	ANP	BD	BD
Lead	15*	ANP	BD	BD	BD	60	BD	1200	BD	BD	BD	1600	BD	BD	BD	ANP	ANP	ANP	150	BD
Mercury	2	ANP	BD	0.7	BD	BD	BD	BD	BD	0.6	BD	0.5	BD	BD	BD	ANP	ANP	ANP	BD	BD
Selenium	50	ANP	ANP	BD	ANP	BD	ANP	BD	ANP	BD	ANP	BD	ANP	ANP	ANP	ANP	ANP	ANP	ANP	ANP
Silver	NE	ANP	BD	BD	BD	BD	BD	BD	BD	BD	BD	140	BD	BD	BD	ANP	ANP	ANP	ANP	ANP
Sodium (mg/l)	250**	ANP	280	ANP	360	ANP	400	ANP	160	ANP	90	ANP	750	430	25	15	62	140	ANP	ANP
INORGANICS (mg/l)																				
Chloride	250**	ANP	550	ANP	1000	ANP	500	ANP	170	ANP	110	ANP	580	150	26	18	100	260	ANP	ANP

NOTES: 1. VOCs - Volatile Organic Compounds
TPH - Total Petroleum Hydrocarbons
2. BD - Below Laboratory Detection Limits.
MW - Monitoring Well
SW - Surface Water Sample from Cocheco River
TP - Groundwater Sample from Test Pits in WWTF Storage Area
ANP - Analyses Not Performed.
3. MCL - Maximum Contaminant Level as outlined in USEPA "Drinking Water Regulations and Health Advisories", November 1991.
NE indicates MCL not established
* indicates lead action level equal to 0.015 mg/l as established in USEPA "Drinking water Regulations and Health Advisories" November 1991.
** Enforceable Secondary Maximum Contaminant Level for community public water system under NH Code of Administrative Rules Part Env-Ws 319.01
4 May 1991 samples and September 19, 1991 test pit samples, TP-8 and TP-9, were preserved in the field with nitric acid without filtering.
September 5, 1991 samples were filtered in the laboratory and then preserved with nitric acid.
5. The results from May 1991 were all below the detection limit for VOCs & TPH. These wells were not analyzed for ABN, Chloride, Sodium or metals in May 1991

From "Follow-Up Phase I Environmental Site Assessment" by Dunn Corporation, dated February 7, 19

Table 6
Groundwater Quality Data
Volatile Organic Compounds

Sample ID:	Method 1	MW-2	MW-2	MW-2
Matrix:	Standards	Aqueous	Aqueous	Aqueous
Date Received:	NH GW-1 (GW-2)	9/20/96	10/4/96	10/1/98
Units:	ppb	µg/L	µg/L	µg/L
Date of Analysis:		9/24/96	10/9/96	10/7/98
Analyst:		CWC	TML	JDS
EPA Method:		8260	8020	8060
Dilution Factor:		1	1	1

Note: Shaded Value indicates an exceedance of Method 1 Standards.

NA - Not Available
U - Not detected at the indicated detection limit
NAF - Not Analyzed For
* - Value is for Total Xylenes

Table 6
Groundwater Quality Data
Volatile Organic Compounds

Sample ID:	Method 1	MW-3A		MW-3A		MW-3A	
Matrix:	Standards	Aqueous		Aqueous		Aqueous	
Date Received:	NH GW-1 (GW-2)	9/20/96		10/4/96		6/4/97	
Units:	µg/L	µg/L		µg/L		µg/L	
Date of Analysis:		9/26/96		10/9/96		6/4/97	
Analyst:		CWC		TML		TML	
EPA Method:		8260		8020		*8020(mod)	
Dilution Factor:		10		10		100	
Benzene	5 (2,000)	420		510		500	
Naphthalene	20	20		NAF		900	
Toluene	1,000	20		30		1,600	
Ethylbenzene	700	10	U	10	U	400	
1,2,4-Trimethylbenzene	NA	190		NAF		NAF	
1,3,5-Trimethylbenzene	NA	100		NAF		NAF	
o-Xylene	10000 (6,000)*	720		NAF		6,800	
m,p-Xylene	10000 (6,000)*	730		NAF		11,000	
MTBE	70	4600		3000		2000	U
Total Xylenes	10000 (6,000)	NAF		1500		NAF	

Note: Shaded Value indicates an exceedance of Method 1 Standards.

NA - Not Available
U - Not detected at the indicated detection limit
NAF - Not Analyzed For
* - Value is for Total Xylenes

Table 6
Groundwater Quality Data
Volatile Organic Compounds

Sample ID:	Method 1 Standards NH GW-1 (GW-2) ppb	MW-5	MW-5
Matrix:		Aqueous	Aqueous
Date Received:		9/20/96	10/4/96
Units:		µg/L	µg/L
Date of Analysis:		9/26/96	10/9/96
Analyst:		CWC	TML
EPA Method:		8260	8020
Dilution Factor:		1	1

Note: Shaded Value indicates an exceedance of Method 1 Standards.

NA - Not Available
U - Not detected at the indicated detection limit
NAF - Not Analyzed For
* - Value is for Total Xylenes

Table 6
Groundwater Quality Data
Volatile Organic Compounds

Sample ID:	Method 1 Standards	MW-6		MW-6		MW-6		MW-6	
Matrix:	NH GW-1 (GW-2)	Aqueous		Aqueous		Aqueous		Aqueous	
Date Received:		9/20/96		10/4/96		6/4/97		10/1/98	
Units:	µg/L	µg/L		µg/L		µg/L		µg/L	
Date of Analysis:		9/27/96		10/9/96		6/4/97		10/7/98	
Analyst:		CWC		TML		TML		JDS	
EPA Method:		8260		8020		*8020(mod)		8260	
Dilution Factor:		10		10		100		10	
Benzene	5 (2,000)	2700		2500		1,100		1,600	
sec-Butylbenzene	NA	10	U	NAF		NAF		20	
Ethylbenzene	700	930		1100		700		830	
Isopropylbenzene	NA	50		NAF		NAF		60	
p-Isopropyltoluene	NA	1		NAF		NAF		20	
Naphthalene	20	300		NAF		1,000		300	
n-Propylbenzene	NA	10	U	NAF		NAF		150	
Toluene	1,000	420		70		100	U	40	
1,2,4-Trimethylbenzene	NA	950		NAF		NAF		970	
1,3,5-Trimethylbenzene	NA	190		NAF		NAF		290	
o-Xylene	10000 (6,000)*	950		NAF		300		40	
m,p-Xylene	10000 (6,000)*	2600		NAF		2,300		1,600	
MTBE	70	800		500		2000	U	200	
Total Xylenes	10000 (6,000)	NAF		2700		NAF		NAF	

Note: Shaded Value indicates an exceedance of Method 1 Standards.

NA - Not Available
U - Not detected at the indicated detection limit
NAF - Not Analyzed For
* - Value is for Total Xylenes

Table 6
Groundwater Quality Data
Volatile Organic Compounds

Sample ID:	**Method 1**	MW-7	MW-7
Matrix:	**Standards**	Aqueous	Aqueous
Date Received:	**NH GW-1 (GW-2)**	9/20/96	10/4/96
Units:	**ppb**	µg/L	µg/L
Date of Analysis:		9/27/96	10/9/96
Analyst:		CWC	TML
EPA Method:		8260	8020
Dilution Factor:		1	1

Note: Shaded Value indicates an exceedance of Method 1 Standards.

NA - Not Available
U - Not detected at the indicated detection limit
NAF - Not Analyzed For
* - Value is for Total Xylenes

Table 6
Groundwater Quality Data
Volatile Organic Compounds

Sample ID:	Method 1	MW-8A		MW-8A	
Matrix:	Standards	Aqueous		Aqueous	
Date Received:	NH GW-1 (GW-2)	9/20/96		10/4/96	
Units:	ppb	µg/L		µg/L	
Date of Analysis:		9/25/96		10/9/96	
Analyst:		CWC		TML	
EPA Method:		8260		8020	
Dilution Factor:		1		1	
Toluene	1,000	1	U	6	
2-Butanone (MEK)	170	20		NAF	

Note: Shaded Value indicates an exceedance of Method 1 Standards.

NA - Not Available
U - Not detected at the indicated detection limit
NAF - Not Analyzed For
* - Value is for Total Xylenes

Table 6
Groundwater Quality Data
Volatile Organic Compounds

Sample ID:	Method 1	MW-9		MW-9		MW-9		MW-9	
Matrix:	Standards	Aqueous		Aqueous		Aqueous		Aqueous	
Date Received:	NH GW-1 (GW-2)	9/20/96		10/4/96		6/4/97		10/1/98	
Units:	µg/L	µg/L		µg/L		µg/L		µg/L	
Date of Analysis:		9/25/96		10/9/96		6/4/97		10/7/98	
Analyst:		CWC		TML		TML		JDS	
EPA Method:		8260		8020		*8020(mod)		8260	
Dilution Factor:		10		10		1		10	
Benzene	5 (2,000)	4400		4100		2,100		690	
Ethylbenzene	700	250		240		200		120	
Isopropylbenzene	NA	10	U	NAF		NAF		20	
Naphthalene	20	110		NAF		150		100	
n-Propylbenzene	NA	10	U	NAF		NAF		60	
Toluene	1,000	120		110		45		10	
1,2,4-Trimethylbenzene	NA	170		NAF		NAF		130	
1,3,5-Trimethylbenzene	NA	10		NAF		NAF		10	
o-Xylene	10000 (6,000)*	30		NAF		47		10	U
m,p-Xylene	10000 (6,000)*	340		NAF		500		80	
MTBE	70	1200		900		220		100	U
Total Xylenes	10000 (6,000)	NAF		360		NAF		NAF	

Note: Shaded Value indicates an exceedance of Method 1 Standards.

NA - Not Available
U - Not detected at the indicated detection limit
NAF - Not Analyzed For
* - Value is for Total Xylenes

Table 6
Groundwater Quality Data
Volatile Organic Compounds

Sample ID:	Method 1	MW-10		MW-10	
Matrix:	Standards	Aqueous		Aqueous	
Date Received:	NH GW-1 (GW-2)	9/20/96		10/4/96	
Units:	ppb	µg/L		µg/L	
Date of Analysis:		9/25/96		10/9/96	
Analyst:		CWC		TML	
EPA Method:		8260		8020	
Dilution Factor:		1		1	
Toluene	1,000	1	U	8	
total Xylenes	10000 (6,000)	NAF		12	

Note: Shaded Value indicates an exceedance of Method 1 Standards.

NA - Not Available
U - Not detected at the indicated detction limit
NAF - Not Analyzed For
* - Value is for Total Xylenes

Table 6
Groundwater Quality Data
Volatile Organic Compounds

Sample ID:	**Method 1 Standards NH GW-1 (GW-2) ppb**	MW-11		MW-11		MW-11	
Matrix:		Aqueous		Aqueous		Aqueous	
Date Received:		9/20/96		10/4/96		6/4/97	
Units:		µg/L		µg/L		µg/L	
Date of Analysis:		9/25/96		10/9/96		6/4/97	
Analyst:		CWC		TML		TML	
EPA Method:		8260		8020		*8020(mod)	
Dilution Factor:		1		1		1	
Benzene	5 (2,000)	19		16		11	
sec-Butylbenzene	NA	2		NAF		NAF	
Chlorobenzene	100.	6		1	U	NAF	
1,4-Dichlorobenzene	75	1		NAF		NAF	
Ethylbenzene	700	1	U	6		1	
Isopropylbenzene	NA	5		NAF		NAF	
p-Isopropyltoluene	NA	6		NAF		NAF	
Naphthalene	20	75		NAF		65	
1,2,4-Trimethylbenzene	NA	15		NAF		NAF	
1,3,5-Trimethylbenzene	NA	1		NAF		NAF	
o-Xylene	10000 (6,000)*	1		NAF		1	U
m,p-Xylene	10000 (6,000)*	6		NAF		3	
2-Butanone (MEK)	170	20		NAF		NAF	
Total Xylenes	10000 (6,000)	NAF		7		NAF	

Note: Shaded Value indicates an exceedance of Method 1 Standards.

NA - Not Available
U - Not detcted at the indicated detection limit
NAF - Not Analyzed For
* - Value is for Total Xylenes

Table 6
Groundwater Quality Data
Volatile Organic Compounds

Sample ID:	Method 1	MW-12		MW-12	
Matrix:	Standards	Aqueous		Aqueous	
Date Received:	NH GW-1 (GW-2)	6/4/97		10/1/98	
Units:	µg/L	µg/L		µg/L	
Date of Analysis:		6/9/97		10/7/98	
Analyst:		JDS		JDS	
EPA Method:		8260		8260	
Dilution Factor:		100		100	
Benzene	5 (2,000)	3,100		3,100	
sec-Butylbenzene	NA	10	U	20	
Ethylbenzene	700	2,000		1,700	
Isopropylbenzene	NA	100		90	
Naphthalene	20	300		360	
Toluene	1,000	500		60	
n-Propylbenzene	NA	200		200	
1,2,4-Trimethylbenzene	NA	1,400		1,000	
1,3,5-Trimethylbenzene	NA	200		190	
o-Xylene	10000 (6000)*	1,000		80	
m,p-Xylene	10000 (6000)*	5,400		2,900	
MTBE	70	3,000		2,900	

Note: Shaded Value indicates an exceedance of Method 1 Standards.

NA - Not Available
U - Not detected at the indicated detection limit
NAF - Not Analyzed For
* - Value is for Total Xylenes

Table 6
Groundwater Quality Data
Volatile Organic Compounds

Sample ID:	Method 1	MW-13		MW-13	
Matrix:	Standards	Aqueous		Aqueous	
Date Received:	NH GW-1 (GW-2)	6/4/97		10/1/98	
Units:	ppb	µg/L		µg/L	
Date of Analysis:		6/11/97		10/7/98	
Analyst:		JDS		JDS	
EPA Method:		8260		8260	
Dilution Factor:		1		1	
Benzene	5 (2,000)	7		2	
Chlorobenzene	100	7		4	
Naphthalene	20	49		48	
Toluene	1,000	1	U	2	
o-Xylene	10000 (6000)*	1		1	U
m,p-Xylene	10000 (6000)*	1		1	U

Note: Shaded Value indicates an exceedance of Method 1 Standards.

NA - Not Available
U - Not detected at the indicated detection limit
NAF - Not Analyzed For
* - Value is for Total Xylenes

Table 6
Groundwater Quality Data
Volatile Organic Compounds

Sample ID:	Method 1 Standards	WP-1		WP-1	
Matrix:		Aqueous		Aqueous	
Date Received:	NH GW-1 (GW-2)	9/20/96		10/4/96	
Units:	ppb	µg/L		µg/L	
Date of Analysis:		9/25/96		10/9/96	
Analyst:		CWC		TML	
EPA Method:		8260		8020	
Dilution Factor:		1		1	
Naphthalene	20	1		NAF	

Note: Shaded Value indicates an exceedance of Method 1 Standards.

NA - Not Available
U - Not detected at the indicated detection limit
NAF - Not Analyzed For
* - Value is for Total Xylenes

Table 6
Groundwater Quality Data
Volatile Organic Compounds

Sample ID:	Method 1	WP-2	WP-2	WP-2
Matrix:	Standards	Aqueous	Aqueous	Aqueous
Date Received:	NH GW-1 (GW-2)	9/20/96	10/4/96	6/4/97
Units:	µg/L	µg/L	µg/L	µg/L
Date of Analysis:		9/25/96	10/9/96	6/4/97
Analyst:		CWC	TML	TML
EPA Method:		8260	8020	*8020(mod)
Dilution Factor:		1	1	1
Benzene	5 (2,000)	41	20	200
Toluene	1,000	NAF	NAF	1
o-Xylene	10000 (6000)*	NAF	NAF	1
Naphthalene	20	NAF	NAF	3
MTBE	70	480	500	650

Note: Shaded Value indicates an exceedance of Method 1 Standards.

NA - Not Available
U - Not detected at the indicated detection limit
NAF - Not Analyzed For
* - Value is for Total Xylenes

Table 7
Groundwater Quality Data
Polynuclear Aromatic Hydrocarbons

Sample ID:	Method 1	MW-9		MW-10		MW-11		MW-13	
Matrix:	Standards	Aqueous		Aqueous		Aqueous		Aqueous	
Date Received:	NH GW-1	9/20/96		9/20/96		9/20/96		6/4/97	
Units:	ppb	µg/L		µg/L		µg/L		µg/L	
Date of Extraction:		9/24/96		9/24/96		9/24/96		6/5/97	
Date of Analysis:		9/26/96		9/26/96		9/26/96		6/12/97	
Analyst:		TDS		TDS		TDS		TDS	
EPA Method:		8270		8270		8270		8270	
Naphthalene	20	52		5	U	40		71	
2-Methylnaphthalene	280	5	U	5	U	25		5	U

NA - Not Available
U - Not detected at the indicated detection limit
Shaded Value indicates an exceedance of Method 1 Standards

Table 8
Surface Water Quality Data
Volatile Organic Compounds

Sample ID:	Method 1	SW-1	SW-2	SW-2	SW-3	SW-3
Matrix:	Standard	Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Date Received:	NH GW-1 (GW-2)	9/20/96	9/20/96	10/1/98	9/20/96	10/1/98
Units:	ppb	µg/L	µg/L	µg/L	µg/L	µg/L
Date of Analysis:		9/27/96	9/27/96	10/7/98	9/27/96	10/7/98
Analyst:		TML	TML	JDS	TML	JDS
EPA Method:		8020	8020	8260	8020	8260
Dilution Factor:		1	1	1	1	1

U - Not detected at the indicated detection limit
Shaded Value indicates an exceedance of Method 1 Standards

TEST PIT LOG

DUNN GEOSCIENCE CORPORATION
Village West, Box 7078
Laconia, NH 03246

DATE STARTED 9-11-91 TIME — JOB NO. 09791

DATE FINISHED 9-11-91 TIME — TEST PIT NO. FTP-1

CLIENT CITY of DOVER - DPW SITE DPW Garage Fuel Island

SURFACE ELEVATION — EXCAVATOR DPW

DATUM — EQUIPMENT Backhoe

WATER ELEVATION NONE INSPECTOR Garret Graaskamp

FT. DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
0			0-1' Brown, med. to coarse SAND, tr - Med to coarse Gravel, dry.	PID = Ø strong petrol. odor from excavation
			1-3' Olive-gray to Black, coarse SAND, tr - med to coarse Gravel, dry/damp. Refuse: garden hose, copper pipe, framing wood (2x4), brick	PID = 1830ppm
5			3-7' Black, coarse SAND, tr - Med. to coarse Gravel, damp. Refuse: framing wood, brick	PID = 1808ppm
			7-10' Light to med. Blue-gray to Olive-gray CLAY, damp	NATURAL GROUND PID ~1100ppm
10			BOH - 10' NO LEDGE NO GROUNDWATER	
			SOIL SAMPLE TP-1 is a composite sample of material from FTP-1, 1-10' and FTP 2, 1'-10'.	
15				

TEST PIT LOG

DUNN GEOSCIENCE CORPORATION
Village West, Box 7078
Laconia, NH 03246

DATE STARTED 9-11-91 TIME — JOB NO. C8781

DATE FINISHED 9-11-91 TIME — TEST PIT NO. FTP-2

CLIENT CITY OF DOVER - DPW SITE DPW Garage Fuel Island

SURFACE ELEVATION — EXCAVATOR DPW

DATUM — EQUIPMENT Backhoe

WATER ELEVATION 4.5' ± BGS INSPECTOR Garret Graustein

DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
0			0-1' Brown, med. to coarse SAND, tr + fine to med. Gravel, damp	PID = 0 ppm
			1-2' Dark Brown to Olive-gray Brown med. to coarse SAND, tr - med. to coarse Gravel, damp	PID = 4000 ppm
5			2-4.5' Black to Dark Brown, med to coarse SAND, tr fine Gravel damp to moist Refuse: brick, wood, metal stripping	PID = 2500 ppm
			4.5-10' Light to mod. Blue-gray CLAY Moist.	NATURAL GROUND
10			BOH = 10'	
			NO LEDGE	
			GROUNDWATER @ 4.5'	
15			SOIL SAMPLE: TP-1 is a composite sample of Material from FTP-1 1-10' and FTP-2 1-10'.	

TEST PIT LOG

DUNN GEOSCIENCE CORPORATION
Village West, Box 7078
Laconia, NH 03246

DATE STARTED 9-11-91 TIME — JOB NO. 03781

DATE FINISHED 9-11-91 TIME — TEST PIT NO. FTP-3

CLIENT City of Dover - DPW SITE Cocheco River Fuel Island

SURFACE ELEVATION — EXCAVATOR DPW

DATUM — EQUIPMENT Backhoe

WATER ELEVATION 6.5' ± BGS INSPECTOR Garret Graustamp

DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
0			0 - 0.3' Asphalt 0 - 1.5' Light Brown, fine to coarse SAND little + fine Gravel, dry	PID = 0 ppm no odor
			1.5 - 2.0' Asphalt	
			2.0 - 3.0' Black to mod. Yellow-brown fine to coarse SAND, little + coarse Gravel (crushed stone included), dry	PID = 1886 ppm
5			3.0 - 5.0' Black to Brown-black, med. to coarse SAND, tr - Gravel, damp. Refuse: brick	PID = 1723 ppm
			5.0 - 9.0' Gray-olive to Light-olive fine SAND, wet	NATURAL GROUND
10			BOH = 9.0' NO LEDGE GROUNDWATER @ 6.5'	
			SOIL SAMPLE TP-3 is a composite sample of material from FTP-3, 2-9' and FTP-4, 0-7.5'.	
15				

TEST PIT LOG

DUNN GEOSCIENCE CORPORATION
Village West, Box 7078
Laconia, NH 03246

DATE STARTED 9-11-91 TIME — JOB NO. 08781

DATE FINISHED 9-11-91 TIME — TEST PIT NO. FTP-4

CLIENT CITY OF DOVER - DPW SITE Cocheco River Fuel Island

SURFACE ELEVATION — EXCAVATOR DPW

DATUM — EQUIPMENT Backhoe

WATER ELEVATION 7' ± BGS INSPECTOR Garret Grassthemp

DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
0			0-7.5' Dusky Yellow Brown medium to coarse SAND, little coarse Gravel (includes crushed stone), trace cobbles and boulders to 24"	PID=1782 ppm @ ~5 feet
5				Fill to BOH
10			BOH = 7.5' NO LEDGE GROUNDWATER @ ~7'.	
15			SOIL SAMPLE TP-3 is a composite sample of material from FTP-3, 2-9' and FTP-4, 0-7.5'.	

TEST PIT LOG

DUNN GEOSCIENCE CORPORATION
Village West, Box 7078
Laconia, NH 03246

DATE STARTED 9/19/91 TIME — JOB NO. 08781

DATE FINISHED 9/19/91 TIME — TEST PIT NO. TP-2

CLIENT City of Dover - DPW SITE Treatment Plant Storage

SURFACE ELEVATION — EXCAVATOR Dennis Lirotte

DATUM — EQUIPMENT Backhoe

WATER ELEVATION ± 8 FT BGS INSPECTOR Mark Ledgard

DEPTH (FT.)	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
0			2" Broken Asphalt w/ Pel-Bs, fine to coarse SAND, gravel & Cobbles 2-6" Gray, fine SAND, little silt 6-12" Grayish-White, fine - medium SAND 12-14" Roots & Wood shavings	
			1.5-3' Brown, fine to medium SAND, few organic silts	
5			3-6' Olive-Gray, fine SAND, SILT and CLAY (Possible Dredgings)	
10			6-11' Municipal Solid Waste (wood, metal, glass, rubber, sand and gravel) mixed w/ sand, gravel and silt	
			11-12' light Gray, SILT and CLAY	Original Ground ±
			END OF TEST PIT @ 12 FEET	
15			- Photovac TIP Meter Readings <1PPM [illegible] Soil Samples From [illegible] Feet [illegible] Composite [illegible] (S[illegible]1)	

TEST PIT LOG

DUNN GEOSCIENCE CORPORATION
Village West, Box 7078
Laconia, NH 03246

DATE STARTED 9/19/91 TIME — JOB NO. 08781

DATE FINISHED 9/19/91 TIME — TEST PIT NO. TP-1

CLIENT CITY OF DOVER - DPW SITE TREATMENT PLANT STORAGE

SURFACE ELEVATION — EXCAVATOR DENNIS LIBOTTE

DATUM — EQUIPMENT BACKHOE

WATER ELEVATION ±8 Ft. BGS INSPECTOR MARK LEDGARD

(FT.) DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
0			0-1' Yellow-Brown, fine to Medium SAND	
			1-4' Olive-Gray, fine SAND, little gravel and cobbles to 5in. Dia., few silt	
			4-5' WOOD and ROOTS	① ②
5			5-8' Olive-Gray, fine SAND, little gravel and cobbles to 5in. Dia., few silt	
10			8-12' Municipal Solid Waste (newspaper, bottles, wood, brick, metal, sand, gravel)	Original Ground ±1
			12-14' Light Olive-Gray, SILT and CLAY	
15			END OF TEST PIT @ 14 FEET	
			(1) – Thermo TIP Meter Readings all <1ppm	
			(2) – LEATHER HIDES @ 4-6 Ft on ONE SIDE OF TEST PIT Wall	

TEST PIT LOG

DUNN GEOSCIENCE CORPORATION
Village West, Box 7078
Laconia, NH 03246

DATE STARTED	9/19/91	TIME	—	JOB NO.	08781
DATE FINISHED	9/19/91	TIME	—	TEST PIT NO.	TP-3
CLIENT	City of Dover - DPW			SITE	Treatment Plant Storage
SURFACE ELEVATION	—			EXCAVATOR	Dennis Lirotte
DATUM	—			EQUIPMENT	Backhoe
WATER ELEVATION	±10 Ft. BGS			INSPECTOR	Mark Ledgard

(FT.) DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
0			0-1' Red-Brown, fine to Medium SAND, few fine gravel	
			1-2' Gray, f. SAND, little silt, few Cs-fg, Cobbles 5' Dia.	
			2-5' Brown, fine to medium SAND, few Organic Silts	
5			5' Thin layer of Roots	
			5-9.5' Olive-Gray, fine SAND, SILT and CLAY w/occasional Brick, metal & cloth pieces	
10			9.5-12' Municipal Solid Waste w/fine SAND, SILT and CLAY Dredgings	
			12-14' LEATHER HIDES and Municipal Solid Waste	
			14+' Gray, SILT and CLAY	Original Ground ±14'
15			END OF TEST PIT @ 14 FEET	
			- Photovac TIP Meter Readings <1 PPM	
			- [illegible] Site [illegible] (ST-1)	

TEST PIT LOG

DUNN GEOSCIENCE CORPORATION
Village West, Box 7078
Laconia, NH 03246

DATE STARTED 9/19/91 TIME — JOB NO. 08781

DATE FINISHED 9/19/91 TIME — TEST PIT NO. TP-4

CLIENT City Of Dover - DPW SITE Treatment Plant Storage

SURFACE ELEVATION — EXCAVATOR Dennis Lipotte

DATUM — EQUIPMENT Backhoe

WATER ELEVATION None Observed INSPECTOR Mark Ledgard

DEPTH (FT.)	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
0			0-1' Brown, f-m SAND, little silt, few Cs - fg	
			1-2' Brown, f-m SAND, few Organic Silt	
			2-5' Misc. fill (ie., rubber, metal, glass wood) mixed w/ f. SAND, SILT & CLAY Boulders	
5				Original Ground ± 5'
			5-11' light Olive-Yellow, fine SAND, few silt	
10				
			11-12' Gray, SILT & CLAY	
			END OF TEST PIT @ 12 FEET	
			-Ambient TIP Meter Readings < 1 PPM	
15				

TEST PIT LOG

DUNN GEOSCIENCE CORPORATION
Village West, Box 7078
Laconia, NH 03246

DATE STARTED 9/19/91 TIME — JOB NO. 08781

DATE FINISHED 9/19/91 TIME — TEST PIT NO. TP-5

CLIENT CITY OF DOVER - DPW SITE TREATMENT PLANT STORAGE

SURFACE ELEVATION — EXCAVATOR DENNIS LIBOTTE

DATUM — EQUIPMENT BACKHOE

WATER ELEVATION ±11 FT. BGS INSPECTOR MARK LEDGARD

(FT.) DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
0			0-1' Yellow-Brown, fine to Coarse SAND & GRAVEL, few Silt	
			1-4' Dark Gray, fine SAND, Little m-C sand, and f-C gravel, few cobbles to 5 in. Dia, few silt mixed w/Municipal Solid Waste (ie. rubber, glass, wood, metal)	
5			4-6' Decomposed Organic Matter, wood pieces and logs	
			6-10' Dredgings of Gray, f SAND, SILT & CLAY	
10			10-11' light Olive, fine SAND, few Silt	
			11-12' Municipal Solid Waste (ie., glass, metal, leather Hides)	
			12'+ Gray, SILT and CLAY	
			END OF TEST PIT @ 12 FEET - Photovac TIP Meter Readings < 1PPM - Collected Soil Sample From 6-8 Ft. for Composite Sample (ST-1)	
15				

TEST PIT LOG

DUNN GEOSCIENCE CORPORATION
Village West, Box 7078
Laconia, NH 03246

DATE STARTED 9/19/91 TIME — JOB NO. 08781

DATE FINISHED 9/19/91 TIME — TEST PIT NO. TP-6

CLIENT City Of Dover - DPW SITE Treatment Plant Storage

SURFACE ELEVATION — EXCAVATOR Dennis Lirette

DATUM — EQUIPMENT Backhoe

WATER ELEVATION ±10 FEET GGS INSPECTOR Mark Ledgard

DEPTH (FT.)	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
0			0-6" Red-Brown, fine-Coarse SAND, little f-C gravel	
			0.5-5' Drk. Gray-Black, fine SAND, little fine-Coarse gravel, little silt, little cobbles to 5 inch Dia. Mixed w/ msw & CD (bricks, metal, glass, rubber, wood)	
5			5-7' Logs, Wood Planks & misc. wood	
			7-9' Light Olive, fine SAND, few silt w/ clods of Olive Gray silt & clay (Dredgings)	
10			9-11' ASH w/wood shavings and paper	
			11-12' light Olive Gray, fine SAND, little silt	Original Ground
			END OF TEST PIT @ 12 FEET	
15			- Nothing TIP Meter Readings <.1 PPM	

TEST PIT LOG

DUNN GEOSCIENCE CORPORATION
Village West, Box 7078
Laconia, NH 03246

DATE STARTED 9/19/91 TIME — JOB NO. 08781

DATE FINISHED 9/19/91 TIME — TEST PIT NO. TP-7

CLIENT City Of Dover - DPW SITE Treatment Plant Storage

SURFACE ELEVATION — EXCAVATOR Dennis Lirette

DATUM — EQUIPMENT Backhoe

WATER ELEVATION ±8 FT. BGS INSPECTOR Mark Ledgard

(FT.) DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
0			0-1' Red-Brown, f-C SAND, Little f-C gravel	
			1-7' Dk. Gray, fine SAND, little f-C gravel, Cobbles ½ Inch Dia, little silt mixed w/ MSW & CD (Bricks, Glass, Rubber, Wood, Paper)	
5			7-8' Brown, loam	
			8-10' Leather Hides and Misc. MSW	
10			10-12' Light Olive-Gray, fine SAND, few silt	Original Ground
			END OF TEST PIT @ 12 FEET - Photovac TIP Meter Readings < 1PPM - Collected Soil Samples @ 7 FEET for Composite Sample (ST-1)	
15				

TEST PIT LOG

DUNN GEOSCIENCE CORPORATION
Village West, Box 7078
Laconia, NH 03246

DATE STARTED 9/19/91 TIME — JOB NO. 08781

DATE FINISHED 9/19/91 TIME — TEST PIT NO. TP-8

CLIENT City of Dover - DPW SITE Treatment Plant Storage

SURFACE ELEVATION — EXCAVATOR Dennis [illegible]

DATUM — EQUIPMENT Backhoe

WATER ELEVATION ±8 Ft. BGS INSPECTOR Mark Ledgard

DEPTH (FT.)	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
0			0-1' Yellow-Brown, fine - Medium SAND	
			1-5' Olive-Gray, fine SAND, little silt, few Coarse gravel & [illegible] to 3 inch. Dia.	
5			Layer of Asphalt @ 5 feet	
			5-8' Olive, fine SAND, little silt	
			Layer of [illegible] @ 8 feet (Peat)	— Original Ground
			8-10' Dk. Olive Gray, fine SAND, little silt	
10'			End of Test Pit @ 10 feet	
			- [illegible] TIP Meter Readings [illegible] Due To [illegible]	
			— [illegible] Pit Located Downgradient [illegible] Pit	
15			- [illegible] Water Sample [illegible]	

TEST PIT LOG

DUNN GEOSCIENCE CORPORATION
Village West, Box 7078
Laconia, NH 03246

DATE STARTED 9/19/91 TIME — JOB NO. 08781

DATE FINISHED 9/19/91 TIME — TEST PIT NO. TP-9

CLIENT CITY OF DOVER - DPW SITE TREATMENT PLANT STORAGE

SURFACE ELEVATION — EXCAVATOR DENNIS LIPOTTE

DATUM — EQUIPMENT BACKHOE

WATER ELEVATION ± 8 FT. BGS INSPECTOR MARK LEDGARD

DEPTH (FT.)	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
0			0-1' Yel. Fine - Medium SAND	
			1-5' Olive Gray, fine SAND, little silt, few fine gravel [illegible] to Sandy Silt.	
5			Layer of Asphalt @ 5 FT	
			5-8' Olive, fine SAND, little silt	
			Layer of [illegible] @ 8 FT	
			8-10' Dark Olive Gray, fine SAND, little silt	
10			END OF TEST PIT @ 10 FEET	
			- Thermo TIP Methane Readings Not Taken Due To Traffic	
			- Test Pit Location Upgradient of Monitoring Well	
15			- Collect 1 Water Sample TP-9	

TEST PIT LOG

DUNN GEOSCIENCE CORPORATION
Village West, Box 7078
Laconia, NH 03246

DATE STARTED 9/19/91 TIME — JOB NO. 08781

DATE FINISHED 9/19/91 TIME — TEST PIT NO. TP-10

CLIENT City Of Dover - DPW SITE Treatment Plant Storage

SURFACE ELEVATION — EXCAVATOR Dennis Lizotte

DATUM — EQUIPMENT Backhoe

WATER ELEVATION — INSPECTOR Mark Ledgard

(FT.) DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
0			0-6" Loam w/Grass Roots	
			0.5-1.5' Brown, fine SAND, Little Silt	
			1.5-4' Olive-Gray, fine SAND, Little Silt	
5			4-10' Olive-Gray fine SAND, Little Silt mixed with CD (Logs, Wood, Brick, Metal, Boulders, Leather Hides)	
10			10-12' Light Olive, fine SAND, Little Silt	Original Ground
			End Of Test Pit @ 12 Feet	
			- Photovac TIP Meter Readings < 1 PPM	
15				

TEST PIT LOG

DUNN GEOSCIENCE CORPORATION
Village West, Box 7078
Laconia, NH 03246

DATE STARTED 9/19/91 TIME — JOB NO. 08781

DATE FINISHED 9/19/91 TIME — TEST PIT NO. TP-11

CLIENT City Of Dover - DPW SITE Treatment Plant Storage

SURFACE ELEVATION — EXCAVATOR Dennis Lisotte

DATUM — EQUIPMENT Backhoe

WATER ELEVATION ±4 Ft. BGS INSPECTOR Mark Ledgard

(FT.) DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
0			0-6" Loam w/Grass Roots	
			6-12" Yel.-Br., fine-Medium SAND	
5			1-8' Drk. Gray, fine SAND and SILT Mixed w/MSW & CD, few pieces of leather Hides	
				Original Ground
10			8-10' Gray SILT and CLAY	
			END OF TEST PIT @ 10 FEET	
			-Photovac TIP Meter Readings < 1 PPM	
15				

DUNN GEOSCIENCE CORP.
Laconia, N. H. (603) 528-4005

TEST BORING / WELL CONSTRUCTION LOG

PROJECT: Dover DPW Facility — BORING NO. B-1
CLIENT: City of Dover — SHEET 1 OF 1
DRILLING CONTRACTOR: Kennedy Drilling — JOB. NO. 08763
PURPOSE: Monitoring Well Installation — ELEV. H.P. / GR.

GROUNDWATER DATA					CASING	SAMPLE	CORE	WELL
DATE	W.L.	DATE	W.L.	TYPE	HSA	SS	—	PVC
				DIAM	4" ID	2 1/4"	—	2" ID
				WEIGHT	—	140 lbs	—	
				FALL	—	30"	—	

DATUM
STARTED: 5/7/91
COMPLETED: 5/7/91
DRILLER: Kevin Kennedy
INSPECTOR: Mark Leggard

DEPTH FT.	SAMPLE NUMBER	BLOWS PER 6"	WELL CONSTRUCTION	IDENTIFICATION	REMARKS
0	S-1 Rec. 6"	5, 13, 13, 10		10YR 3/2, f-m SAND, few C. sand - f. gravel	OPPM TIP Meter Reading
				Bricks, gravel, ash, rubber fill on Augers	
5	S-2 Rec. 6"	8, 15, 10, 9		2.5Y 4/4, f-m SAND w/ clay brick, ASH, coal	OPPM TIP Meter Reading 5-6' Augers Grinding On Cobbles
10	S-3 Rec. 24"	1, 2, 1, 2		5Y 4/3 - 5/1, SILT, little f. sand w/4" lenses of 5Y 3/2 f. sand, few silt	Drk alluvial accumulation of organic matter?, 2-3" dia. Collected Sample B-1 for laboratory analyses at a depth of 9.8-10.5'
15	S-4 Rec. 21"	7, 4, 7, 4		4" 5Y 4/1, f-c SAND, few silt 9" 5Y 5/2, CLAY, little silt 4" 2.5Y 5/4, f-m SAND 4" 2.5Y 5/0, SILT, little clay	
				END OF BORING @ 16.8 FEET	

LEGEND: SCREEN: RISER: SAND PACK: BENTONITE: BACKFILL:

DUNN GEOSCIENCE CORP.
Laconia, N. H. (603) 528-4005

TEST BORING / WELL CONSTRUCTION LOG

PROJECT Dover DPW Facility — BORING NO. B-2
CLIENT City of Dover — SHEET 1 OF 1
DRILLING CONTRACTOR Kennedy Drilling — JOB. NO. 08763
PURPOSE Monitoring Well Installation — ELEV. H.P. ____ GR. ____

GROUNDWATER DATA					CASING	SAMPLE	CORE	WELL	DATUM
DATE	W.L.	DATE	W.L.	TYPE	HSA	SS	—	PVC	STARTED: 5/8/91
				DIAM	4"ID	2 1/4"	—	2"ID	COMPLETED: 5/8/91
				WEIGHT	—	140lbs	—		DRILLER Kevin Kennedy
				FALL	—	30"	—		INSPECTOR Mark Leggard

DEPTH FT.	SAMPLE NUMBER	BLOWS PER 6"	WELL CONSTRUCTION	IDENTIFICATION	REMARKS
0	S-1 Rec. 8"	1, 2, 2, 1		Gravel Fill	
5	S-1 Rec. 8"	1, 2, 2, 1		Fill Ash, cinders, coal, glass Layered w/ 10YR 3/6 f-m sand	0ppm TIP Meter Reading. Throughout Fill.
	S-2 Rec. 11"	2, 2, 2, 2			
	S-3 Rec. 11"	1, 2, 2, 4			
10	S-4	4, 2, 1, 4			
	S-5 Rec. 2"	4, 4, 3			
15	S-6 Rec. 22"	4, 4, 11, 13		2" Fill 16" fine Sandy loam (Top Soil) 4" Highly Decomposed rock	Collected Sample B-2 from a depth of 14.5-15.5 ft.
				End Of Boring @ 16.5 Feet	

LEGEND: SCREEN: RISER: SAND PACK: BENTONITE: BACKFILL:

DUNN GEOSCIENCE CORP. Laconia, N.H.	TEST BORING / WELL CONSTRUCTION LOG

PROJECT Dover DPW Facility	BORING NO. MW-1
CLIENT City of Dover	SHEET 1 OF 1
DRILLING CONTRACTOR Kennedy Drilling	JOB NO. 08763
PURPOSE Monitoring Well Installation	ELEV. MP. / GR.

GROUNDWATER					CASING	SAMPLE	CORE	WELL	DATUM
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS	—	PVC	STARTED: 5/6/91
				DIAMETER	4" ID	2 1/4"	—	2" ID	COMPLETED: 5/6/91
				WEIGHT		140 lbs	—	DRILLER Kevin Kennedy	
				FALL		30"	—	INSPECTOR Garret Graaskamp	

DEPTH FT.	SAMPLE NUMBER	BLOWS PER 6"	WELL CONSTRUCTION	IDENTIFICATION	REMARKS
			cement	4" ASPHALT	
	S-1	18	Quartz Sand	6" 5YR 4/4, m-c SAND, trace⊖ f. gravel, dry	10" Cobble below Asphalt
	R=0.9'	17		2" N2-N1, m-c SAND trace⊖ f. gravel tar petroleum-base odor, dry	NO ODOR, Ø ppm TIP 5 ppm TIP meter reading
	(S-1B)	9		As @ 1.0' in Return; trace petroleum odor at 4.0'.	
	(1.6-18')	8	Bentonite		
5	S-2	4		10YR 4/2 - 5/4, f⊕m SAND, trace⊖ f Gravel dry to damp	Ø ppm TIP METER READING NO ODOR
	R=1.1'	5			
		7			
		9		7.0'	
			Quartz Sand	FILL ± NATURAL	
10	S-3	7		Mottled coloring 5YR 3/4 to 5Y 5/6 to 10YR 6/2 f SAND, wet @ ~9.0'	2 ppm TIP METER READING NO ODOR
	R=1.7'	6			
		10			
		18			
15	S-4	2		10 GY 5/2 fm SAND wet	<1 ppm TIP METER READING NO ODOR "Flowing Sand"
	R=0.4'	2			
		1			
		1		17.0'	
	S-5	9		As @ 14.5' w/ trace f Gravel, wet.	≤1 ppm TIP METER READING NO ODOR
	R=0.1'	14			
		18			
20		21		BOH = 20.0'	

LEGEND - Screen: Sand: Gravel: Soil Backfill: Bentonite: Cement Grout:

DUNN GEOSCIENCE CORP.
Laconia, N.H.

TEST BORING / WELL CONSTRUCTION LOG

PROJECT DOVER DPW FACILITY — BORING NO. MW-2

CLIENT CITY OF DOVER — SHEET 1 OF 1

DRILLING CONTRACTOR KENNEDY DRILLING — JOB NO. 08763

PURPOSE MONITORING WELL INSTALLATION — ELEV. MP. GR.

GROUNDWATER					CASING	SAMPLE	CORE	WELL	DATUM
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS	—	PVC	STARTED: 5/6/91
				DIAMETER	4" ID	2 1/4"	—	2" ID	COMPLETED: 5/6/91
				WEIGHT		140 Lbs	—	DRILLER KEVIN KENNEDY	
				FALL		30"	—	INSPECTOR GARRET GRAASKAMP	

DEPTH FT.	SAMPLE NUMBER	BLOWS PER 6"	WELL CONSTRUCTION	IDENTIFICATION	REMARKS
	S-1 R=1.3'	22, 49, 54, 38	Cement; quartz sand; Bentonite	4" Asphalt Irregular coloring 5Y 4/1, N2-N1, 5YR 4/4-3/4 fmc SAND, trace ⊖ f Gravel, dry	< 2 ppm TIP METER READING NO ODOR Coal pieces FILL ±
5	S-2 R=1.3'	6, 27, 28, 24		10YR 5/4, f⊕m SAND, trace ⊖ Gravel Damp, dense	Natural < 2 ppm TIP METER READING NO ODOR
			7.0'		
			quartz sand		
10	S-3 R=1.4'	14, 24, 26, 31		10YR 5/4, fmc SAND, trace f Gravel wet, dense, poorly sorted wet @ ~9'	< 2 ppm TIP METER READING NO ODOR
15		31, 62, 63, 71		5Y 4/4-4/6, fmc SAND, trace ⊖ Silt, trace ⊖ f Gravel dry to damp	< 1 ppm TIP METER READING TILL, NO ODOR perched water on top of till
			17.0		
20	S-5 R=.2'	31, 68, 100/.2'	19.4' to 20.7' BOH=20.7'	10YR 4/2, fmc SAND, trace f Gravel, wet	< 2 ppm TIP METER BEDROCK REFUSAL

LEGEND - Screen: Sand: Gravel: Soil Backfill: Bentonite: Cement Grout:

DUNN GEOSCIENCE CORP. Laconia, N.H.	TEST BORING / WELL CONSTRUCTION LOG

PROJECT DOVER DPW FACILITY	BORING NO. MW-3
CLIENT CITY OF DOVER	SHEET 1 OF 1
DRILLING CONTRACTOR KENNEDY DRILLING	JOB NO. 08763
PURPOSE MONITORING WELL INSTALLATION	ELEV. MP. / GR.

GROUNDWATER					CASING	SAMPLE	CORE	WELL	
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS	—	PVC	DATUM
				DIAMETER	4" ID	2¼"	—	2" ID	STARTED: 5/6/91
				WEIGHT		140 lbs	—		COMPLETED: 5/6/91
				FALL		30"	—		DRILLER KEVIN KENNEDY
									INSPECTOR GARRET GRUSKAY

DEPTH FT.	SAMPLE NUMBER	BLOWS PER 6"	WELL CONSTRUCTION	IDENTIFICATION	REMARKS
5	S=1 R=0.9'	21 28 33	cement; grout & sand; bentonite; grout & sand (4.0)	10YR 5/4 to 3/2 fmc SAND, trace ⊕ fm Gravel dry	50 ± ppm TIP METER READING "OLD GAS" ODOR red brick piec
	S=2 R=1.0'	3 3 100/0.3'	natural (6.0')	5YR 4/2 mc SAND, little ⊕ fm Gravel	FILL
				5YR 3/2 - 4/2 SILT and CLAY, stiff, wet	NATURAL 50 ± ppm TIP METER READING strong "OLD GAS" ODOR
10				BEDROCK	
				BOH = 6.5' water @ ~5.7'	REFUSAL AT 6.5 BEDROCK
15					
20					

LEGEND - Screen: Sand: Gravel: Soil Backfill: Bentonite: Cement Grout:

Project: River St DPW - RI/PET			Boring #: MW-3A
Client: City of Dover			Sheet 1 of 1
Contractor: NH Boring		Date Begun: 9/4/96	Overburden Drilled: 17'
Method: Auger / Split Spoon	Casing Size	Completed: 9/4/96	Rock Drilled
Ground Elevation	PID: HNU-PI-101 (11.7 eV)	Protection Level: D	▽ Below Ground: 10.5'
Logged By: CMT	Checked By	Date	Site: Dover DPW

Depth (ft)	PID Ambient Air	Sample #	Sample Interval	Rec / Pen	Jar-Headspace (ppm)	Soil/Rock Description	Lithologic Symbol	Well Construction	SPT Blows/6 in. or RQD %	Elevation (ft)
0–2	0.0			1'/2'	90	Light brown fine/medium sand, no odor		Silica [illegible]; Bentonite; 2" PVC Riser	2/2/4/3	
5–7				1.5'/2'	0.0	5.5-[illegible]: Grey/brown fine medium sand no odor [illegible]: Asphalt debris [illegible]-7.0: Brown/grey fine coarse sand, no odor		Sand Pack	7/7/6/10	
10–12		MW-3A	X	2'/2'	180	10-10.5: Dark brown silty fine sand petroleum odor 10.5-10.8: Dark brown silty fine sand w/ some wood debris 10.8-12.0: Grey/brown striated clay	▽	Sand Pack	12/14/14/15	
15–17				1'/2'	80	Saturated grey silty clay with some rock fragments @ total depth			6/15/34/38	
17						EOB @ 17.0'				

NOTES: - Completed installation of MW-3A @ 15.0' with 10' screen (2" OD)

- Secured with road box

CEH

CASWELL, EICHLER & HILL, INC.

GEOLOGY HYDROGEOLOGY GEOPHYSICS ENGINEERING

DUNN GEOSCIENCE CORP. Laconia, N. H. (603) 528-4005	TEST BORING / WELL CONSTRUCTION LOG
PROJECT Dover DPW Facility	BORING NO. MW-
CLIENT City of Dover	SHEET 1 OF 1
DRILLING CONTRACTOR Kennedy Drilling	JOB. NO. 0876
PURPOSE Monitoring Well Installation	ELEV. H.P. / GR.

GROUNDWATER DATA					CASING	SAMPLE	CORE	WELL	DATUM
DATE	W.L.	DATE	W.L.	TYPE	HSA	SS	—	PVC	STARTED: 5/7/91
				DIAM	4"ID	2 1/4"	—	2"ID	COMPLETED: 5/7/
				WEIGHT	—	140lbs	—		DRILLER Kevin Kennedy
				FALL	—	30"	—		INSPECTOR Mark Leonard

DEPTH FT.	SAMPLE NUMBER	BLOWS PER 6"	WELL CONSTRUCTION	IDENTIFICATION	REMARKS
0		5	Cement →	2" Grass and Roots	
	S-1 Rec. 20"	5 4 3		18" 5Y 4/1, f-m SAND, little silt, glass, wood	1.4 PPM TIP Meter Reading
5	S-2 Rec. 24"	2 3 12 12		18" SAME / 6" 5Y 5/2 f. SAND, few silt	1.0 PPM TIP Meter Reading
10	S-3 Rec. 12"	2 3 8 6		Wood, glass, paper fill; organic matter, w/f. SAND and silt	15.9 PPM TIP Meter Reading
	S-4 Rec. 0"	15 19 23 23		LEATHER / HIDES	Hard Augering 12' to 15'
16				END OF BORING @ 15 FEET	

LEGEND: SCREEN: RISER: SAND PACK: BENTONITE

DUNN GEOSCIENCE CORP. Laconia, N. H. (603) 528-4005	TEST BORING / WELL CONSTRUCTION LOG

PROJECT Dover DPW. Facility — BORING NO. M

CLIENT City of Dover — SHEET 1 OF 1

DRILLING CONTRACTOR Kennedy Drilling — JOB. NO. 0876

PURPOSE Monitoring Well Installation — ELEV. H.P. / GI

DATUM

STARTED: 5/7/

COMPLETED: 5/7

DRILLER Kevin Kenne

INSPECTOR Mark Leoca

GROUNDWATER DATA

DATE	W.L.	DATE	W.L.

	CASING	SAMPLE	CORE	WELL
TYPE	HSA	SS	—	PVC
DIAM	4"ID	2¼"	—	2"ID
WEIGHT	—	140lbs	—	
FALL	—	30"	—	

DEPTH FT.	SAMPLE NUMBER	BLOWS PER 6"	WELL CONSTRUCTION	IDENTIFICATION	REMARKS
0	S-1 Rec. 12"	28, 25, 23, 23	CEMENT →	2.5Y 6/3, f-m SAND, few C. sand - f. gravel	0PPm TIP MET READING
	S-2 Augers			Black, f-m SAND, few silt, few C. Sand	Augers SAMPLE
5	S-3 Rec. 24"	1, 1, 1, 1		5Y 3/2, f. SAND, illuvial Black organic Mutteles (4" dia.)	0PPm TIP METS READING
				12" 5Y 5/1, f. SAND, few silt	
10	S-4 Rec. 20"	3, 2, 1, 2		10" 5Y 6/1, f. SAND, few silt	
				10" 5Y 4/2, f. SAND, few silt, D.O.M	0PPm TIP METS READING
15	S-5 Rec. 24"	1, 1, 1		2.5Y 5/0, CLAY, few silt	0PPm TIP METS READING
				END OF BORING @ 16.5 FEET	

LEGEND: SCREEN: RISER: SAND PACK: BENTONITE: BACKFILL:

DUNN GEOSCIENCE CORP. Laconia, N. H. (603) 528-4005	TEST BORING / WELL CONSTRUCTION LOG
PROJECT Dover DPW Facility	BORING NO. MW-6
CLIENT City of Dover	SHEET 1 OF 1
DRILLING CONTRACTOR Kevin Kennedy	JOB. NO. 08763
PURPOSE Monitoring Well Installation	ELEV. H.P. / GR.

GROUNDWATER DATA					CASING	SAMPLE	CORE	WELL	
DATE	W.L.	DATE	W.L.	TYPE	HSA	SS	—	PVC	DATUM
				DIAM	4" ID	2¼"	—	2" ID	STARTED: 5/7/91
				WEIGHT	—	140lbs	—		COMPLETED: 5/7/9
				FALL	—	30"	—		DRILLER Kevin Kennedy
									INSPECTOR Mark Ledgard

DEPTH FT.	SAMPLE NUMBER	BLOWS PER 6"	WELL CONSTRUCTION	IDENTIFICATION	REMARKS
0	S-1 Rec. 20"	9, 6, 6, 6	Cement	6" 5Y 3/1, f-M SAND, few M-C sand, glass, brick 14" 5Y 3/1 f. SAND, few silt	1.0 PPM TIP Meter Reading Fill: end of spoon rubber, paper, leather
5	S-2 Rec. 20"	4, 5, 1, 2		5Y 3/1, f-M SAND, little silt	270 PPM TIP Meter Reading Strong Gas Odor Wet at 5'
10	S-3 Rec. 6"	14, 40, 12, 11		2.5Y 2/0, f-M SAND and 1" dia. crushed stone	50 PPM TIP Meter Reading Strong Gas Odor
				End of Boring @ 11.5 Feet	

LEGEND: SCREEN: RISER: SAND PACK: BENTONITE: BACKFILL:

DUNN GEOSCIENCE CORP.
Laconia, N. H. (603) 528-4005

TEST BORING / WELL CONSTRUCTION LOG

PROJECT Dover DPW Facility
CLIENT City of Dover
DRILLING CONTRACTOR Kennedy Drilling
PURPOSE Monitoring Well Installation

BORING NO. MW
SHEET 1 OF 1
JOB. NO. 087(
ELEV. H.P. | GI
DATUM
STARTED: 5/8/9
COMPLETED: 5/8/
DRILLER Kevin Kenn
INSPECTOR Mark Leogard

GROUNDWATER DATA

DATE	W.L.	DATE	W.L.

	CASING	SAMPLE	CORE	WELL
TYPE	HSA	SS	—	PVC
DIAM	4"ID	2¼"	—	2"ID
WEIGHT	—	140lbs	—	
FALL	—	30"	—	

DEPTH FT.	SAMPLE NUMBER	BLOWS PER 6"	WELL CONSTRUCTION	IDENTIFICATION	REMARKS
0			Cement	3" ASPHALT	
	S-1	54		6" 10YR 3/2, f-c SAND, few C. gravel	
	Rec.	44		6" 10YR 5/6, f-c SAND, few C. gravel	1 PPM TIP METER READING
	12"	30			
	S-2			Black, f-M SAND, few C. gravel	Auger SAMPLE
5	S-3	2		2" 2.5Y 5/4, fine SAND	
	Rec.	4		4" 5Y 4/2, ASH FILL, CINDERS w/ f-c sand	0.5 PPM TIP M READIN
	8"	5			
		4			
10	S-4	3		5Y 5/2, 5Y 5/4, fine SAND, little silt	0.5PPM TIP Mete READING
	Rec.	3			
	19"	2			
		2			
15	S-5	8		6" 5Y 4/1, f-c SAND, CRUSHED STONE (1" dia.)	
	Rec.	20			0.5 PPM TIP Mete READING
	14"	17		6" 10YR 4/6, f-c SAND, few f. gravel	
		18			
				END OF BORING @ 16.5 FEET	

LEGEND: SCREEN: RISER: SAND PACK: BENTONITE: BACKFILL:

DUNN GEOSCIENCE CORP. Laconia, N. H. (603) 528-4005	TEST BORING / WELL CONSTRUCTION LOG
PROJECT Dover DPW Facility	BORING NO. MW-1
CLIENT City of Dover	SHEET 1 OF 1
DRILLING CONTRACTOR Kennedy Drilling	JOB. NO. 0876.
PURPOSE Monitoring Well Installation	ELEV. H.P. / GR.
GROUNDWATER DATA	DATUM
DATE / W.L. / DATE / W.L.	STARTED: 5/8/91
	COMPLETED: 5/8/
	DRILLER Kevin Kennedy
	INSPECTOR Mark Leogard

	CASING	SAMPLE	CORE	WELL
TYPE	HSA	SS	—	PVC
DIAM	4" ID	2 1/4"	—	2" ID
WEIGHT	—	140 lbs	—	
FALL	—	30"	—	

DEPTH FT.	SAMPLE NUMBER	BLOWS PER 6"	WELL CONSTRUCTION	IDENTIFICATION	REMARKS
0	S-1 Rec. 6"	4 6 5 4	Cement	2.5Y 5/6, f-C SAND and GRAVEL SATURATED	0 PPM TIP Meter Reading
				3.5' CLAY on AUGERS	
5	S-2 Rec. 24"	2 2 3 3		2.5Y 5/3, 2.5Y 5/4, CLAY	0 PPM TIP Meter Reading
10	S-3 Rec. 24"	1 1 1 3		8" 2.5Y 5/0 CLAY w/last 6" 10YR 4/6, fine SAND lenses (1/8")	0 PPM TIP Meter Reading
				END OF BORING @ 11.8 FEET	

LEGEND: SCREEN RISER SAND PACK

Project River St DPW - RI/FS			Boring # MW-8A
Client City of Dover			Sheet 1 of 1
Contractor NH Boring		Date Begun 9/5/96	Overburden Drilled 10'
Method Auger / Split Spoon	Casing Size	Completed 9/5/96	Rock Drilled
Ground Elevation	PID HNU-PI-101 (11.7 eV)	Protection Level	▽ Below Ground 6.0'
Logged By CMT	Checked By	Date	Site Dover DPW

Depth (ft)	PID Ambient Air	Sample #	Sample Interval	Rec / Pen	Jar-Headspace (ppm)	Soil/Rock Description	Lithologic Symbol	Well Construction	SPT Blows/6 in. or RQD % (0 20 40 60 80 100)	Elevation (ft)
0	0			1.5/2	5	GREY/BROWN FINE/MEDIUM SAND, SOME GRAVEL. PETROLEUM STAINING (Fill)			18/30/30/24	
2										
4										
6		SS-8A		6"/2'	6	DARK GREY FINE/MEDIUM SAND, SOME SILT				
8				1.7/2	4	8.5-8.7: GREY SILTY FINE SAND 8.7-9.1: GREY SILT 9.1-10: GREY SILT w/ ROCK FRAGMENTS, ORGANIC ODOR			6/11/9/17	
10						EOB @ 10'				

NOTES: COMPLETED INSTALLATION OF MW-8A @ 10' WITH 8' SCREEN (2" DIA) - SECURED WITH LOCK BOX

CEH

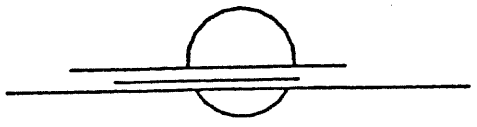
CASWELL, EICHLER & HILL, INC.

GEOLOGY HYDROGEOLOGY GEOPHYSICS ENGINEERING

Project	River St DPW - Rt 1 PET			Boring # MW-9
Client	City of Dover			Sheet 1 of 1
Contractor	NH Boring		Date Begun 2/5/96	Overburden Drilled 7'
Method:	Auger / Split Spoon	Casing Size	Completed 2/5/96	Rock Drilled
Ground Elevation		PID HNU-PI-101 (11.7eV)	Protection Level D	▽ Below Ground 10.3'
Logged By	CMT	Checked By	Date	Site Dover DPW

Depth (ft)	PID Ambient Air	Sample #	Sample Interval	Rec / Pen	Jar-Headspace (ppm)	Soil/Rock Description	Lithologic Symbol	Well Construction	SPT Blows/6 in. or RQD % (0 20 40 60 80 100)	Elevation (ft)
0	0			1.2/2	2.0	Brown Fine Medium Sand w/ some gravel and organics			2/5/7/6	
2										
4										
6		MW-9		1.5/2	6.0	3" Brown Fine Sand 3" Tan Silt 1" Grey Clay 6" Grey Brown Silt 3" Grey Clayey Silt			1/1/2/5/7	
8										
10				1.4/2	6.0	3" Grey/Brown Clayey Silt 1.5" Saturated Grey Fine/Medium Sand w/ Silt 1" Grey Clay 4" Grey Sandy Silt 6" Grey Clay	▽	Sand Pack	1/5/8/10	
12										
14										
16				2'/2'	22	Grey Saturated Clay			1/1/1/2	
18						EOB @ 17.0'				

NOTES: Completed Installation of MW-9 @ 15.0' with 10' Screen (2" dia)
- Secured with Road Box



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CASWELL, EICHLER & HILL, INC.

GEOLOGY HYDROGEOLOGY GEOPHYSICS ENGINEERING

Project: River St. DPW - RI/FS				Boring # MW-10
Client: City of Dover				Sheet 1 of 1
Contractor: NH Boring		Date Begun: 9/5/96		Overburden Drilled: 10'
Method: Auger/Split Spoon	Casing Size	Completed: 9/5/96		Rock Drilled
Ground Elevation	PID: HNU - PI-101 (11.7 eV)	Protection Level		Below Ground: 3.5'
Logged By: CMT	Checked By	Date		Site: Dover DPW

Depth (ft)	PID Ambient Air	Sample #	Sample Interval	Rec/Pen	Jar-Headspace (ppm)	Soil/Rock Description	Lithologic Symbol	Well Construction	SPT Blows/6 in. or RQD %	Elevation (ft)
0	0			5"/2'	20	0-2' GREY FILL 2-3' NO RECOVERY! 3-3.5' BROWN MEDIUM SAND		2" DIA SCH 40	3/2/1/1	
2		MW-10		1"/2'	2	3.5-4.0 GREY SILT W/ ROCK FRAGMENTS AND SOIL STAINING @ BOTTOM STRONG PETROLEUM ODOR			3/5/4/3	
4										
6										
8				2'/2'	50	GREY/BROWN CLAY SOME BROWN SILTY SAND			8/12/19/26	
10						EOB @ 10'				

NOTES: Soil based installation of MW-10 @ 10' with 8' screen (2" (DIA)) - Secured with Road Box

CEH

CASWELL, EICHLER & HILL, INC.

GEOLOGY HYDROGEOLOGY GEOPHYSICS ENGINEERING

Project: River St DPW - RI Ret			Boring #: MW-11
Client: City of Dover			Sheet _ of _
Contractor: NH Boring		Date Begun: 9/5/96	Overburden Drilled: 13'
Method: Auger / Split Spoon	Casing Size	Completed: 9/6/96	Rock Drilled
Ground Elevation	PID: HNU-PI-101 (11.7 eV)	Protection Level: D	▽ Below Ground: 8.0'
Logged By: WMT	Checked By	Date	Site: Dover DPW

Depth (ft)	PID Ambient Air	Sample #	Sample Interval	Rec / Pen	Jar-Headspace (ppm)	Soil/Rock Description	Lithologic Symbol	Well Construction	SPT Blows/6 in. or RQD %	Elevation (ft)
0–2	0			1.5'/2'	8	0.5-1.0: Tan med coarse sand & gravel 1.0-1.5: Brown fine med sand slight odor 1.5-2.0: Heavily stained fine sand w/ strong odor, some silt @ bottom		Cement / Bent. / 4" PVC Riser	12/23/15/10	
5–7		MW-11	X	1'/2'	20	6.0-6.2: Brown fine to coarse sand 6.2-6.5: Heavily stained silt 6.5-6.7: Grey silt w/ rock frags 6.7-7.0: Grey silt w/ staining and odor	▽	Sand Pack	3/2/2/2	
10–12				0/2'		No Recovery - Spoon Wet				
13–15				1'/2'	8	Saturated grey silty sand w/ rock fragments, strong petroleum odor			8/7/5/3	
						EOB @ 15'				

NOTES: Completed installation of MW-11 @ 13.0' with 10' screen (4" dia)

- Secured with road box

CEH

CASWELL, EICHLER & HILL, INC.

GEOLOGY HYDROGEOLOGY GEOPHYSICS ENGINEERING

Project: River Street DPW - RI/FS			Boring # MW-12
Client: City of Dover			Sheet 1 of 1
Contractor: NH Boring		Date Begun 5/21/97	Overburden Drilled 15'
Method: Auger/Split Spoon	Casing Size	Completed 5/21/97	Rock Drilled
Ground Elevation	PID HNu-PI-101 (11.7 ev)	Protection Level D	▽ Below Ground 6.00'
Logged By: CMT	Checked By	Date	Site: Dover DPW

Depth (ft)	PID Ambient Air	Sample #	Sample Interval	Rec / Pen	Jar-Headspace (ppm)	Soil/Rock Description	Lithologic Symbol	Well Construction	SPT Blows/6 in. or RQD %	Elevation (ft)
0	0			20"/24"	3.2	0-2" ASPHALT 2-5" CLEAN GREY FINE SAND 5-7" DK BN F/M SAND & GRAVEL 7-15" BN F/M SILTY SAND 15-16" LT BN F/M SAND 19-20" STONE (1.5" DIA)		Bentonite / Fill / 2" PVC Riser / Fill	9/9/8/16	
6		MW-12		24"/24"	30	0-2" DK BN F/M SAND & GRAVEL 2-3" GREY CLAY W/ INTERBEDDED FINE SAND 3-24" GREY CLAY		Sand Pack	3/5/7/11	
10				24"/24"	24	0-24" GREY CLAY 5-10"/13-24" MOIST LAYERS			3/4/2/2	
12				24"/24"	14	0-3" GREY SILTY CLAY 3-9" GRAY CLAY (MOIST/SOFT) 9-14" G/BN SILTY CLAY W/ROCK FRAG'S 14-16" MOIST GREY CLAY W/TRACE TILL 16-20" GRAY CLAY, SOME SILT, SOME TILL 20-24" BN F/C GRAVEL (TILL)			7/16/11/17	
16				18"/24"	6.0	0-16" F/M/C GRAVEL (TILL) 16-22" LT BN F/m SILTY SAND, ROCK FRAG'S 22-24" WEATHERED ROCK			24/28/46/46	
18						E.O.B. @ 17' - REFUSAL				

NOTES: Completed Installation of MW-12 @ 15' with 10' of screen (2" dia) - Secured with Road Box

CEH

CASWELL, EICHLER & HILL, INC.

GEOLOGY HYDROGEOLOGY GEOPHYSICS ENGINEERING

Project: River Street DPW - RI/FS			Boring # MW-13
Client: City of Dover			Sheet _ of _
Contractor: NH Boring		Date Begun: 5/21/97	Overburden Drilled: 10'
Method: Auger/Split Spoon	Casing Size	Completed: 5/21/97	Rock Drilled
Ground Elevation	PID	Protection Level: D	▽ Below Ground: 5.93
Logged By	Checked By	Date	Site: Dover DPW

Depth (ft)	PID Ambient Air	Sample #	Sample Interval	Rec / Pen	Jar-Headspace (ppm)	Soil/Rock Description	Lithologic Symbol	Well Construction	SPT Blows/6 in. or RQD %	Elevation (ft)
0–2	0	MW-5	X	3"/15"	10.4	2" ... some asphalt ... 6" ...		Fill; Bentonite; 2" PVC Riser		
5–7				20"/24"	3.4	... DK BN F/M SAND; ... silty sand; ... w/ some ...	▽	Sand; 2" PVC screen	4/7/8	
7–9				22"/24"	3.0	4" ... silt ... 4" ... clayey silt; 13" ... silt; 5" BN silt (wet) ... lt sand			5/4/7/12	
9–11				13"/24"	0.4	2" black silt; 6" saturated lt BN silt; 5" ... silt w some ... interlayer w/ ... sand			7/7/7/13	
						EOB @ 12'				

NOTES: Completed installation of MW-13 @ 10' with 5' screen ... — ... Soil Box

CEH

CASWELL, EICHLER & HILL, INC.

GEOLOGY HYDROGEOLOGY GEOPHYSICS ENGINEERING

JACQUES WHITFORD COMPANY, INC

27 Congress Street
Portsmouth, NH 03801

ject:	River Street DPW, Dover NH				Page 1 of 1
ent:	City of Dover				
ntractor:	Great Works	Casing Size:	NA	Boring #.	MW-14
lling Method:	41/4 H.S.A	PID:	Microtip	Date Begun:	02/23/99
ound Elevation:	(Local)	Checked By:	NA	Completed:	02/23/99
ged By:	DAG	Protection Level:	D	Depth to Water:	4.5 ft bls

Sample Interval (ft)	Sample No.	Rec/Pen	Standard Penetration Test (blows/foot) 0 - 6"	6" - 12"	12" - 18"	18" - 24"	Soil/Rock Description	Soil Classification	Well Construction Details
0 - 2	S - 1	16 / 24	34	34	37	39	dry,very dense,dark brown,f-c SAND, little f-m Gravel, trace Silt	SILTY SAND	
2 - 4	S - 2	13 / 24	25	15	13	13	dry,m-dense,brown,f-c SAND,trace f-m Gravel, trace Silt		
4 - 6	S - 3	10 / 24	7	3	2	4	wet,loose,dark brown to black,f-m SAND some Silt,trace f-m Gravel,Organics		
6 - 8	S - 4	9 / 24	5	6	7	12	wet,m-dense,dark brown,f-c SAND, little f-m Gravel, trace Silt		
8 - 10	S - 5	10 / 24	6	4	14	15	simliar to above		
10 - 12	S - 6	8 / 24	3	7	6	6	wet,m-dense,olive brown,f-m SAND, little Silt,trace f-m Gravel		
							BOB at 12 feet BLS		

2"-10 slot PVC 12 - 2'
2 "- PVC 2 - +3'
Washed Sand 12 - 1'
Bentonite Pellets 1 - 0'
Stand Pipe

NOTES: 1=Installed a 2-inch monitoring well at 12 ft BLS upon completion.

2/24/99

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

DNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

CT: STP Additions — LOCATION: Dover, N. H.

No. A-5 — Started: 11-22-76 — Completed: 11-23-76 — Driller: Adams

H	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	blows/ft. casing
	Drove 1½" I.D. X 5 ft. solid type sampler 0.0 to 5.0 ft.	Silt, Clay, Sand, Gravel and Wood Fill	10			
			18			
	Drove BX FC casomg tp 5 ft. and washed out.		9			
			12			
.0			11			
	Drove 1½" I.D. X 2 ft. split type sampler 5.0 to 7.0 ft.	Brown changing to gray, fine to medium SAND (SP) wet	1	S-1	5.0 to 7.0	
.0			6			
	Advanced casing to 10 ft. and washed out.					17
						16
.0						16
	Drove 1½" I.D. X 2 ft. split type sampler. 10.0 to 12.0 ft.		5	S-2	10.0 to 12.0	
.0			8			
	Advanced casing to 15' and washed out.					15
.0						50
.0		Gray, soft, CLAY (CL), wet				14
	Drove 1½" I.D. X 2 ft. split type sampler 15.0 to 17.0 ft.		1	S-3	15.0 to 17.0	
.0			2			

KS: Penetration of samplers 30" fall of 140 lb. drive mer, and of casing by 18" l of 300 lb. drive hammer. lows = weight of hammer

IALS AND ROCK CLASSIFIED IN FIELD WITH-ABORATORY ANALYSIS.

GROUND WATER READINGS:

11-22-76 - 3:45 PM -m15 minutes after last last sample removal - water @ 11.9'

11-23-76 - 7:00 AM - casing pulled back to 30 ft. water @ 2.6 ft.

11-23-76 - 2:30 PM - helper put lath in hole - blocked

LOG COMPILED BY: K W Adams

FIELD REPORT TEST BORING

GRANITE-STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. CHARLESTOWN, N. H.

OJECT: STP Additions LOCATION: Dover, N. H.

ing No. A-5 Started: Completed: Driller:

EPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	blows/f casi ***** * Recovery
17.0						
	Advanced casing to 20 ft, washed, by mistake, to 22.0 ft.					13
						12
20.0						13
	Washed with carbide bit					24
22.0						19
	Drove 1½" I?D. X 2 ft.		0	S-4	22.0	19
	pplit type sampler 22.0 to 24.0 ft.		0		to 24.0	19
24.0	Advanced casing to 25'					16
	and washed out.					
25.0						
	Drove 1½" I.D. X 2 ft.		0	S-5	25.0	
	split type sampler 25.0 to 27.0 ft.		0		to 27.0	
27.0						
	Advanced casing to 30'					23
	and wshed out.					23
						19
30.0						
	Drove 1½" I.D. X 2 ft.		0	S-6	30.0	
	split type sampler 30.0		0		to	
31.4	to 32.0 ft.				31.4	
32.0		Gray, loose, CLAY (CL) with thin Sand layers and occassional Gravel, wet	8	S-7	31.4 to 32.(	
	Advanced casing to 35'					23
	and washed out.					42
						39
35.0						
	Drove 1½" I.D. X 2 ft.	Gray, loose, gravelly, medium and fine SAND (SP) wet	24			
	split type sampler 35.0 to 37.0 ft.		28			
37.0	No sample recovered,					

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

OJECT: STP Additions — LOCATION: Dover, N. H.

ng No. A-5 — Started: — Completed: — Driller:

EPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
7.0	Drove 1½" I.D. X 5 ft. solid type sampler 35.0 to 40.0 ft.	(see page 2)	23	S-8	35.0 to 40.0	
			17			
			20			
40.0	Drove 1½" I.D. X 5 ft. solid type sampler 40.0 to 45.0 ft.		13			
			17			
			45	S-9	40.0 to 45.0	
			170			
			57			
45.0	Drove 1½" I.D. X 5 ft. solid type sampler 45.0 to 47.5 ft. - Refusal 100 blows/no penetration		43			
			50	S-10	45.0 to 47.5	
47.5	Bottom of Exploration at refusal per instructions		200			

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

OJECT: STP Additions — LOCATION: Dover, N. H.

ing No. A-6 modified — Started: 12-9-76 — Completed: 12-10-76 — Driller: Adams

EPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recover
1.0	Drilled with 3" flite augers to 5 ft.	Dark brown, Topsoil				
	1000 lbs. bit weight used	Brown, loose, silty, gravelly, SAND (SP-SM), barely moist to wet below 8'± Fill				
5.0						
	Drove 1½" I.D. X 2 ft. split type sampler 5.0 to 7.0 ft.		2 4	S-1	5.0 to 7.0	all of sampl
7.0						
	Drilled with 3" flite augers to 10'	no gravel in material				
0.0						
	Drove 1½" I.D. X 2 ft. split type sampler 10.0 to 12.0 ft.		5 10	S-2	10.0 to 12.0	
2.0						
	Drilled with 3" flite augers to 15'					
5.0						
	Drove 1½" I.D. X 2 ft. split type sampler 15.0 to 17.0 ft.	Gray, loose, SAND (SP), wet with wood in sample	0 4	S-3	15.0 to 17.0	
7.0						

ARKS: Penetration of samplers y 30" fall of 140 lb. drive ammer, of casing by 18" fall f 300 lb. drive hammer. blows = weight of hammer

ERIALS AND ROCK CLASSIFIED IN FIELD WITH-LABORATORY ANALYSIS.

GROUND WATER READINGS:

12-10-76 8:00AM Csg. @ 40' Water at 16.0 ft.
12-10-76 11:10AM 15 min. after last sample Water at 20.5 ft.
12-14-76 12:55PM Water at 8.0 ft.

LOG COMPILED BY: R R Adams

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. CHARLESTOWN, N. H.

JECT: STP Additions LOCATION: Dover, N. H.

ng No. A-6 modified Started: Completed: Driller:

PTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	blows/f casing % Core Recovery
7.0	Set EX FC casing to 15' and rove to 20' and washed out.					7 11 14
.0	Drove 1½" I.D. X 2 ft. split type sampler 20.0 to 22.0 ft.	Gray, soft, CLAY (CL), wet	0 0	S-4	20.0 to 22.0	
2.0	Advanced casing to 25' and washed out.					12 12 13
.0	Drove 1½" I.D. X 2 ft. split type sampler 25.0 to 27.0 ft.		0 0	S-5	25.0 to 27.0	
.0	Advanced casing to 30' and washed out.					20 17 14
.0	Drove 1½" I.D. X 2 ft. split type sampler 30.0 to 32.0 ft.		0 0	S-6	30.0 to 32.0	
.0	Advanced casing to 35' and washed out.					17 19 15
.0	Drove 1½" I.D. X 2 ft. split type sampler 35.0 to 37.0 ft.		0 0	S-7	35.0 to 37.0	
.0	Advanced casing to 40' and washed out.					17 22 20
.0						

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. CHARLESTOWN, N. H.

JECT: STP Additions LOCATION: Dover, N. H.

ng No. A-6 modified Started: Completed: Driller:

PTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
0.0	Drove 1½" I.D. X 5 ft. solid type sampler 40.0 to 45.0 ft. - Piece of gravel blocked sample entry at about 43' Advanced casing to 45' and washed out.	Gray, medium compact, slightly clayey, gravelly SAND (SP-SC), wet Till	washed 26 46 50 70	S-8	41.0 to 45.0	
5.0	Drove 1½" I.D. X 5 ft. solid type sampler 45.0 to 50.0 ft.		24 32 37 27 21	S-9	45.0 to 50.0	
0.0	Drove 1½" I.D.X 5 ft. solid type sampler 50.0 to 55.0 ft.		11 13 24 27 18	S-10	50.0 to 55.0	
5.0	Drove 1½" I.D. X 5 ft. solid type sampler 55.0 to 60.0 ft.		30 40 30 11 40	S-11	55.0 to 60.0	
0.0	Drove 1½" I.D. X 5 ft. solid type sampler 60.0 to 63.1 ft. - Refusal 100 blows/no penetration		50 47 57 200	S-12	60.0 to 63.1	
3.1	Bottom of Exploration at Refusal					

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

JECT: STP Additions — LOCATION: Dover, N. H.

ng No. A-13 — Started: 11-23-76 — Completed: 12-1-76 — Driller: Adams

PTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1½" I.D. X 5 ft. solid type sampler 0.0 to 5.0 ft.	Brown changing to gray, Gravel, Sand, Silt, Clay, Wood, etc. Fill	10			
			14			
			12			
			28			
5.0			19			
	Drove 1½" I.D. X 5 ft. solid type sampler 5.0 to 10.0 ft.		17			
			23			
	Drove HX FC casing to 10' and washed out.		18	S-1	5.0 to 10.0	
			12			
0.0			11			
	Drove 1½" I.D. X 2 ft. split type sampler 10.0 to 12.0 ft.	(wood on top of sample) Mottled Gray, stiff, CLAY (CL), moist	14			
2.0	Advanced casing to 14.5'		24	S-2	10.0 to 12.0	
	with refusal, cleaned out and tried to drive 1½" I.D solid sampler 100 blows with no penetration - Refusal		30	casing		
			26	casing		
4.7			76	casing		
	Bottom of Exploration at Refusal					

RKS. Penetration of samplers y 30" fall of 140 lb. drive ammer. amd pf casing by 18" all of 300 lb. drive hammer.

GROUND WATER READINGS:
5 minutes after removing sampler: Water at 7.1 ft.
12-7-76 1:30 PM water at 6.0 ft.

ERIALS AND ROCK CLASSIFIED IN FIELD WITH-LABORATORY ANALYSIS.

LOG COMPILED BY: R R Adams

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

ROJECT: STP Additions — LOCATION: Dover, N. H.

oring No. A-14 — Started: 12-15-76 — Completed: 12-15-76 — Driller: Beach

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% C Recove
0.0	Drove 2" I.D. X 5 ft. solid type sampler 0.0 to 5.0 ft.	Ice				
		Brown, loose, silty, SAND (SM), wet	15			
2.0			15			
		Brown, compact, silty, gravelly, SAND (SM), wet Till	32			
			50	S-1	2.0 to 5.0	
5.0			55			
	Drove 2" I.D. X 5 ft. solid type sampler 5.0 to 7.0 ft.		102			
7.0			130			
	Drove 1½" I.D. X 5 ft. solid type sampler to 10.0 ft.		140			
			92	S-2	7.0 to 00.0	
10.0			50			
10.1	1½" I.D sampler		300			
	Refusal at 10.1 ft. 100 blows with no penetration					
	Bottom of Exploration at Refusal					

MARKS: Penetration by 30" fall of 140 lb. drive hammer.

GROUND WATER READINGS:
10 minutes after completion: Water at 7.0 ft.

TERIALS AND ROCK CLASSIFIED IN FIELD WITH-T LABORATORY ANALYSIS.

LOG COMPILED BY: R. R. Adams

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

JECT: STP Additions — LOCATION: Dover, N. H.

g No. A-21 — Started: 12-2-76 — Completed: 12-8-76 — Driller: Adams

PTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	blows/f casing / Recovery
	Drove 1½" I.D. X 5 ft. solid type sampler 0.0 to 5.0 ft.	Brown, black and gray, loose, Silt, Gravel, Sand, Wood, Plastic, Paper, etc., dump fill	4			
			10			
	Drove BX FC casing to 5' and washed out.		18			
			21			
5.0			21			
	Drove 1½" I.D. X 2 ft. split type sampler 5.0 to 7.0 ft.		4			
			7			
7.0	No sample recovered					
	Drove 1½" I.D. X 5 ft. solid type sampler 5.0 to 10.0 ft.		6	S-1	5.0 to 10.0	
			10			
	Advanced casing to 10' and washed out.		12			
10.0						
	D rove 1½" I.D. X 5 ft. solid type sampler 10.0 to 15.0 ft.		19			
			7			
	No sample recovered (material too sloppy)		9			
	Advanced casing to 15' and washed out.		11			
			13			
15.0						
	Drove 1½" I.D X 2 ft. split type sampler 15.0 to 17.0 ft.	Gray, loose, SAND (SP), wet with wood (O.G. ?)	5	S-2	15.0 to 17.0	
17.0			11			

MARKS: Penetration of samplers y 30" fall of 140 lb. drive ha ammer, of casing by 18" fall f 300 lb. drive hammer.

GROUND WATER READINGS:

12-2-76	4:20PM	Water at 7.0 ft.
12-3-76	7:15AM	" " 8.5 ft.
"	10:55AM	" " 5.5 ft.
12-7-76	10:50AM	" " 8.8 ft.
12-8-76	8:10AM	" " 8.6 ft.

TERIALS AND ROCK CLASSIFIED IN FIELD WITH-UT LABORATORY ANALYSIS.

LOG COMPILED BY: R R Adams

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g.

CHARLESTOWN, N. H.

JECT: STP Additions LOCATION: Dover, N. H.

ng No. A-21 Started: Completed: Driller:

PTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	blows/ft casing
17.0						22
	Advanced casing to 20' and cleaned out.					32
19.0						
		Gray, moderately stiff, CLAY (CL) and brwon, loose, SAND (SP) with wood, wet				25
20.0	Drove 1½" I.D. X 2 ft. split type sampler 20.0 to 22.0 ft.		6	S-3	20.0 to 22.0	
			17			
22.0						
	Advanced casing to 25' and washed out.					124
						114
						200
25.0						
	Drove 1½" I.D. X 5 ft. solid type sampler 25.0 to 30.0 ft.	Gray and Brown, medium compact, gravelly, SAND (SP), wet	57			
			231		25.0 to 30.0	
	Advanced casing to 30' and washed out.		41	S-4		
			48			
30.0			47			
	Drove 1½" I.D. X 5 ft. solid type sampler 30.0 to 35.0 ft.		25			
			19			
	Advanced casing to 35' and washed out.		25	S-5	30.0 to 35.0	
			39			
			40 60			
35.0						
	Drove 1½" I.D. X 5 ft. solid type sampler 35.0 to 39.6 ft. - Refusal 100 blows with no penetration		52			
			40	S-6	35.0 to 39.6	
			52			
			67			
39.6						
	Bottom of Exploration at Refusal					

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

JECT: S&P Additions — LOCATION: Dover, N. H.

ng No. A-28 — Started: 12-1-76 — Completed: 12-2-76 — Driller: Adams

PTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	blows/f casing & Core Recovery
	Drove 1½" I.D X 5 ft. solid type sampler 0.0 to 5.0 ft.	Grits, dark brown, silty, gravelly, SAND to dark gray of the same, wood, paper, plastic, etc. Fill (dump)	6			
			10			
			9			
	Drove BX FC casing to 5' and washed out.		16			
			12			
5.0						
	Drove 1½" I.D. X 2 ft. split type sampler 5.0 to 7.0 ft.		9			
			13			
7.0	No sample recovered				5.0	
	Drove 1½" I.D. X 5 ft. solid type sampler 7.0 to 10.0 ft.		7	S-1	to 10.0	
	Advanced casing to 10' and washed out		9			
			25			
10.0						
10.3	Drove 1½" I.D. X 2 ft.		12		10.0	
	split type sampler 10.0 to 12.0 ft.	Brown and Gray, layers of SILT, CLAY & SAND (ML,CL & SP), wet	19	S-2	to 12.0	
12.0						
	Advanced casing to 15' and washed out.					40
						32
14.0						
		Gray, soft, CLAY, (CL), wet				21
15.0						
	Drove 1½" I.D. X 2 ft. split type sampler 15.0 to 17.0 ft.		2	S-3	15.0 to 17.0	
			8			
17.0						

ARKS: Penetration of samplers by 30" fall of 140 lb. drive hammer, and of casing by 18" fall of 300 lb. drive hammer.

GROUND WATER READINGS:

12-1-76	4:10PM	Water at 8.8 ft.
12-2-76	8:30AM	" " 9.1 ft.
12-7-76	1:30PM	" " 8.7 ft.

ERIALS AND ROCK CLASSIFIED IN FIELD WITH- LABORATORY ANALYSIS.

LOG COMPILED BY: RR Adams

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. CHARLESTOWN, N. H.

JECT: STP Additions LOCATION: Dover, N. H.

ıg No. A-28 Started: Completed: Driller:

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	blows/ casing
17.0	Advanced casing to 20' and washed out.	(see page 1)				30
						31
						28
0.0	Drove 1½" I.D. X 2 ft. split type sampler 20.0 to 22.0 ft.		1	S-4	20.0 to 22.0	
2.0			6			
	Advanced casing to 25' and washed out. tough going at end of casing					37
						38
5.0						29
	Drove 1½" I.D X 5 ft. solid type sampler 25.0 to 30.0 ft.	Gray, medium compact, clayey, gravelly, SAND (SC), wet Till	43	S-5	25.0 to 30.0	
			57			
	Advanced casing to 30' and washed out.		38			
			28			
			28		1	
0.0	Drove 1½" I.D. X 5 ft. solid type sampler 30.0 to 35.0 ft.		95			
			30			
	Advanced casing to 35' and washed out, casing is sprung 10' from bottom		60	S-6	30.0 to 35.0	
			39			
5.0			27			

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

OJECT: STP Additions — LOCATION: Dover, N. H.

ng No. A-28 — Started: — Completed: — Driller:

PTH 35.0	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1½" I.D. X 5 ft. solid type sampler 35.0 to 40.0 ft.	(see page 2)	26			
			33			
			31	S-7	35.0 to 40.0	
			42			
0.0			59			
	Drove 1½" I.D. X 5 ft. solid type sampler 40.0 to 42.2 ft. - Refusal 100 blows/no penetration		55			
		Fractured rock 42 to 42.2 see S-8	190	S-8	40.0 to 42.2	
2.2						
	Bottom of Exploration at Refusal		1000			

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

OJECT: STP Additions — LOCATION: Dover, N. H.

ing No. A-33 — Started: 12-14-76 — Completed: 12-14-76 — Driller: Adams

EPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Cor Recovery
	Drove 2" I.D. X 5 ft. solid type sampler 0.0 to 5.0 ft.	Black and Brown, SILT, GRAVEL, SAND, WOOD, PAPER, etc. dump fill	11			
			8			
			35			
			17			
5.0			8			
	Drove 2" I.D. X 5 ft. solid type sampler 5.0 to 10.0 ft.		7			
			13			
8.0			13			
		Gray, medium compact, to compact, slightly silty, gravelly, SAND (SP-SM), wet	36	S-1	8.0 to 10.0	
10.0			86			
	Drove 1½" I.D. X 5 ft. solid type sampler 10.0		61			
11.0	to 15.0 ft.	Brown, compact, silty, gravelly, SAND (SM), wet	55			
		Till	66	S-2	11.0 to 15.0	
			78			
			160			
15.0						
	Drove 1½" I.D. X 5 ft. solid type sampler 15.0 to 20.0 ft.		36			
			42			

MARKS: Penetration by 30" fall of 140 lb. drive hammer.

GROUND WATER READINGS:
Water at 1.3 ft. all through operations and after

TERIALS AND ROCK CLASSIFIED IN FIELD WITH-
IT LABORATORY ANALYSIS.

LOG COMPILED BY: R. R. Adams

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. CHARLESTOWN, N. H.

OJECT: STP Additions LOCATION: Dover, N. H.

ing No. A-33 Started: Completed: Driller:

EPTH 17.0	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
		(see page 1)	100	S-3	15.0 to 20.0	
			228			
20.0			200			
	Drove 1½" I.D. X 5 ft. solid type sampler 20.0 to 25.0 ft. Hole caving badly		78			
			140	S-4	20.0 to 25.0	
			175			
			153			
25.0			250			
	Drove AX Rod probe 25.0 to 43.0 ft. Unable to pull back and exchange 5 ft. rods for 10 ft. ones due to cave		50			
			55			
			67			
			74			
			90			
			134			
			130			
			177			
			230			
			162			
			160			
			136			
			109			
			122			
			93			
			100			
43.0			133			
			76			
	Bottom of Exploration depth considered sufficient					

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g.

CHARLESTOWN, N. H.

OJECT: STP Additions LOCATION: Dover, N. H.

ing No. A-35 Started: 12-15-76 Completed: 12-15-76 Driller: Beach

EPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recover
	Drove 2" I.D. X 5 ft. solid type sampler 0.0 to 5.0 ft.	Black and gray, loose, CLAY, WOOD, SILT, PEAT, and SAND interbedded, (CL,ML, PT & SP), wet	3			
			6			
			1			
			2			
5.0			1			
	Drove 2" I.D. X 5 ft. solid type sampler 5.0 to 10.0 ft.		1			
			3			
			3			
			11	S-1	8.0 to 10.0	
10.0			27			
	Drove 2" I.D. X 5 ft. solid type sampler 10.0 to 12.0 ft. - Refusal		65	S-2	10.0 to 12.0	
12.0	100 blows/no penetration		276			
	Tried to drive 1½" I.D. sampler 100 blows with no penetration					
	Bottom of Exploration at Refusal					

MARKS: Penetration by 30" fall of 140 lb. drive hammer.

GROUND WATER READINGS:
Water at 1.0 ft.

TERIALS AND ROCK CLASSIFIED IN FIELD WITH-T LABORATORY ANALYSIS.

LOG COMPILED BY: RRA

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

OJECT: STP Additions — LOCATION: Dover, N. H.

10 ft. towards A-31 from A-35

ng No. A-35r — Started: 12=15-76 — Completed: 12-15-76 — Driller: Beach

EPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 2" I.D. X 5 ft. solid type sampler 0.0 to 5.0 ft.	Brown, black and gray, loose, CLAY, WOOD, SILT, PEAT and SAND interbedded (CL,ML,PT & SP), wet Fill	13			
			2			
			6			
			6			
5.0			5			
	Drove 2" I.D. X 5 ft. solid type sampler 5.0 to 10.0 ft.		8			
			40			
			4			
			3			
10.0			10			
11.0	Drove 2" I.D. X 5 ft. solid type sampler 10.0 to 15.0 ft.		13			
		Gray and brown, loose, gravelly, SAND (SP), wet - some wood pr esent	80			
			143	S-3	11.0 to 15.0	
			45			
15.0			13			
	Drove 1½" I.D. X 5 ft. solid type sampler 15.0 to 20.0 ft.		5			
			4			

MARKS: Penetration by 30" fall of 140 lb. drive hammer.

GROUND WATER READINGS:
Water at 0.9 ft.

TERIALS AND ROCK CLASSIFIED IN FIELD WITH-T LABORATORY ANALYSIS.

LOG COMPILED BY: R R Adams

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. CHARLESTOWN, N. H.

OJECT: STP Additions LOCATION: Dover, N. H.

ring No. A-35B Started: Completed: Driller:

EPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Co Recovery
17.0	No sample recovered (did not shear and wait for swelling)	Gray, soft, CLAY (CL), wet	5			
			6			
20.0			7			
	Drove 1½" I.D. X 5 ft. solid type sampler 20.0 to 25.0 ft.		6			
			7			
			9	S-4	20.0 to 24.0	
24/0			10			
25.0		Gray, stiff, gravelly, CLAY (CL), wet	85			
	Drove 1½" I.D. X 5 ft. solid type sampler 25.0 to 30.0 ;ft.		136	S-5	25.0 to 28.0	
			80			
28.0			55			
		Gray, compact, clayey, gravelly, SAND (SP-SC), wet	54	S-6	28.0 to 30.0	
30.0		Till	32			
	Drove AX Rod probe 30.0 to 34.1 ft. - Refusal 100 blows with no penetration		20			
			17			
			31			
34.1			100			
	Bottom of Exploration at Refusal		400			

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. C-1 — Started: 4-18-77 — Completed: 4-19-77 — Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
1.0	Drove 1 1/2" I.D. solid type sampler 0.0 to 5.0 ft.	Sand and gravel	0			
		Dark brown, compact, SILT (ML), barely moist.	10			
			22	S-1	1.0 to 5.0	
			33			
5.0			41			
5.4	Drove 1 1/2" I.D. split type sampler 5.0 to 7.0 ft		45			
6.0		Dark brown, compact, sandy gravelly, SILT ("), barely moist.	32	S-2	5.4 to 6.0	
7.0	Drilled with 3" flite angers	Brownish-gray, soft, CLAY (CL), moist to wet with depth Gray at about 13 ft.				
10.0	Drove 1 1/2" I.D. split type sampler 10.0 to 12.0 ft.		7	S-3	10.0 to 12.0	
12.0	Drilled with 3" flite auger.		6			
15.0	Drove 1 1/2" I.D. split type sampler 15.0 to 17.0		0	S-4	15.0 to 17.0	

REMARKS: Penetration of samplers by 30" fall of 140 lb. drive hammer.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

GROUND WATER READINGS:

4-18-77 at 4:40 PM
Water at 10.0 ft.
Hole at 30.0 ft.

4-19-77 at 8:00 AM
Water at 8.7 ft.

LOG COMPILED BY:

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. CHARLESTOWN, N. H.

OJECT: STP Additions LOCATION: Dover, N.H.

ing No. C-1 Started: 4-18-77 Completed: 4-19-77 Driller: Adams

EPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Cor Recovery
17.0	Drilled with 3" flite augers					
19.0		Gray, loose, clayey, gra elly SAND (SC), wet.				
20.0	Drove 1 1/2" I.D. split type sampler 20.0 to 30.0 ft.			S-5	20.0 to 21.2	
21.2			7			
22.0		Brown, compact, silty, gravelly, SAND (SM), wet. ?	63	S-6	21.2 to 22.0	
25.0		Gray, compact, gravelly, clayey, SAND (SC), wet, Pasal till	24			
			26			
			55	S-7	25.0 to 30.0	
			82			
30.0			124			
	Drilled with 3" flite augers to refusal at 43.5 ft. Bottom of explorations at refusal					

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

CHARLESTOWN, N. H.

RODNEY R. ADAMS, c.p.g.

PROJECT: STP Additions LOCATION: Dover, N.H.

Boring No. C-2 Started: 4-20-77 Completed: 4-20-77 Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1 1/2" I.D. solid type sampler 0.0 to 5.0 ft.	Brown, loose, gravelly, SAND (SP), with occassional SILT. Dry to wet below 5 ft.	9 18 9 9	S-1	0.0 to 5.5	
5.0	~~Drove 1 1/2" I.D. split~~		11			
5.5	type sampler 5.0 to 7.0 ft.	Brown, soft, clay (CL), moist.	10	S-2	5.5 to 7.0	
7.0	Drilled with 3" flite auger		13			
10.0				S-3	10.2 to 11.3	
10.2	Drove 1 1/2" I.D. split type sampler 10.2 to 12.0ft	Gray, soft, CLAY (CL), with some sand & gravel, wet.	3			
11.3			33	S-4	11.3 to 12.0	
12.0	Drilled with 3" flite augers.	Brown, compact, silty, gravelly, SAND (SM), moist to wet. TILL				
15.0	Drove 1 1/2" I.D. split type sampler 15.0 to 17.0		63 52	S-5	15.0 to 17.0	
17.0	Drilled with 3" flite augers.					

REMARKS: Penetration of samplers by 30" fall of 140 lb. drive hammer.

GROUND WATER READINGS: 4-20-77 at 11:40 AM

Water at 5.7 ft.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

LOG COMPILED BY:

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. C-2 — Started: 4-20-77 — Completed: 4-20-77 — Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recov.
20.0			70			
	Drove 1 1/2" I.D. solid type type sampler. Refusal-100					
			100		21.5	
21.5	blows, no penetration.				to	
22.2		Highly fractured rock.	500	S-6	22.2	
	Bottom of exploration at refusal.					

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. C-3 — Started: 4-19-77 — Completed: 4-19-77 — Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1 1/2" I.D. solid type sampler 0.0 to 2.0 ft. Lost most of sample	Sand and gravel	8			
2.0			10			
		Brown-gray, soft, SILT & CLAY (ML & CL), moist to wet.	8			
			9			
5.0			10			
	Drove 1 1/2" I.D. split type sampler 5.0 to 7.0 ft. Lost sample. Drilled with		11			
7.0	3" flite augers to 7.0 ft.		10		7.0	
	Drove 1 1/2" I.D. split type sampler 7.0 to 9.0 ft.		1	S-1	to 9.0	
9.0			1			
10.0	Drilled with 3" flite augers.	Gray, soft, CLAY (CL), with occassional brown silt layers at about 1/2" thick, wet.			10.0	
	Drove 1 1/2" I.D. split type sampler 10.0 to 12.0ft			S-2	to 11.0	
11.0			0			
		Brown, medium compact, silty, gravelly, SAND (SM), wet. TILL?		S-3	11.0 to 12.0	
12.0			11			
	Drilled with 3" flite augers. Refusal at about 13.9 ft. 2000 lbs. on bit.					
13.9						
	Bottom of exploration at refusal.					

REMARKS: Penetration of samplers by 30" fall of 140 lb. drive hammer.

GROUND WATER READINGS: 4-20-77 at 8:10 AM

Water at 2.4 ft.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

LOG COMPILED BY:

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. C-5 — Started: 4-19-77 — Completed: 4-19-77 — Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1 1/2" I.D. solid type sampler 0.0 to 5.0 ft.		4			
			8			
			5			
			4			
5.0			4			
	Drove 1 1/2" I.D. split type sampler 5.0 to 7.0 ft.	Gray with black organics, loose gravelly, SAND (SP), wet.	9	S-1	5.0 to 6.8	
7.0			19			
	Drilled with 3" flite augers.					
				S-2	10.0 to 11.0	
10.0	Drove 1 1/2" I.D. split type sampler 10.0 to 12.0ft		10	S-3	11.0 to 12.0	
11.0		Gray, clayey, soft, CLAY (CL) with occassional brown silt layers, wet.	10			
12.0	Drilled with 3" flite augers.					
15.0						
15.5	Drove 1 1/2" I.D. split type sampler 15.0 to 17.0ft	Gray, medium compact, clayey, gravelly, SAND (SC), wet. TILL	16	S-4	15.5 to 17.0	
17.0			52			

REMARKS: Penetration of samplers by 30" fall of 140 lb. drive hammer.

GROUND WATER READINGS:

4-19-77 at 4:15 PM--Water at 2.2 ft.

4-20-77 at 8:10 AM--Water at 1.0 ft.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

LOG COMPILED BY:

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g.

CHARLESTOWN, N. H.

ECT: STP Additions LOCATION: Dover, N.H.

No. C-5 Started: 4-19-77 Completed: 4-19-77 Driller: Adams

H	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
7.0	Drilled with 3" flite augers.		26 40 120	S-5	20.0 to 22.2	
0.0	Drove 1 1/2" I.D. solid type sampler 20.0 to 22.2, 100 blows-no penetration. Lost most of sample.					
2.2	Bottom of exploration at refusal.					

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STF Additions — LOCATION: Dover, N.H.

Moved 7 ft. west

Boring No. C-6 — Started: 4-28-77 — Completed: 4-29-77 — Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Cor Recove.
	Drove 1 1/2" I.D. solid type sampler 0.0 to 5.0 ft. Refusal at 3.5 ft. 100 blow no penetration. Moved 7 ft. west started new boring.	Brown, compact, clay (CL), with occassional sand layers, moist.	7 9 20 24 50			
5.0	Drove 1 1/2 " I.D. split type sampler 5.0 to 7.0 ft.		57 74	S-1	5.0 to 7.0	
7.0	Drilled with 3" flite auger	Gray, compact, clayey, gravelly, SAND (SL), moist TILL				
9.0	Drove 1 1/2" I.D. solid type sampler 9.0 to 14.0 ft.		69 39 39 53 55	S-2	9.0 to 14.0	
14.0	Drilled with 3" flite augers					
15.0	Drove 1 1/2" I.D. solid type sampler 15.0 to 20.0 ft. Drilled with 3" flite augers to 20.0 ft.		14 17			

REMARKS: Penetration by 30" fall of 140 lb. drive hammer.

GROUND WATER READINGS: 4-29-77 at 1:35 PM

Water at 7.4 ft.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

LOG COMPILED BY: J. L. Walsh

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

JECT: ~~S&B~~ Additions — LOCATION: Dover, N.H.

ng No. C-6 — Started: 4-28-77 — Completed: 4-29-77 — Driller: Adams

PTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
			16	S-3	20.0 to 20.5	
			29			
			24			
			7			
			30	S-4	20.0 to 25.0	
20.0	Drove 1 1/2" I.D. solid type sampler 20.0 to 25.0 ft. Drilled with 3" flite augers.		30			
			66			
			111			
			25			
			70			
25.0	Drove 1 1/2" I.D. solid type sampler 25.0 to 30.0 ft.		67	S-5	25.0 to 30.0	
			97			
			110			
			54			
			95			
30.0	Drove 1 1/2" I.D. solid type sampler 30.0 to 35.0 ft.		325	S-6	30.0 to 35.0	
			120			
			155			
35.0	Bottom of explorations per instructions.					

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. C-7 — Started: 4-21-77 — Completed: 4-22-77 — Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
1.0	Drove 1 1/2" I.D. solid type sampler 0.0 to 5.0 ft.	Topsoil	3			
		Grayish brown, compact, dessicated CLAY (CL), barely moist.	6			
			16			
			30			
5.0			51	S-1	5.0 to 7.0	
	Drove 1 1/2" I.D. split type sampler 5.0 to 7.0 ft.		57			
7.0			60			
	Drilled with 3" flite augers.					
9.5						
	Drove 1 1/2" I.D. split type sampler 9.5 to 11.5 ft Pocket pentrometer 3.3 tons by square ft.	Color changes to brown	17	S-2	9.5 to 11.5	
11.5			30			
	Drilled with 3" flite augers.					
15.0			12	S-3	15.0 to 17.0	
	Drove 1 1/2" I.D. split type sampler 15.0 to 17.0 ft. Pocket pentrometer 2.3 tons/square ft.		16			

REMARKS: Penetration of samples by 30" fall of 140 lb. drive hammer.

GROUND WATER READINGS: 4-22-77 at 11:45 AM

Water at 27.0 ft.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

LOG COMPILED BY:

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. CHARLESTOWN, N. H.

OJECT: STP Additions LOCATION: Dover, N. H.

ng No. C-7 Started: 4-21-77 Completed: 4-22-77 Driller: Adams

PTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
17.0	Drilled with 3" flite augers.					
20.0	Drove 1 1/2" J.D. split type sampler 20.0 to 22.0 ft	ecomes softt.	5	S-4	20.0 to 22.0	
22.0	Drilled with 3" flite augers		12			
25.0	Drove 1 1/2" I.D. split type sampler 25.0 to 27.0 ft.		5	S-5	25.0 to 27.0	
27.0	Drilled with 3" flite augers.	Mostly gray	6			
28.5		Brown compact, silty, gravelly, SAND (SM), wet TILL				
30.0	Drove 1 1/2" I.D. split type sampler 30.0 to 32.0 ft.		30	S-6	30.0 to 32.0	
32.0	Drilled with 3" flite augers.		50			
35.0	Drove 1 1/2" I.D. solid type sampler 35.0 to 42.0 ft.		26			
			61	S-7	35.0 to 40.0	
			78			

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

STP Additions — Dover, N.H.

JECT: — LOCATION:

C-7 — 4-21-77 — 4-22-77 — Adams

ng No. — Started: — Completed: — Driller:

PTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
			91			
40.0			71			
42.0	Drove 1 1/2" I.D. solid type sampler 42.0 to 47.0 ft.		18			
			27			
			39	S-8	42.0 to 47.0	
			77			
			80			
47.0			90			
48.0	Drove 1 1/2" I.D. solid type sampler 47.0 to 52.0 ft.		180			
		Gray compact, clayey, gravelly SAND (SC), moist. Basal till	80	S-9	48.0 to 52.0	
			133			
			182			
52.0	Bottom of exploration Depth considered sufficient					

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. C-8 — Started: 5-2-77 — Completed: 5-3-77 — Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 2" I.D. solid type type sampler 0.0 to 1.5 ft.	Topsoil	5			
1.5		Brown, stiff to moderately stiff. Desiccated CLAY (CL), moist.	11			
			27			
			45			
5.0			63			
	Drove 1 1/2" I.D. solid type sampler 5.0 to 10.0 ft. Drove EX-FC casing to 10.0 ft. and washed out.		36			
			74			
			80	S-1	5.0 to 10.0	
			80			
10.0			80			
	Drove 1 1/2" I.D. solid type sampler 10.0 to 15.0 ft. Advanced casing to 15.0 ft. and washed out.		10			
			17			
			20	S-2	10.0 to 15.0	
			25			
15.0			32			
	Drove 1 1/2" I.D. solid type sampler 15.0 to 20.0		10			
16.7	Advanced casing to 20.0 ft. and washed out.	Brown, compact, silty, gravelly, SAND (SM), moist till	13			

REMARKS: Penetration by 30" fall of 140 lb. drive hammer.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

GROUND WATER READINGS:

5-3-77 at 9:45 AM-15 minutes after: Sampling to 33.3 ft.--Water at 11.2 ft.

5-3-77 at 11:15 AM-casing pulled and 25 minutes later--Water at 18.6 ft.

LOG COMPILED BY: J. T. Wall

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. CHARLESTOWN, N. H.

OJECT: STP Additions LOCATION: Dover, N.H.

ring No. C-8 Started: 5-2-77 Completed: 5-2-77 Driller: Adams

EPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Co Recov
			14	S-3	15.0 to 16.7	
			33			
20.0			63			
	Drove 1 1/2" I.D. solid type sampler 20.0 to 25.0 ft. Advanded casing to 25.0 ft. and washed out.		48			
			20			
			55			
			130	S-4	20.0 to 25.0	
25.0			128			
	Drove 1 1/2" I.D. solid type sampler 25.0 to 30.0 ft. Advanced casing to 30.0 ft. and washed out.		40			
			63			
			140	S-5	25.0 to 30.0	
30.0			474			
	Drove 1 1/2" I.D. solid type sampler 30.0 to 33.3 ft. Refusal at 33.3 ft. 100 blows no penetration.		331			
			163			
			400	S-6	30.0 to 33.3	
33.3			390			
	Bottom of exploration at refusal.		800			

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. C-9 — Started: 4-21-77 — Completed: 4-21-77 — Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1 1/2" I.D. Solid type sampler 0.0 to 5.0 ft.	Brown and gray, loose to medium compact, thinly bedded FINE SANDS(SU), with Iron oxide stains, barely moist to wet with depth.	3 9 18 30 33	S-1	0.0 to 5.0	
5.0	Drove 1 1/2" I.D. split type sampler 5.0 to 5.0 ft. Drilled with 3" flite augers to 7.1 ft.		21 39	S-2	5.0 to 7.0	
7.0	Drove 1 1/2" I.D. solid type sampler 7.0 to 9.8 ft. Tried augers, refusal 1000 lbs. on bit.	Brown, compact, silty, gravelly, SAND (SM), moist Till	40 90 178	S-3	7.0 to 9.8	
9.8	Bottom of exploration at refusal.					

REMARKS: Penetration of samplers by 30" fall of 140 lb. drive hammer.

GROUND WATER READINGS:

No water in boring.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

LOG COMPILED BY:

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. C-10 — Started: 4-20-77 — Completed: 4-21-77 — Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1 1/2" I.D. solid type sampler 0.0 to 5.0 ft. Drilled with flite augers to 5.0 ft.	FILL	28			
			53			
			20			
			15			
5.0			16			
	Drove 1 1/2" I.D. solid type sampler 5.0 to 10.0 ft. Drilled with 3" flite augers.		9			
			2	S-1	5.0 to 10.0	
			2			
			10			
10.0		?				
	Drove 1 1/2" I.D. solid type sampler 10.0 to 15.0 ft. Lost most of sample. Drilled with 3" flite augers to 15.0 ft. On trying to lower sampler, fill caves in at 9 ft. Drove BX-FC casing to 15.0 ft. and cleaned out.	Brown, medium compact, silty, gravelly, SAND (SM), wet. TILL	5			
			2			
			16	S-2	10.0 ? to 15.0	
			22			
15.0			30			
	Drove 1 1/2" I.D. solid type sampler 15.0 to 20.0ft		80			
16.0		Gray, medium compact, clayey, gravelly, SAND (SL), wet TILL				

REMARKS: Penetration of sampler by 30" fall of 140 lb. drive hammer.

GROUND WATER READINGS:

4-20-77 at 4:40 PM--Water at 6.5 ft.

4-21-77 at 7:00 AM--Water at 6.0 ft.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

LOG COMPILED BY:

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g.

CHARLESTOWN, N. H.

OJECT: STP Additions LOCATION: Dover, N.H.

-ing No. C-10 Started: 4-20-77 Completed: 4-21-77 Driller: Adams

EPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
			32			
			37		16.0	
				S-3	to	
			33		20.0	
			31			
20.0						
	Drove 1 1/2" I.D. solid type sampler 20.0 to 25.0 ft.		33			
			35		20.0	
22.5						
		Highly fractured rock.	36	S-4	to	
					22.5	
			66			
			313		22.5	
25.0				S-5		
	Bottom of exploration Depth considered sufficient		113		to 25.0	

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. C-12 — Started: 5-3-77 — Completed: 5-3-77 — Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 2" I.D. solid type					
1.0	sampler 0.0 to 1.0 ft.	Topsoil	3			
		Brown, thinly bedded, stiff, desiccated CLAY (CL), barely moist.	12			
			18			
			28			
5.0			70			
	Drove 1 1/2" I.D. solid type sampler 5.0 to 10.0 ft. Drove BX-FS casing to 10.0 ft. and washed out.		41			
			105			
			108	S-1	5.0 to 10.0	
			124			
10.0			120			
	Drove 1 1/2" I.D. solid type sampler 10.0 to 15.0 ft. Lost sample, re-drove with trap in shoe advanced casing to 15.0 ft and washed out.		15			
			24			
			33	S-2	10.0 to 15.0	
			43			
15.0						
15.2			64			
	Drove 1 1/2" I.D. solid type sampler, refusal at 15.2 ft. 100 blows no penetration.		100			

REMARKS: ~~Penetration by 30" fall of 140 lb. drive hammer.~~

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

GROUND WATER READINGS:

5-3-77 at 4:22 PM--casing pulled 1/2 hour after
Water at 6.1 ft.

LOG COMPILED BY: J. T. Wall

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. B-13 — Started: 4-22-77 — Completed: 4-26-77 — Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1 1/2" I.D. solid type sampler 0.0 to 5.0 ft.	Brown, compact, dessicated clay (CL), moist.	3			
			6			
			17			
			57			
5.0	Drove 1 1/2" I.D. split type sampler 5.0 to 7.0 ft.		49			
			48	S-1	5.0 to 7.0	
7.0	Drilled with 3" flite augers.		43			
9.5	Drove 1 1/2" I.D. split type sampler 9.5 to 11.5 ft.					
			15	S-2	9.5 to 11.5	
11.5	Drilled with 3" flite augers.		29			
15.0	Drove 1 1/2" I.D. split type sampler 15.0 to 17.0 ft.					
			12	S-3	15.0 to 17.0	
17.0	Drilled with 3" flite augers		20			

REMARKS: Penetration by 30" fall of 140 lb. drive hammer.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

GROUND WATER READINGS:

4-26-77 at 9:00 AM--Water at 1.0 ft.

4-26-77 at 12:40 PM--Water at 25.7 ft.

4-28-77 at 2:25 PM--Water at 12.9 ft.

LOG COMPILED BY: J. F. Walsh

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

ROJECT: STP Additions — LOCATION: Dover, N.H.

oring No. C-13 — Started: 4-22-77 — Completed: 4-26-77 — Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% C Recov
20.0	Drove 1 1/2" I.D. split type sampler 20.0 to 22.0 ft.	Very thin sand layers in sample.	8	S-4	20.0 to 22.0	
22.0	Drilled with 3" flite augers.		12			
23.5		Brown, compact, silty, gravelly, SAND (SM), barely moist. TILL				
24.5	Drove 1 1/2" I.D. split type sampler 24.5 to 26.2. Refusal-100 blows no penetration-1 ton on bit- refusal.		48	S-5	24.6 to 26.2	
26.2	Bottom of exploration at refusal.		303			

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. B-19 — Started: 4-27-77 — Completed: 4-27-77 — Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 2" I.D. solid type sampler 0.0 to 2.0 ft.	Topsoil	2			
			2			
2.0		Brown, compact, dessicated, CLAY (CL), moist.	13			
			27			
			45			
5.0	Drove 1 1/2" I.D. solid type sampler 5.0 to 10.0 ft.		37	S-1	5.0 to 7.0	
			61			
7.0		Brown, compact, silty, gravelly, SAND (SM), damp TILL	102			
			95	S-2	7.0 to 10.0	
			85			
10.0	Drove 1 1/2" I.D. solid type sampler 10.0 to 15.0 ft.		62			
			64			
			55	S-3	10.0 to 15.0	
			69			
			110			
15.0						
	Drove 1 1/2" I.D. solid type sampler 15.0 to 15.7 ft		136	S-4	15.0 to 15.7	
15.7	Refusal 100 blows--no penetration.	Rock in bottom of sample 15.5 ft. to 15.7 ft.				

REMARKS: Penetration by 30" fall of 140 lb. drive hammer.

GROUND WATER READINGS:

4-28-77 at 2:30 P.M.-Dry to 15.1 ft.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

LOG COMPILED BY: J. F. Walsh

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. C-17 — Started: 5-4-77 — Completed: 5-5-77 — Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 2" I.D. solid type sampler 0.0 to 5.0 ft.	FILL	33 64 30 18 9			
5.0	Drove 1 1/2" I.D. solid type sampler 5.0 to 8.0 ft. Drove BX-FC casing to 10.0 ft. and washed out.	Dark brown with black, loose SAND with organics, wet. TOPSOIL	2 2 10			
8.0		Brown topsoil, loose fine SAND (SU), wet.	22 22	S-1	8.0 to 10.0	
10.0	Drove 1 1/2" I.D. solid type sampler 10.0 to 12.8 ft. Advanced casing to 15.0 ft. and washed out.	Black with brown, very loose, peat and SAND (PT & SU), wet.	2 2 2	S-2	10.0 to 12.8	
12.8		Brown, loose, gravelly, SAND (SP), wet.	18 26	S-3	12.8 to 15.0	
15.0	Drove 1 1/2" I.D. solid type sampler 15.0 to 20.0 ft. Advanced casing to 20.0 ft. and washed out.	Gray, soft, CLAY (CL), wet.	10 200 lbs.			

REMARKS: Penetration by 30" fall of 140 lb. drive hammer.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

GROUND WATER READINGS:

5-4-77 at 4:30 PM-casing filled.

5-5-77 at 7:00 AM-down 0.1 ft.

5-5-77 at 10:00 AM-casing pulled, etc. Water at 5.2 ft.

LOG COMPILED BY: J. F. Walsh

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

OJECT: STP Additions — LOCATION: Dover, N.H.

ing No. C-17 — Started: 5-4-77 — Completed: 5-5-77 — Driller: Adams

PTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
			200			
			200			
			200	S-4	15.0 to 20.0	
			200			
20.0			200			
	Drove 1 1/2" I.D. solid type sampler 20.0 to 25.0 ft. Advanced casing to 25.0 ft. and washed out.		200			
			200	S-5	20.0 to 24.3	
			200			
			200			
24.3				S-6	24.3 to 25.0	
25.0		Gray, soft, gravelly, CLAY (CL)	26			
	Drove 1 1/2" I.D. solid type sampler 25.0 to 30.0 ft. Advanced casing to 30.0 ft. and washed out.	Gray, loose to medium compact, clayey, gravelly, SAND (SC), wet Basal Till	43			
			30		25.0	
			29	S-7	to 30.0	
			21			
30.0			27			
	Drove 1 1/2" I.D. solid type sampler 30.0 to 35.0 ft. Advanced casing to 35.0 ft. and cleaned out.		23			
			35	S-8	30.0 to 35.0	
			40			
35.0			55			
	Drove 1 1/2" I.D. solid type sampler 35.0 to 40.0 ft. Advanced casing to 40.0 ft. and washed out.		75			
			46			

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

OJECT: STP Additions — LOCATION: Dover, N.H.

ing No. C-17 — Started: 5-4-77 — Completed: 5-5-77 — Driller: Adams

EPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Cor Recove
			144			
			54	S-9	35.0 to 40.0	
			73			
			93			
40.0	Drove 1 1/2" I.D. solid type sampler 40.0 to 45.0 ft. Lost sample, re-drove with basket trap in shoe. Sample lost-trap ruined. Advanced casing to 45.0 ft. and washed out.		94			
			50			
			100			
			54			
45.0			52			
	Drove 1 1/2" I.D. solid type sampler 45.0 to 50.0 ft. Advanced casing to 50.0 ft. and washed out.		9			
			20	S-10	45.0 to 50.0	
			21			
			27			
50.0			4[illegible]			
	Drove 1 1/2" I.D. solid type sampler 50.0 to 55.0 ft.		44			
			60	S-11	50.0 to 55.0	
			67			
			66			
55.0			142			
			96	S-12	55.0 to 58.7	
			170			
58.7	Bottom of explorati n at refusal.					
			114			

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: St. Anthony — LOCATION: Dover, N.H.

Boring No. C-18 — Started: 4-26-77 — Completed: 4-26-77 — Driller: adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1 1/2" I.D. solid type sampler 0.0 to 5.0 ft.	Brown, compact, dessicated CLAY (CL), moist.	1			
			3			
			24			
			57			
5.0			75		5.0	
	Drove 1 1/2" I.D. split t type sampler 5.0 to 7.0 ft.		62	S-1	to 7.0	
7.0			57			
	Drilled with 3" flite augers to 9.5 ft.					
9.5					9.5	
	Drove 1 1/2" I.D. split type sampler 9.5 to 11.5 ft.			S-2	to 11.5	
11.5			12			
	Drove 1 1/2" I.D. solid type sampler 11.5 to 15.0 ft.	Brown, very compact, silty, gravelly, SAND (SM), damp. TILL	31			
			80			
			133	S-3	11.5 to 15.0	
			100			
15.0						
	Drove 1 1/2" I.D. solid type sampler-refusal		332			
15.4			10			

REMARKS: Penetration by 30" fall of 140 lb. drive hammer.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

GROUND WATER READINGS:

4-26-77 at 4:00 PM-- Water at 7.8 ft.

4-26-77 at 2:25 PM-- Water at 1.2 ft.

LOG COMPILED BY: J. F. Walsh

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Peter, N.H.

Boring No. B-19 — Started: 4-27-77 — Completed: 4-27-77 — Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 2" I.D. solid type sampler 0.0 to 1.5 ft.	Topsoil	3			
1.5			18			
		Brown, compact, silty, gravelly, SAND (SM), damp TILL	112	S-1	1.5 to 5.0	
			109			
			126			
5.0	Drove 1 1/2" I.D. solid type sampler 5.0 to 8.6 ft. Refusal-100 blows no penetration.		80			
			98			
			147	S-2	5.0 to 8.6	
8.6			167			
	Bottom of explorations at refusal.					

REMARKS: Penetration by 30" fall of 140 lb. drive hammer.

GROUND WATER READINGS:

4-27-77 at 10:25 AM--Water at 8.5 ft.

4-28-77 at 2:25 PM--Water to 8.2 ft.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

LOG COMPILED BY: J F Walsh

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

JECT: STP Additions — LOCATION: Dover, N. H.

ing No. A-9 — Started: 11-19-76 — Completed: 11-19-76 — Driller: Adams

EPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	blows/f casing
1.0	Drove 1½" I.D. X 5 ft. solid type sampler 0.0	Dark brown, sandy, Topsoil	14			
	to 5.0 ft.	Brown, loose, slightly silty, fine and medium SAND (SU - SP), moist to wet	13			
	Drove BX FC casing to 5' and washed out.		8			
			9			
5.0			11			
	Drove 1½" I.D. X 2 ft. split type sampler 5.0		3	S-1	5.0	
	to 7.0 ft.		4		to 7.0	
7.0						
	Advanced casing to 10' and washed out.					8
						9
10.0						13
	Drove 1½" I.D. X 5ft. split type sampler 10.0	color to gray at 11.2'±	3	S-2	10.0	
	to 12.0 ft.	with trace of organics	6		to 12.0	
12.0						
	Advanced casing to 15' and washed out.					17
						15
14.0						
15.0		Gray, loose, gravelly, SAND (SP), wet				26
	Drove 1½" I.D. X 2 ft. split type sampler 15.0		11	S-3	15.0 to 16.0	
16.0	to 17.0 ft.	(see page 2)	3	S-4	16.0 to 17.0	
17.0						

ARKS: Penetration of samplers y 30" fall of 140 lb. drive ham ammer, and of casing by 18" all of 300 lb. drive hammer. blows = weight of hammer

GROUND WATER READINGS:
15 minutes after completion: water @ 17.0 ft.
11-22-76 - 11:00 AM - water @ 4.9 ft.

TERIALS AND ROCK CLASSIFIED IN FIELD WITH-T LABORATORY ANALYSIS.

LOG COMPILED BY: R R Adams

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

OJECT: STP Additions — LOCATION: Dover, N. H.

ing No. A-9 — Started: — Completed: — Driller:

EPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	blows/6" casing
7.0		Gray, soft, CLAY (CL), wet				17
	Advanced casing to 20' and washed out.					16
						15
0.0						
	Drove 1½" I.D. X 2 ft. split type sampler 20.0 to 22.0 ft.		0	S-5	20.0 to 22.0	
			0			
2.0						20
	Advanced casing to 25' and cleaned out.					18
						18
5.0						
	Drove 1½" I.D. X 2 ft. split type sampler 25.0 to 27.0 ft.		0	S-6	25.0 to 27.0	
			0			
7.0						21
	Advanced casing to 30' and washed out.					21
						20
0.0						
	Drove 1½" I.D. X 5 ft. solid type sampler. 30.0 to 35.0 ft.		0			
			0			
			0	S-7	30.0 to 35.0	
			5			
			6			
5.0						
	Bottom of Exploration per instructions					

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

ECT: STP Additions — LOCATION: Dover, N. H.

g No. A-11 — Started: 11-18-76 — Completed: 11-19-76 — Driller: Adams

TH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	blows/1 casing Recovery
.0	Drove 1½" I.D. X 5 ft. solid type sampler 0.0	Dark brown, sandy, Topsoil	4			
	to 5.0 ft.	Brown, loose, fine SAND (SU), moist to wet	6			
	D rove BX FC casing to 5 ft. and washed out.		8			
			10			
5.0			11			
	Drove 1½" I.D. X 2 ft. split type sampler 5.0 to 7.0 ft.		4	S-1	5.0 to 7.0	
7.0			4			
	Advanced casing to 10' and washed out.	pieces of wood in wash water (bark?)				6
						8
0.0						7
	Drove 1½" I.D. X 5ft. split type sampler 10.0 to 12.0 ft.		4	S-2	10.0 to 12.0	
2.0			5			
	Advanced casing to 15' and washed out.					13
4.0						10
5.0		Gray, soft, CLAY (CL), wet				8
	Drove 1½" I.D. X 2 ft. split type sampler 15.0 to 17.0 ft.		2/3	S-3	15.0 to 17.0	
7.0			2 1/3			

ARKS: Penetration of samplers by 30" fall of 140 lb. drive hammer, and of casing by 18" fall of 300 lb. drive hammer.

) blows = weight of hammer

ERIALS AND ROCK CLASSIFIED IN FIELD WITH-LABORATORY ANALYSIS.

GROUND WATER READINGS:

7:30 AM, 11-19-76 csg.@ 30' - Water @ 3.3 ft.
11:00 AM, 11-22-76 = Water @ 3.0 ft.

LOG COMPILED BY: R R Adams

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. CHARLESTOWN, N. H.

ECT: STP Addition LOCATION: Dover, N. H.

g No. A-11 Started: Completed: Driller:

TH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	blows/ casing
.0						4
	Advanced casing to 20' and cleaned out.					5
						4
.0	Drove 1½" I.D. X 2 ft. split type sampler 20.0 to 22.0 ft.		2	S-4	20.0 to 22.0	
			4			
.0						12
	Advanced casing to 25' and cleaned out.					10
						7
.0	Drove 1½" I.D. X 2 ft. split type sampler 25.0 to 27.0 ft.		0	S-5	25.0 to 27.0	
			3			
.0						11
	Advanced casing to 30' and washed out.					11
						10
.0	Drove 1½" I.D. X 5 ft. solid ltype sampler 30.0 to 35.0 ft.		4			
			5		30.0 to 35.0	–
			5	S-6		
		slightly sandy with some gravel in Clay 33 to 35'	40			
			28			
.0	Bottom of Exploration per instructions					

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: Dover STP Additions — LOCATION: Dover, N.H.

Boring No. D-1 — Started: 5-10-78 — Completed: 5-10-78 — Driller: Holmes

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1 1/2" I.D. solid type sampler 0.0 to 5.0 ft. Cleaned out to 5.0 ft. with 3" flite augers.	Brown, stiff, CLAY,(CL), moist.	3 13 33 46 55	S-1	0.0 to 5.0	
5.0	Drove 1 1/2" I.D. split type sampler 5.0 to 7.0 ft.		15 17	S-2		
7.0	Cleaned out to 10.0 ft. with 3" flite augers.					
10.0	Drove 1 1/2" I.D. split type sampler, lost 0.8 ft. gray clay.	Gray, CLAY (CL), moist	6 23	S-3		
12.0	Cleaned out 3" flite augers	Gray, loose, clayey, gravelly, SAND (SP&SC), moist.				
15.0	Drove 1 1/2" I.D. split type sampler 15.0 to 17.0		18 23	S-4		
17.0	3" flite augers					
20.0	Drove 1 1/2" I.D. split type sampler 20.0 to 25.0		18 12			
22.0	3" flite augers					
25.0	Drove 1 1/2" I.D. solid type sampler 25.0 to 30.0 ft.	Loode grading to compact	18 45 85 106 88			
30.0	Bottom of exploration depth considered sufficient per phone with T. Grumbling.					

REMARKS:

GROUND WATER READINGS:

5-10-78--4:25 PM

Water at 5.8 ft.

5-11-78--7:25 AM

Water at 5.1 ft.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

LOG COMPILED BY: J. Y. Walsh

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. D-2 — Started: 5-23-78 — Completed: 5-24-78 — Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 5.0 ftl solid type sampler from 0.0 to 5.0 ft.	Grayish brown, compact, CLAY, mottled, moist.	8			
	Advanced hole to 5.0 ft. with 3" flite augers		17		0.0	
			36	S-1	to	
			43		13.5	
			52			
5.0						
	Drove 1 1/2" I.D. split type sampler 5.0 to 7.0 ft.		14	S-2		
7.0			23			
	Advanced hole to 10.0 ft. with 3" flite augers.					
10.0						
	Drove 1 1/2" I.D. split type sampler from 10.0 to 12.0 ft.		13			
12.0			19	S-3		
	Advanced hole from 10.0 to 15.0 ft. with 3" flite augers.					
		Brownish gray, soft, CLAY, wet.				
15.0						
	Drove 1 1/2" I.D. split type sampler from 15.0 to 17.0 ft.		3		13.5	
			4	S-4	to 19.0	

REMARKS:

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

GROUND WATER READINGS:

5-24-78--7:30 AM--Water at 9.6 ft.

5-24-78--5:00 PM--Water at 9.8 ft.

LOG COMPILED BY: R. F. Adams

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

OJECT: STP Additions — LOCATION: Dover, N.H.

ing No. D-2 — Started: 5-23-78 — Completed: 5-24-78 — Driller: Holmes

EPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
17.0						
	Advanced hole from 15.0 to 20.0 ft. with 3" flite augers					
0.0		Grayish brown, compact, gravelly, SAND, wet.				
	Drove 1 1/2" I.D. split type sampler from 20.0 to 22.0 ft.	Brownish,gray, compact, clayey, gravelly, SAND, Wet, glacial Till	20	S-5	19.0 to 21.0	
2.0			29	S-6	21.0 to 24.0	
	Advanced hole from 20.0 to 25.0 ft. with 3" flite augers.	Grayish brown, compact, gravelly, silty, SAND, heavy mottling, wet				
5.0						
	Drove 1 1/2" I.D. split type sampler from 25.0 to 27.0 ft.		34			
7.0			45	S-7	24.0 to 38.8	
	Advanced hole from 25.8 to 30.0 with 3" flite augers.					
.0						
	Drove 1 1/2" I.D. split type sampler from 30.0 to 32.0 ft.		45			
.0			57	S-8		
	Advanced hole from 30.0 to 35.0 ft. with 3" flite augers.					
.0						
	Drove 1 1/2" I.D. split type sampler from 35.0 to 37.0 ft.		43			
.0			61	S-9		
	Refusal to augers at 38.8 ft.					
.8						
	100 blows, 140 lb. hammer., no penetration.					

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: Dover STP Additions — LOCATION: Dover, N.H.

Boring No. D-4 — Started: 5-11-78 — Completed: 5-11-78 — Driller: Holmes

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1 1/22 I.D. solid type sampler 0.0 to 5.0 ft.	Gravel and sand Fill	8			
			14			
		Brown, stiff, CLAY (CL), moist	74			
	Advanced hole with 3" flite augers.		17			
5.0			15			
	Drobe 1 1/2" I.D. split type sampl r 5.0 to 7.0 ft.	Gray, soft, CLAY (CL), wet	2			
			2	S-1	5.0 to 10.0	
7.0	3" flite augers					
0.0				S-2	10.0 to 11.0	
	Drove 1 1/2" I.D. split type sampler 10.0 to 12.0 ft.	Grayish brown, soft CLAY (CL), wet, bedded with thin sand layers.	12			
2.0			45	S-3	11.0 to 13.7	
	3" flite augers.	Brown, loose, clayey, gravelly, SAND, wet.				
	Refusal ato augers					
3.7						
	Tried to drive 1 1/2" I.D. solid type sampler. 100 blows--no pentration.					
	Bottom of exploration at refusal.					

REMARKS:

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

GROUND WATER READINGS:

5-11-78--12:37

Water at 2.7 ft.

LOG COMPILED BY: J. F. Walsh

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. D-5 — Started: 6-6-78 — Completed: 6-6-78 — Driller: Holmes

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1 1/2", 5 ft. solid type sampler 0.0 to 5.0 ft.	Brownish gray, soft, CLAY, wet.	2			
	Advanced hole from 0.0 to 5.0 with 3" flite augers.		3			
			4	S-1	0.0 to 6.4	
			5			
			5			
5.0						
	Drove 1 1/2" I.D. split type sampler 5.0 to 7.9 ft.		3	S-2		
		Grayish brow , soft, CLAY, heavy mottling, wet. (Transition to Glacial Till below)	5	S-3	6.4 to 9.1	
7.0						
	Advanced hole from 5.0 to 9.1 ft. Refusal to augers. 100 blows with 140 lb. drive hammer, no penetration.	Brown Till from about 7.1 ft. to 9.1 ft.				
9.1						
	Bottom of exploration at refusal.					

REMARKS:

GROUND WATER READINGS:

6-6-78--3:30 PM Water at 3.0 ft.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

LOG COMPILED BY: R. Walsh

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No: D-6 — Started: 5-22-78 — Completed: 5-23-78 — Driller: Holmes

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1 1/2" I.D. solid type sampler 0.0 to 5.0 ft. Advanced hole to 5.0 ft. with 3" flite augers.	Brown, loose, gravelly SAND, Random Fill	6 16 17 17 23			
5.0	Drove 1 1/2" I.D. split type sampler 5.0 to 7.0 ft.	Grayish brown. stiff, CLAY, moist.	16 36	S-1	0.0 to 5.3	
7.0	Advanced hole to 10.0 ft. with 3" flite augers.					
10.0	Drove 1 1/2" I.D. split type sampler 10.0 to 12.0 ft.	Grayish brown, compact, gravelly, silty, SAND mottled, wet. Glacial Till	112 84	S-2	5.3 to 9.0	
12.0	Advanced hole to 15.0 ft. with 3" flite augers.					
15.0	Drove 1 1/2" I.D. split type sampler from 15.0 to 17.0 ft.		35 55	S-3	9.0 to 20.3	
17.0	Advanced hole to 20.0 ft. with 3" flite augers.					
20.0	Drove solid type sampler to 20.3 ft. 100 blows-no penetration.					
20.3						

REMARKS:

GROUND WATER READINGS:

5-23-78--7:15 AM Water at 4.1 ft.

5-23-78--4:30 PM Water at 4.2 ft.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

LOG COMPILED BY: G.Y. Walsh

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. D-7 — Started: 5-11-78 — Completed: 5-19-78 — Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1 1/2" I.D. solid type sampler 0.0 to 5.0 ft.	Random sandy fill	3			
			5			
			5			
	Advanced hole with 3" flite augers		6			
5.0			18			
	Drove 1 1/2" I.D. split type sampler 5.0 to 7.0 ft.		20	S-1	0.0 to 7.0	
7.0			23			
	Advanced with flite augers.	Grayish brown, soft, SAND, wet.				
10.0						
	Drove 1 1/2" I.D. split type sampler 10.0 to 12.0 ft. Lost sample coming out of hole.		2			
12.0			6			
	Drove 1 1/2" I.D. solid type sampler 12.0 to 15.0 ft.		9			
	Advanced with flite augers.	Brownish gray, soft, gravelly SAND, wet.	9	S-2	7.0 to 14.0	
15.0		Brownish gray, soft, CLAY, mottled, wet.	25			
	Drove 1 1/2" I.D. split type sampler 15.0 to 17.0 ft.		12	S-3	14.0 to 16.0	

REMARKS:

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

GROUND WATER READINGS:

3:30 PM-Water at 8.4 ft.

5-18-78--7:45 AM-Water at 8.5 ft.

5-19-78--7:30 AM-Water at 7.9 ft.
Caved at 12.5 ft.

LOG COMPILED BY: J. Waldron

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

JECT: STP Additions — LOCATION: Dover, N.H.

g No. D-7 — Started: 5-11-78 — Completed: 5-19-78 — Driller: Holmes

TH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
			20	S-4	16.0 to 21.0	
7.0	Advanced hole from 17.0 to 20.0 with 3" flite augers					
0.0	Drove 1 1/2" I.D. split type sampler 20.0 to 22.0 ft.		18			
		Gray, soft, gravelly, clayey, SAND, mottled, wet.	65	S-5	21.0 to 26.0	
2.0	22.0 ft. to 25.0 ft. with flite augers.					
5.0	Drove 1 1/2" I.D. split type sampler 25.0 to 27.0 ft.		20			
		Grayish brown, compact, clayey, gravelly, SAND, mottled, wet. Glacial Till	23	S-6	26.0 to 50.0	
7.0	27.0 to 30.0 with flite augers					
0.0	Drove 1 1/2" I.D. split type sampler 30.0 to 32.0 ft.		18			
			22			
2.0	32.0 to 36.0 with flite augers.					
.0	Drove 1 1/2" I.D. solid type sampler 36.0 to 41.0 ft.		26			

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

ODNEY R. ADAMS, c. p. g. CHARLESTOWN, N. H.

ECT: STP Additions LOCATION: Dover, N.H.

g No. D-7 Started: 5-11-78 Completed: 5-19-78 Driller: Holmes

TH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
			31			
			27			
			32			
			52			
0						
	Drove 1 1/2" I.D. solid type sampler from 41.0 to 45.0 ft.		19			
			25			
	Advanced hole to 45.0 ft. with 3" flite augers.		29			
			39			
.0						
	Drove 1 1/2" I.D. solid type sampler from 45.0 to 50.0 ft. Lost sample bumping out. Excessive bumping due to hole caving.		20			
			32			
			32			
			37			
			57			
.0						
	Hole terminated per conversation with Don Stearns.					

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. D-9 — Started: 5-19-78 — Completed: 5-22-78 — Driller: Holmes

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1 1/2" I.D. solid type sampler 0.0 to 5.0 ft.	Random unconsolidated Fill Gravelly, sand moist	2			
			5			
			8			
			5			
			5			
5.0						
	Drove 1 1/2" I.D. split type sampler 5.0 to 7.0 ft.		3	S-1	0.0 to 9.0	
			4			
7.0						
	Advanced hole from 7.0 to 10.0 with 3" flite augers.					
		Grayish black, soft, sandy, SILT, moist				
10.0						
	Drove 1 1/2" I.D. split type sampler 10.0 to 12.0 ft.		4			
			6	S-2	9.0 to 14.0	
12.0						
	Advanced hole from 12.0 to 15.0 ft. with 3" flite augers.					
		Brownish gray, compact, gravelly, silty, SAND moist Glacial Till				
15.0						
	Drove 1 1/2" I.D. split type sampler from 15.0 to 17.0 ft.		19			
			35	S-3	14.0 to 17.0	

REMARKS:

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

GROUND WATER READINGS:

5-22-78--8:00 AM Water at 5.2 ft.

5-22-78--4:30 PM Water at 5.2 ft.

LOG COMPILED BY: J. Y. Walsh

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

ROJECT: STP Additions — LOCATION: Dover, N.H.

oring No. D-9 — Started: 5-19-78 — Completed: 5-22-78 — Driller: Haines

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recover
17.0			45			
17.8	Refusal to augers at 17.8 ft.	Grayish brown, compact, gravelly, SAND mottled, moist Glacial Till	34			
	Drove 5.0 ft. solid type sampler from 17.8 to 20.0 ft.		36	S-4	17.8 to 34.3	
20.0	Advanced 3" flite augers to 20.0 ft.		34			
	Drove 1 1/2" I.D. split type sampler from 20.0 to 22.0 ft.		45	S-5		
22.0						
	Advanced hole to 25.0 ft. with 3" flite augers.					
25.0						
	Drove 1 1/2" I.D. split type sampler from 25.0 to 27.0 ft.		40			
27.0			49	S-6		
	Advanced hole to 30.0 ft. with 3" flite augers.	Brownish gray, compact, gravelly, SAND, moist.				
30.0						
	Drove 1 1/2" I.D. split type sampler from 30.0 to 32.0 ft.		35			
32.0			41	S-7		
	Advanced hole with 3" flite augers. Refusal to augers at 34.3 ft. 100 blows with 140 lb. hammer on solid sampler-no penetration.					
34.3						
	Bottom of exploration at refusal.					

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. D-11 — Started: 6-5-78 — Completed: 6-6-78 — Driller: Holmes

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1 1/2", 5 ft. solid type sampler from 0.0 to 5.0 ft. Advanced hole from 0.0 to 5.0 with 3" flite augers.	Grayish brown, compact, CLAY, barely moist.	4 11 28 43 57	S-1	0.0 to 24.5	
5.0			15			
7.0	Drove 1 1/2" I.D. split type sampler 5.0 to 7.0 ft.		31	S-2		
	Advanced hole from 5.0 to 10.0 with 3" flite augers.					
10.0						
12.0	Drove 1 1/2" I.D. split type sampler 10.0 to 12.0		14 20	S-3		
15.0	Advanced hole from 10.0 to 15.0 with 3" flite augers.					
17.0	Drove 1 1/2" I.D. split type sampler 15.0 to 17.0 ft.	Becoming more moist	11 17	S-4		
20.0	Advanced hole from 15.0 to 20.0 with 3" flite augers.					
22.0	Drovell 1/2" I.D. split type sampler 20.0 to 22.0		7 10	S-5	0.0 to 24.5	
	Advanced hole from 20.0 to to 25.0 with 3" flite augers.					

REMARKS:

GROUND WATER READINGS:

6-6-78--7:30 AM Water at 23.8 ft.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

LOG COMPILED BY: J. Walsh

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. D-11 — Started: 6-5-78 — Completed: 6-6-78 — Driller: Holmes

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
25.0	Drove 1 1/2" I.D, split type sampler from 25.0 to 27.0 ft.	Brownish gray, soft, CLAY, wet	4		24.5	
27.0			7	S-6	to 31.0	
	Advanced hole from 25.0 to 30.0 30.0 with 3" flite augers.					
30.0						
	Drove 1 1/2" I.D. split type sampler 30.0 to 32.0		6		31.0	
32.0		Brownish gray, compact, silty, gravelly, SAND. Wet Glacial Till	73	S-7	to 34.5	
	Advanced hole from 30.0 to 35.0 with 3" flite augers.					
35.0						
	Drove 1 1/2" I.D. split type sampler 35.0 to 37.0 ft.	Grayish brown, compact, gravelly, silty, SAND. Mottled, wet, glacial till.	53		34.5	
37.0			87	S-8	to 37.1	
	Refusal to augers at 37.1 ft. Drove 1 1/2", 5 ft. solid type sampler 37.1 to 40.0. Advanced hole from 37.1 to 40.0 with 3" F.A.	Brownish gray, compact, silty, gravelly, SAND. Wet, glacial till.	210			
			83	S-9	37.1	
40.0			97		to 50.0	
	Drove 1 1/2", 5 ft. solid type sampler 40.0 to 45.0 ft.		87			
			110			
	Advanced hole from 40.0 to 45.0 with 3" flite augers.		101			
			137	S-10	37.1 to 50.0	
45.0			115			
	Drove 1 1/2", 5 ft. solid type sampler 45.0 to 50.0 ft.		52			
			63			
			91	S-11		
			118			
50.0			131			
	Operations terminated at 50.0 ft. per instructions from Paul Killion.					

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: Dover STP Additions — LOCATION: Dover, N.H.

Boring No. D-12 — Started: 5-8-78 — Completed: 5-8-78 — Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recover
	Drove 1 1/2" I.D. solid type sampler 0.0 to 5.0 ft.	Brown, stiff, CLAY (CL), moist.	6			
			22		0.0	
			40	S-1	to	
			61		5.0	
	Drilled 3" flite augers		58			
5.0	to 5.0 ft.					
	Drove 1 1/2" I.D. solid type sampler 5.0 to 7.0 ft.		9		5.0	
			16	S-2	to	
7.0					7.0	
8.0	Drilled 3" flite augers to 10.0 ft.	Gray, soft, CLAY (CL), wet				
10.0						
	Drove 1 1/2" I.D. split type sampler 10.0 to 12.0ft.		0		10.0	
			3	S-3	to	
12.0					12.0	
	Drilled 3" flite augers					
14.0	to 15.0 ft.					
15.0		Brown, loose, slightly clayey, gravelly, SAND (SP-SC), wet.				
	Drove 1 1/2" I.D. split type sampler 15.0 to 17.0		15		15.0	
			22	S-4	to	
17.0					17.0	
	Drilled 3" flite augers to 20.0 ft.					
20.0						
	Drove 1 1/2" I.D. solid type sampler 20.0 to 25.0 ft. Drove BX-FC casing to		30			
			25		20.0	
			40	S-5	to	
			55		24.5	
24.5	25.0 ft. and washed out.					
25.0		Gray, medium compact, gravelly, clayey, SAND (SC), moist. Basal Till	35			
	Drove 1 1/2" I.D. solid type sampler to 29.0 ft. Advanced casing to 30.0 ft. and washed out.		40			
			72		25.0	
			74	S-6	to	
			52		30.0	
			62			
30.0						

REMARKS: Penetration of samplers by 30" fall of 140 lb. hammer of casing by 24" fall of 300 lb. hammer.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

GROUND WATER READINGS:

5-9-78--12:30 AM
Water at 0.0 ft.

5-10-78--7:30 AM
Water at 4.1 ft.

5-10-78--4:22PM
Water at 4.7 ft.

5-11-78--7:30 AM
Water at 4.2 ft.

LOG COMPILED BY: J. F. Walsh

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. CHARLESTOWN, N. H.

OJECT: **Dover STP Additions** LOCATION: **Dover, N.H.**

ing No. **D-12** Started: **5-8-78** Completed: **5-10-78** Driller: **Adams**

EPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recover
	Drove 1 1/2" I.D. solid type sampler 30.0 to 35.0 ft.		35			
			42		30.0	
			57	S-7	to	
	Advanced casing to 35.0 ft.		67		25.0	
35.0	and washed out.		86			
	Drove 1 1/2" I.D. solid type sampler 35.0 to 40.0 ft.	Gray, medium compact, gravelly, sandy, CLAY (CL), moist. Basal Till	23			
			22		35.0	
			23	S-8	to	
	Advanced casing to 40.0 ft.		32		40.0	
40.0	and washed out.		43			
	Drove 1 1/2" I.D. solid type sampler 40.0 to 45.0 ft.		16			
			25		40.0	
			46	S-9	to	
	Advanced casing to 45.0 ft.		41		45.0	
45.0	and washed out.		63			
	Drove 1 1/2" I.D. solid type sampler to refusal at		26			
			40		45.0	
	48.2 ft. 100 blows-no pene-		62	S-10	to	
48.2	tration.		120		48.2	
	Bottom of exploration at refusal.					

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. E-1 — Started: 6-1-78 — Completed: 6-2-78 — Driller: Holmes

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1 1/2" 5 ft. solid type sampler from 0.0 to 5.0 ft.	0.5 Black, topsoil, moist	6			
	Advanced hole from 0.0 to 5.0 ft. with 3" flite augers.	Grayish brown, compact, CLAY, mottled, slightly moist.	9			
			25		0.5	
			42	S-1	to	
			59		17.5	
5.0						
	Drove 1 1/2" split type sampler from 5.0 to 7.0		20			
			34	S-2		
7.0	ft.					
	Advanced hole from 5.0 to 10.0 ft.					
10.0		Becoming more moist				
	Drove 1 1/2" I.D. split type sampler from 10.0 to		13			
			24	S-3		
12.0	12.0 ft.					
	Advanced hole from 10.0 to 15.0 ft. with 3" flite augers.					
15.0						
	Drove 1 1/2" I.D. split type sampler from 15.0 to		7			
			11	S-4		
17.0	17.0 ft.					
	Advanced hole from 15.0 to 20.0 ft. with 3" flite augers.	Gray, soft CLAY, wet.				
20.0						
	Drove 1 1/2" I.D. split type sampler from 20.0 to 22.0 ft.		5		17.5	
			9	S-5	to	
					21.2	

REMARKS:

GROUND WATER READINGS:

6-2-78--7:30 AM Water at 18.5 ft.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

LOG COMPILED BY: J. Walsh

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. CHARLESTOWN, N. H.

PROJECT: STP Additions LOCATION: Dover, N.H.

Boring No. E-1 Started: 6-1-78 Completed: 6-2-78 Driller: Holmes

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
22.0		Grayish brown, compact, gravelly, silty, SAND, heavy mottling, wet.				
	Advanced hole from 20.0 to 25.0 ft. with 3" flite augers.					
25.0						
	Drove 1 1/2" I.D. split type sampler from 25.0 to		23		21.2	
27.0	27.0 ft.		62	S-6	to	
	Advanced hole from 25.0 to 30.0 ft. with 3" flite				33.0	
30.0	augers.					
	Drove 1 1/2" I.D. split type sampler from 30.0 to		15			
32.0	32.0 ft.		21	S-7		
	Advanced hole from 30.0 to 35.0 ft. with 3" flite augers	Brownish gray, compact, silty, gravelly, SAND, wet				
35.0						
	Drove 1 1/2" I.D. split type sampler from 35.0 to		37		33.0	
37.0	37.0 ft.		53	S-8	to	
	Advanced hole from 35.0 to 40.0 ft. with 3" flite				50.0	
40.0	augers.					
	Drove 1 1/2" I.D. split type sampler from 40.0 to		55			
42.0	42.0 ft.		156	S-9		
	Advanced hole from 40.0 to 45.0 ft. with 3" flite					
45.0	augers.					
	Drove 1 1/2" 5ft. solid type sampler from 45.0 to		75			
	50.0 ft.		105			
			161	S-10		
			162			
50.0			104			
	Hole terminated at 50.0 ft. per instructions from Jay Grumbling and Don Stearns.					

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. E-3 — Started: 5-31-78 — Completed: 6-1-78 — Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1 1/2" I.D. solid type sampler from 0.0 to 5.0 ft. Advanced hole from 0.0 to 5.0 ft. with 3" flite augers.	Grayish brown, compact, CLAY, mottled, slightly moist.	8 12 21 39 55	S-1	0.0 to 16.0	
5.0	Drove 1 1/2" I.D. split type sampler 5.0 to 7.0 ft.		26 47	S-2		
7.0	Advanced hole from 5.0 to 10.0 ft. with 3" flite augers.					
10.0	Drove 1 1/2" I.D. split type sampler 10.0 to 12.0 ft.	Becoming moist	13 16	S-3		
12.0	Advanced hole from 10.0 to 15.0 ft. with 3" flite augers.					
15.0	Drove 1 1/2" I.D. split type sampler from 15.0 to 17.0 ft.	Grayish brown, compact, silty, gravelly, SAND, moist, heavy mottling.	12 32	S-4	16.0 to 28.1	
17.0	Advanced hole from 15.0 to 20.0 with 3" flite augers					
20.0	Drove 1 1/2" I.D. solid type sampler from 20.0 to 25.0 ft. Advanced hole from 20.0 to 25.0 with 3" flite augers.		54 83 150	S-5	16.0 to 28.1	

REMARKS:

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

GROUND WATER READINGS:

6-1-78--7:30 AM Water at 15.8 ft.

6-1-78--4:30 PM Water at 15.9 ft.

LOG COMPILED BY: J F Walsh

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. CHARLESTOWN, N. H.

PROJECT: STP Additions LOCATION: Dover, N.H.

Boring No. E-3 Started: 5-31-78 Completed: 6-1-78 Driller: Holmes

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recover
			120			
25.0			167			
	Drove 1 1/2" 5ft. solid type sampler from 25.0 to 28.1 ft. Refusal		67			
			210	S-6		
28.0			300			
	100 blows--no penetration 140 lb. hammer.					

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. E-4 — Started: 5-25-78 — Completed: 5-25-78 — Driller: Holmes

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1 1/2" I.D. solid type sampler 0.0 to 5.0 ft. Advanced hole from 0.0 to 5.0 ft. with 3" flite augers.	Black, topsoil, moist	8			
		Grayish brown, stiff CLAY, slightly moist.	23			
			34	S-1	0.5 to 26.0	
			59			
5.0			80			
	Drove 1 1/2" I.D. split type sampler 5.0 to 7.0 ft.		19	S-2		
			36			
7.0	Advanced hole from 5.0 to 10.0 ft. with 3" flite augers.					
10.0	Drove 1 1/2" I.D. split type sampler 10.0 to 12.0 ft.		29			
			45	S-3		
12.0	Advanced hole from 10.0 to 15.0 ft. with 3" flite augers.					
15.0	Drove 1 1/2" I.D. split type sampler 15.0 to 17.0 ft.		21			
			28	S-4		

REMARKS:

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

GROUND WATER READINGS:

5-26-78--7:15 AM No water

Hole caved at 26.8 ft. Wet

LOG COMPILED BY: J. H. Walsh

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. CHARLESTOWN, N. H.

OJECT: STP Additions LOCATION: Dover, N.H.

ring No. E-4 Started: 5-25-78 Completed: 5-25-78 Driller: Adams

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
17.0						
	Advanced hole from 15.0 to 20.0 ft. with 3" flite augers.					
20.0						
	Drove 1 1/2" I.D. split type sampler from 20.0 to 22.0 ft.	Becoming more moist	16			
			30	S-5		
22.0						
	Advanced hole from 20.0 to 25.0 ft. with 3" flite augers.					
25.0						
	Drove 1 1/2" I.D. split type sampler from 25.0 to 27.0 ft.		18			
		Grayish brown, compact, silty, gravelly, SAND, mottled, moist.	81	S-6	26.0 to 27.2	
27.0						
27.2	Refusal to augers					
	100 blows 140 lb. hammer, no penetration.					

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

Boring No. E-6 — Started: 5-26-78 — Completed: 5-26-78 — Driller: Holmes

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recover
	Drove 5.0 ft. solid sampler from 0.0 to 5.0 ft. Advanced hole from 0.0 to 5.0 ft. with 3 " flite augers.	Black topsoil, moist	4			
		Grayish brown, stiff CLAY, slightly moist some staining.	16		0.5 to 24.8	
			32	S-1		
			75			
5.0			95			
	Drove 1 1/2" I.D. split type sampler from 5.0 to		34			
7.0	7.0 ft.		53	S-2		
	Advanced hole from 5.0 to 10.0 ft. with 3" flite augers.					
10.0						
	Drove 1 1/2" I.D. split type sampler from 10.0 to		33			
12.0	12.0 ft.		52	S-3		
	Advanced hole from 10.0 to 15.0 ft. with 3" flite augers.					
15.0						
	Drove 1 1/2" I.D. split type sampler from 15.0 to	Becoming more moist	15			
17.0	17.0 ft.		31	S-4		
	Advanced hole from 15.0 to 20.0 with 3" flite augers.					
20.0						
	Drove 1 1/2" I.D. split type sampler from 20.0 to		10			
22.0	22.0 ft.		18	S-5		

REMARKS:

ATERIALS AND ROCK CLASSIFIED IN LD WITHOUT LABORATORY ANA- IS.

GROUND WATER READINGS:

5-26-78--4:15 AM No Water

Hole caved at 26.1 ft. Wet

LOG COMPILED BY: J. H. Walsh

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. CHARLESTOWN, N. H.

OJECT: STP Additions LOCATION: Dover, N.H.

ring No. E-6 Started: 5-26-78 Completed: 5-26-78 Driller: Holmes

EPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recover
25.0	Drove 1 1/2" 5ft. solid type sampler 25.0 to 26.9 ft. At 26.9 ft. 100 blows- no penetration.	Grayish brown, compact, gravelly, clayey, SAND, mottled, wet.	34	S-6	24.8 to 26.9	
26.9						

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c.p.g. — CHARLESTOWN, N. H.

PROJECT: **STP Additions** LOCATION: **Dover, N.H.**

Boring No. **#-7** Started: **5-30-78** Completed: **5-31-78** Driller: **Holmes**

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Core Recovery
	Drove 1 1/2" 5 ft. solid type sampler 0.0 to 5.0 ft. Advanced hole from 0.0 to 5.0 with 3" flite augers.	0.5 Black topsoil, moist	7			
		Grayish brown, compact, CLAY, mottled, slightly moist	12			
			20		0.5	
			45	S-1	to	
			68		11.2	
5.0						
	Drove 1 1/2" I.D. split type sampler from 5.0 to 7.0 ft.		17			
7.0			24	S-2		
	Advanced hole from 5.0 to to 10.0 with 3" flite augers.	Becoming more moist				
10.0						
	Drove 1 1/2" I.D. split type sampler from 10.0 to 12.0 ft.		11	S-3		
12.0		Grayish brown, compact, gravelly, silty, SAND mottled, wet.	95	S-4	11.2 to 31.2	
	Advanced hole from 10.0 to 15.0 with 3" flite augers.					
15.0						
	Drove 1 1/2" 5 ft. solid type sampler from 15.0 to 20.0 ft. Advanced hole from 15.0 to 20.0 ft. with 3" flite augers.		34			
			56			
			106	S-5		
			152			
			95	S-6		
20.0						
	Drove 1 1/2" I.D. split type sampler from 20.0 to 22.0 ft.		21			
			30			

REMARKS:

GROUND WATER READINGS:

5-31-78--7:15 AM Water at 15.8 ft.

5-31-78--4:45 PM Water at 15.8 ft.

MATERIALS AND ROCK CLASSIFIED IN FIELD WITHOUT LABORATORY ANALYSIS.

LOG COMPILED BY: J T Walsh

FIELD REPORT TEST BORING

GRANITE STATE EXPLORATIONS

RODNEY R. ADAMS, c. p. g. — CHARLESTOWN, N. H.

PROJECT: STP Additions — LOCATION: Dover, N.H.

ring No. F-7 — Started: 5-30-78 — Completed: 5-31-78 — Driller: Holmes

DEPTH	OPERATIONS	MATERIALS CLASSIFICATION	Blows Per Ft. Spoon	Sample No.	Sample Range	% Co Recove
22.0						
	Advanced hole from 20.0 to 25.0 ft. with 3" flite augers					
25.0						
	Drove 1 1/2" I.D. split type sampler from 25.0 to		25			
27.0	27.0 ft.		32	S-7		
	Advanced hole from 25.0 to 30.0 ft. with 3" flite augers,					
30.0						
	Drove 1 1/2" I.D. split type sampler from 30.0 to		29	S-8		
32.0	32.0 ft.	Brownish gray, compact, silty, gravelly, SAND, wet	42	S-9	31.2 to 50.0	
	Advanced hole from 30.0 to 35.0 ft. with 3" flite augers.					
35.0						
	Drove 1 1/2" I.D. split type sampler from 35.0 to		23			
37.0	37.0 ft.		34	S-10		
	Advanced hole from 35.0 to 40.0 with 3" flite augers.					
0.0						
	Drove 1 1/2" I.D. 5 ft. solid type sampler from 40.0 to 45.0 ft.		32			
			41			
	Advanced hole from 40.0 to 45.0 with 3" flite augers.		47	S-11	31.2 to 50.0	
			63			
5.0			81			
	Drove 1 1/2" 5 ft. solid type sampler from 45.0 to		46			
	50.0 ft.		87			
			89	S-12		
50.0			97			
			120			
	Hole terminate at 50.0 ft. per instructions from Don Stearns.					

APPENDIX C

SUMMARY OF SURFICIAL SOIL SAMPLES, AND
TEST PITS AND TEST BORING LOGS BY GZA

TABLE C-1
Summary of Surficial Soil Samples

Dover Department of Public Works
River Street, Dover, New Hampshire

Surficial Soil Sample #	Total Depth (ft.)	Composite	Field Test Data (ppm)	Soil Description
SS-1	0.5	yes	ND	Gray-brown, fine to medium SAND, some Silt (Fill)
SS-2	1	yes	ND	Brown, fine to coarse SAND, some Gravel, trace Silt (Fill)
SS-3	1	yes	ND	Brown, fine to medium SAND, some SILT (Fill)
SS-4	1	yes	ND	Brown, fine to coarse SAND and GRAVEL, little Silt (Fill)
SS-5	1	yes	ND	Dark brown, fine to coarse SAND, little Silt (Fill)
SS-6	1	yes	ND	Brown, fine to coarse SAND, little Gravel, trace Silt (Fill)
SS-7	0.5	yes	ND	Brown, fine to coarse, SAND (Fill)
SS-8	1	yes	ND	Dark brown, fine to coarse SAND, some Silt (Fill)
SS-9	1	yes	ND	Dark brown, fine to coarse SAND and GRAVEL, litttle Silt (Fill)
SS-10	1	yes	ND	Dark brown, fine to medium SAND and SILT

Note:

1. Surficial soil samples were collected by GZA GeoEnvironmental, Inc. on April 21, 2000 using manual sampling techniques. Soil samples were screened for volatile organic compounds (VOCs) using a TEI 580B Organic Vapor Meter. "ND" indicates no VOCs were detected.

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Dover Public Works
Dover, New Hampshire

Boring No.: GZ-1
Page: 1 of 1
File No.: 22457
Check: NJN

Contractor: New Hampshire Boring
Foreman: Bob Thompson/Johnny Michuad
Logged by: Jay Hodkinson
Date Start/Finish: 4-10-00 / 4-10-00
Boring Location: See Exploration Location Plan
GS Elev.: 16 Datum: NGVD

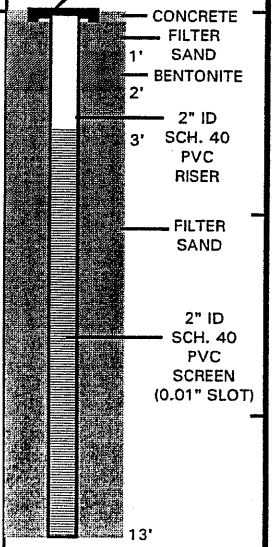
	Auger/ Casing	Sampler
Type:	HSA	SS
O.D. / I.D.:	4-1/4"	1-3/8"
Hammer Wt.:	-	140#
Hammer Fall:	-	30"
Other:	ATV CME 550	

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
4-10-00	1010	7.8	13'	10 min
4-21-00	-	6.0	well	11 days

Depth	Casing Blows	Sample Info: No.	Pen/ Rec. (In.)	Depth (Ft.)	Blows (/6")	Field Test Data (ppm)	Sample Description & Classification	Stratum Desc.	Rmks.
		S-1	24/18	0-2	3-4	0	Loose, dark gray-brown, fine to medium SAND, trace Silt, little Debris consisting of glass, brick, little Organics.		1
					4-7				
		S-2	24/14	2-4	5-4	0	Loose, dark gray-brown, fine to medium SAND, some Organics (compressible), little Gravel, brick, trace Clay.		
					5-3				
		S-3	24/3	4-6	3-2	0	Loose, dark gray-brown, fine to medium SAND, some Clay and Silt. Wet.		
5'					4-4				
		S-4	24/8	6-8	7-8	0	Medium dense, dark gray-brown, fine to medium SAND and Silty CLAY, little leather clipping and brick. Wet.	FILL	
					7-8				
		S-5	24/6	8-10	3-4	0	Loose, gray-brown, Silty CLAY, little Gravel and brick. Wet.		
					4-4				
10'		S-6	24/13	10-12	2-2	34	Very loose, gray-brown, Silty CLAY, some fine to coarse Sand, little Organics, wood (2%), newspaper (5%). Wet. Slight petroleum odor.		
					2-4				
							Bottom of boring at 13 feet below ground surface.	13'	
15'									
20'									
25'									

Equipment Installed



REMARKS

1. Soil samples were screened for total volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter (OVM) referenced to an isobutylene -in-air standard. Total VOCs detected are reported in parts per million (ppm) in the "Field Test Data" column. "ND" indicates no VOCs detected.

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

Boring No.: GZ-1

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Dover Public Works
Dover, New Hampshire

Boring No.: GZ-2
Page: 1 of 1
File No.: 22457
Check: NJN

Contractor: New Hampshire Boring
Foreman: Bob Thompson/Johnny Michuad
Logged by: Jay Hodkinson
Date Start/Finish: 4-10-00 / 4-10-00
Boring Location: See Exploration Location Plan
GS Elev.: 12 Datum: NGVD

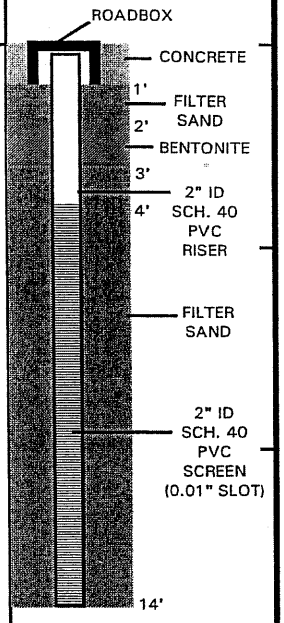
	Auger/ Casing	Sampler
Type:	HSA	SS
O.D. / I.D.:	4-1/4"	1-3/8"
Hammer Wt.:	-	140#
Hammer Fall:	-	30"
Other:	ATV CME 550	

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
4-10-00	1120	8.6	14'	10 min
4-21-00	-	9.6	well	11 days

Depth	Casing Blows	Sample Information: No.	Pen/ Rec. (In.)	Depth (Ft.)	Blows (/6")	Field Test Data (ppm)	Sample Description & Classification	Stratum Desc.	Rmks.
		S-1	24/19	0-2	1-5	0	Medium dense, gray-brown, fine to coarse SAND, some gray-brown Silty Clay, little Gravel, brick.	SAND AND DEBRIS WITH RIVER DREDGINGS	1
					10-7				
		S-2	24/8	2-4	7-12	0	Medium dense, gray-brown, fine to coarse SAND, little gray Clay, some brick, Gravel.		
					7-8				
		S-3	24/11	4-6	6-9	9	Medium dense, dark gray-black, fine to coarse SAND, some wood.		
5'					10-6				
		S-4	24/14	6-8	5-4	0	Loose, gray-brown, fine to coarse SAND, little wood, trace Silt.	6'	
					3-2				
		S-5	24/6	8-10	2-2	0	Loose, gray-brown, fine to coarse SAND, little wood, trace Silt.	FINE TO COARSE SAND WITH WOOD (FILL)	
					3-1				
10'		S-6	24/11	10-12	1-3	0	Very loose, gray-brown, fine to coarse SAND, some Silty Clay, trace Organics.		
					1-2				
		S-7	24/19	12-14	2-7	0	Medium dense, gray-brown, fine to coarse SAND, little Silty Clay, trace wood.		
					9-8				
		S-8	24/12	14-16	8-7	0	Medium dense, gray-brown, fine to coarse SAND, some peat with Organics.	14' PEAT	
15'					6-6				
							Bottom of boring at 16 feet below ground surface.	16'	
20'									
25'									

Equipment Installed



REMARKS

1. Soil samples were screened for total volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter (OVM) referenced to an isobutylene -in-air standard. Total VOCs detected are reported in parts per million (ppm) in the "Field Test Data" column. "ND" indicates no VOCs detected.

Stratification lines represent approximate boundaries between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Dover Public Works
Dover, New Hampshire

Boring No.: GZ-3
Page: 1 of 1
File No.: 22457
Check: NJN

Contractor: New Hampshire Boring
Foreman: Bob Thompson/Johnny Michuad
Logged by: Jay Hodkinson
Date Start/Finish: 4-10-00 / 4-10-00
Boring Location: See Exploration Location Plan
GS Elev.: 28 **Datum:** NGVD

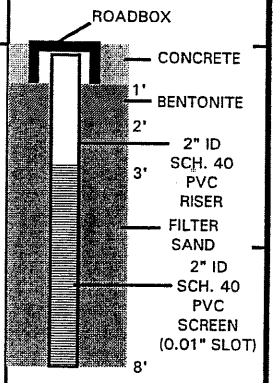
	Auger/ Casing	Sampler
Type:	HSA	SS
O.D. / I.D.:	4-1/4"	1-3/8"
Hammer Wt.:	-	140#
Hammer Fall:	-	30"
Other:	ATV CME 550	

GROUNDWATER READINGS

Date	Time	Depth	Casing	Stab
4-10-00	1215	3.72	8'	5 min
4-21-00	-	3.7	well	11 days

Depth	Casing Blows	Sample Information: No.	Pen/ Rec. (In.)	Depth (Ft.)	Blows (/6")	Field Test Data (ppm)	Sample Description & Classification	Stratum Desc.	Rmks.
		S-1	24/16	0.5-2.5	5-12	0	Dark brown, fine to coarse SAND, some Gravel, little Silt.	ASPHALT	1
					17-16			BANKRUN GRAVEL	
		S-2	24/8	2.5-4.5	9-11	0	Dark brown-black, fine to medium SAND, some brick and Gravel.	FILL	
					13-17				
5'		S-3	24/6	5-7	2-2	0	Loose, black, fine to coarse SAND and WOOD, some Gravel with brick. Wet.		
					5-2				
		S-4	2/2	8	100/2"	0	Dark brown, fractured ROCK with pieces of wood in tip of sampler.	8' POSSIBLE BEDROCK	
10'							Auger and split spoon refusal at 8 feet. Bottom of boring at 8 feet below ground surface.		
15'									
20'									
25'									

Equipment Installed



REMARKS

1. Soil samples were screened for total volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter (OVM) referenced to an isobutylene -in-air standard. Total VOCs detected are reported in parts per million (ppm) in the "Field Test Data" column. "ND" indicates no VOCs detected.

GZA GeoEnvironmental, Inc.
Engineers/Scientists

380 Harvey Road
Manchester, New Hampshire 03103

Dover Public Works
Dover, New Hampshire

Test Pit No. TP-1
Page No. 1 of 1
File No. 22457.00
Checked By:

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Clear, cold

Contractor Dover Public Works
Operator Allan Dews
Make Case Model 580 Super L
Capacity 1/3 cu.yd. Reach 16 ft.

Date 12/20/1999
Ground Elev. See Plan
Time Started
Time Completed

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0	Sand Fill					
1'	Sand Fill soaked with oil					
2'	Tarp					
3'						
4'						
5'	Construction Debris and Fill Leather clippings, granite curbing, concrete blocks, tarps					
6'						
7'						
8'						
9'						
10'						
11'	River dredging	S-1				1
12'	Clays, wood debris, sand					
13'						
14'						
15'	Bottom at 15 feet					
16'						

Notes:

1. Groundwater was encountered at 15 feet below ground surface.

Test Pit Plan

10
3
NORTH
Volume = 17 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

GZA GeoEnvironmental, Inc.
Engineers/Scientists

380 Harvey Road
Manchester, New Hampshire 03103

Dover Public Works
Dover, New Hampshire

Test Pit No. TP-2
Page No. 1 of 1
File No. 22457.00
Checked By:

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Clear, cold

Contractor Dover Public Works
Operator Allan Dews
Make Case Model 580 Super L
Capacity 1/3 cu.yd. Reach 16 ft.

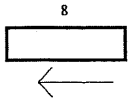
Date 12/20/1999
Ground Elev. See Plan
Time Started
Time Completed

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0						
1'	Sand Fill with Cobbles					
2'						
3'						
4'	Black and white ash with metal and glass debris					
5'						
6'			ND			2
7'	Glass and metal debris with asphalt shingles	S-1				1
8'						
9'	Bottom of excavation at 8.5 feet.					
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Groundwater encountered approximately 8 feet below ground surface.
2. Soil samples were screened for volatile organic compounds using a Model 580B photoionization detector calibrated with an isobutylene-in-air standard. Readings are given in parts per million (ppm). ND indicates not detected above background.

Test Pit Plan



Volume = 8 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

GZA GeoEnvironmental, Inc.
Engineers/Scientists

380 Harvey Road
Manchester, New Hampshire 03103

Dover Public Works
Dover, New Hampshire

Test Pit No. TP-3
Page No. 1 of 1
File No. 22457.00
Checked By:

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Clear, cold

Contractor Dover Public Works
Operator Allan Dews
Make Case Model 580 Sup
Capacity 1/3 cu. yd. Reach 16 ft.

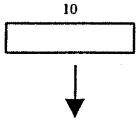
Date 12/20/1999
Ground Elev. See Plan
Time Started
Time Completed

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0						
1'	Sand Fill					
	Ash, brick, glass					
2'						
3'			ND			
4'						
5'	Sand Fill					
6'						
7'	Ash, brick, bottles, rubber, metal debris					
8'			ND			
9'						
10'						
11'		S-1				
12'	Bottom of excavation at 11.5 feet					
13'						
14'						
15'						
16'						

Notes:

1. Groundwater encountered 11.5 feet below ground surface.
2. Soil samples were screened for volatile organic compounds using a Model 580B photoionization detector calibrated with an isobutylene-in-air standard. Readings are given in parts per million (ppm). ND indicates not detected above background.

Test Pit Plan



Volume = 12 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M------Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

GZA GeoEnvironmental, Inc.
Engineers/Scientists

380 Harvey Road
Manchester, New Hampshire 03103

Dover Public Works
Dover, New Hampshire

Test Pit No. TP-4
Page No. 1 of 1
File No. 22457.00
Checked By:

GZA Rep. Jay Hodkinson
Weather Clear, cold

Excavation Equipment
Contractor Dover Public Works
Operator Allan Dews
Make Case Model 580 Sup
Capacity 1/3 cu. yd. Reach 16 ft.

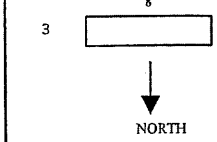
Date 12/21/1999
Ground Elev. See Plan
Time Started
Time Completed

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0						
1'	Sand Fill					
2'			ND			2
3'	Gray, fine SAND, some Silt, trace Gravel.					
4'						
5'	Dark brown, fine to medium SAND, little Gravel with construction debris (i.e., granite curbing, bricks, and ash).	S-1				
6'						
7'			ND			1
8'						
9'	Bottom of excavation at 8.6 feet.					
10'						
11'		S-1				
12'						
13'						
14'						
15'						
16'						

Notes:

1. Groundwater encountered 7 feet below ground surface.
2. Soil samples were screened for volatile organic compounds using a Model 580B photoionization detector calibrated with an isobutylene-in-air standard. Readings are given in parts per million (ppm). ND indicates not detected above background.

Test Pit Plan



Volume = 8 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

GZA GeoEnvironmental, Inc.
Engineers/Scientists

380 Harvey Road
Manchester, New Hampshire 03103

Dover Public Works
Dover, New Hampshire

Test Pit No. TP-5
Page No. 1 of 1
File No. 22457.00
Checked By:

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Clear, cold

Contractor Dover Public Works
Operator Allan Dews
Make Case Model 580 Super L
Capacity 1/3 cu.yd. Reach 16 ft.

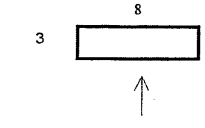
Date 12/21/1999
Ground Elev. See Plan
Time Started
Time Completed

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0						
1'	Sand Fill					
2'			ND			
	Brown, fine to coarse SAND, trace Silt with construction debris.					
3'						
	Dark brown, fine to coarse SAND, little Silt with construction debris (i.e., bricks with mortar, concrete pieces).					
4'			ND			
5'						
	Oily Soil ↓	S1				
6'			36			
	Refusal at 6 feet below ground surface on apparent foundation. Excavation terminated at 6 feet.					
7'						
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened for volatile organic compounds using a Model 580B photoionization detector calibrated with an isobutylene-in-air standard. Readings are given in parts per million (ppm). ND indicates not detected above background.
2. Groundwater was not detected.

Test Pit Plan



Volume = 5 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(x) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

GZA GeoEnvironmental, Inc.
Engineers/Scientists

380 Harvey Road
Manchester, New Hampshire 03103

Dover Public Works
Dover, New Hampshire

Test Pit No. TP-6
Page No. 1 of 1
File No. 22457.00
Checked By:

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Clear, cold

Contractor Dover Public Works
Operator Allan Dews
Make Case Model 580 Super L
Capacity 1/3 cu.yd. Reach 16 ft.

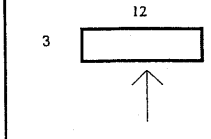
Date 12/21/1999
Ground Elev. See Plan
Time Started
Time Completed

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0						
1'	Brown, fine to coarse SAND, little Gravel, trace Silt.					
2'						
3'			ND			1
4'	Dark brown, fine to coarse SAND, trace Silt, pockets of river dredgings and some construction debris.	S-1				
5'						
6'			ND			
7'	Bottom of excavation at 7 feet below ground surface.					2
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened for volatile organic compounds using a Model 580B photoionization detector calibrated with an isobutylene-in-air standard. Readings are given in parts per million (ppm). ND indicates not detected above background.
2. Groundwater was encountered at 6.5 feet below ground surface.

Test Pit Plan



Volume = 9 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(x) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

GZA GeoEnvironmental, Inc.
Engineers/Scientists

380 Harvey Road
Manchester, New Hampshire 03103

Dover Public Works
Dover, New Hampshire

Test Pit No. TP-7
Page No. 1 of 1
File No. 22457.00
Checked By:

Excavation Equipment

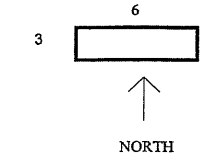
GZA Rep.	Jay Hodkinson	Contractor	Dover Public Works			Date	12/21/1999
		Operator	Allan Dews			Ground Elev.	See Plan
Weather	Clear, 30's	Make	Case	Model	580 Super L	Time Started	
		Capacity	1/3 cu.yd.	Reach	16 ft.	Time Completed	

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0						
1'						
2'	Brown, fine to medium SAND, trace Silt with construction debris.		ND			
3'						
4'	Bricks, concrete, leather clipping, pockets of dredge material.					
5'			ND			
6'						
7'						
8'	Brick debris with ash		ND			
9'						
	Bottom of excavation at 9 feet.					
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Groundwater was encountered approximately 9 feet below ground surface.
2. Soil samples were screened for volatile organic compounds using a Model 580B photoionization detector calibrated with an isobutylene-in-air standard. Readings are given in parts per million (ppm). ND indicates not detected above background.

Test Pit Plan



Volume = 6 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(x) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

GZA GeoEnvironmental, Inc.
Engineers/Scientists

380 Harvey Road
Manchester, New Hampshire 03103

Dover Public Works
Dover, New Hampshire

Test Pit No. TP-8
Page No. 1 of 1
File No. 22457.00
Checked By:

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Clear, 30's

Contractor Dover Public Works
Operator Allan Dews
Make Case Model 580 Super L
Capacity 1/3 cu.yd. Reach 16 ft.

Date 12/21/1999
Ground Elev. See Plan
Time Started
Time Completed

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0						
1'						
2'	Bricks and blasted rock nested in sand fill					
3'		S-1	ND			1
4'						
5'						
6'						2
7'	Bottom of excavation at about 6 feet.					
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened for volatile organic compounds using a Model 580B photoionization detector calibrated with an isobutylene-in-air standard. Readings are given in parts per million (ppm). ND indicates not detected above background.
2. Groundwater encountered at 6 feet below ground surface.

Test Pit Plan

8
4

NORTH

Volume = 7 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(x) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

GZA GeoEnvironmental, Inc.
Engineers/Scientists

380 Harvey Road
Manchester, New Hampshire 03103

Dover Public Works
Dover, New Hampshire

Test Pit No. TP-9
Page No. 1 of 1
File No. 22457.00
Checked By:

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Clear, 30's

Contractor Dover Public Works
Operator Allan Dews
Make Case Model 580 Super L
Capacity 1/3 cu.yd. Reach 16 ft.

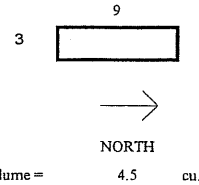
Date 12/21/1999
Ground Elev. See Plan
Time Started
Time Completed

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0						
1'	Brown, fine to medium SAND, little Silt, some Boulders and construction debris.					
2'			ND			1
3'		S-1				
4'						2
5'	Bottom of excavation at 4.5 feet.					
6'						
7'						
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened for volatile organic compounds using a Model 580B photoionization detector calibrated with an isobutylene-in-air standard. Readings are given in parts per million (ppm). ND indicates not detected above background.
2. Groundwater was encountered 4 feet below ground surface.

Test Pit Plan



Volume = 4.5 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(x) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

GZA GeoEnvironmental, Inc.
Engineers/Scientists

380 Harvey Road
Manchester, New Hampshire 03103

Dover Public Works
Dover, New Hampshire

Test Pit No. TP-10
Page No. 1 of 1
File No. 22457.00
Checked By:

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Clear, 30's

Contractor Dover Public Works
Operator Allan Dews
Make Case Model 580 Super L
Capacity 1/3 cu.yd. Reach 16 ft.

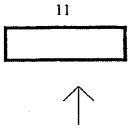
Date 12/21/1999
Ground Elev. See Plan
Time Started
Time Completed

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0						
1'	Sand Fill					
2'	Sand with building debris					
3'						
4'						
5'						
6'						
7'	Layer of asphalt cuttings	S-1	ND			1
8'	Orange stained soil					2
9'	Gray clay and silt					
10'	Bottom of excavation at 10 feet.		ND			
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened for volatile organic compounds using a Model 580B photoionization detector calibrated with an isobutylene-in-air standard. Readings are given in parts per million (ppm). ND indicates not detected above background.
2. Groundwater encountered 8.5 feet below ground surface.

Test Pit Plan



Volume = 12 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(x) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

GZA GeoEnvironmental, Inc.		Test Pit No.	TP-11
Engineers/Scientists	Dover Public Works	Page No.	1 of 1
	Dover, New Hampshire	File No.	22457.00
380 Harvey Road		Checked By:	
Manchester, New Hampshire 03103			

Excavation Equipment

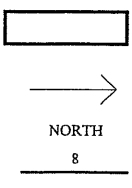
GZA Rep.	Jay Hodkinson	Contractor	Dover Public Works			Date	12/22/1999
		Operator	Allan Dews			Ground Elev.	See Plan
Weather	Clear, 30's	Make	Case	Model	580 Super L	Time Started	
		Capacity	1/3 cu.yd.	Reach	16 ft.	Time Completed	

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0						
1'	Sand Fill					
2'						
3'	Sand with large pieces of cloth, some bricks and asphalt, leather clippings, some scrap metal associated with tannery waste.		ND			1
4'		S-1				
5'						
6'						
7'						
8'						
9'						
10'	Grayish blue Clay					
11'						
12'						
13'						2
	Bottom of excavation at 13 feet.					
14'						
15'						
16'						

Notes:

1. Soil samples were screened for volatile organic compounds using a Model 580B photoionization detector calibrated with an isobutylene-in-air standard. Readings are given in parts per million (ppm). ND indicates not detected above background.
2. No groundwater was encountered.

Test Pit Plan



Volume = 8 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(x) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

GZA GeoEnvironmental, Inc.
Engineers/Scientists

380 Harvey Road
Manchester, New Hampshire 03103

Dover Public Works
Dover, New Hampshire

Test Pit No. TP-12
Page No. 1 of 1
File No. 22457.00
Checked By:

GZA Rep. Jay Hodkinson
Weather Clear, cold

Excavation Equipment
Contractor Dover Public Works
Operator Allan Dews
Make Case Model 580 Sup
Capacity 1/3 cu. yd. Reach 16 ft.

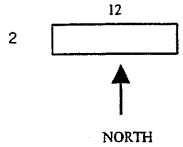
Date 12/22/1999
Ground Elev. See Plan
Time Started
Time Completed

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0						
1'	Sand Fill					
2'	Fine to coarse SAND with contruction and tannery debris, leather clippings, bricks, scrap metal. Strong catchbasin smell.					
3'						1
4'		S-1				
5'	Black soil possibly from catchbasin grit.					
6'						
7'	Grayish Clay					
8'						
9'	Bottom of excavation at 9 feet.					
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Groundwater encountered approximately 4 feet below ground surface.

Test Pit Plan



Volume = 8 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

GZA GeoEnvironmental, Inc.
Engineers/Scientists

380 Harvey Road
Manchester, New Hampshire 03103

Dover Publis Works
Dover, New Hampshire

Test Pit No. TP-13
Page No. 1 of 1
File No. 22457.00
Checked By:

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Clear, cold

Contractor Dover Public Works
Operator Allan Dews
Make Case Model 580 Super L
Capacity 1/3 cu.yd. Reach 16 ft.

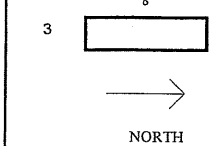
Date 12/22/1999
Ground Elev. See Plan
Time Started
Time Completed

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0						
1'	Brown, fine to coarse SAND, trace Silt with orange staining, some building debris.	S-1				
2'						
3'			ND			
4'						
5'	Grayish Clay					
6'						
7'						
8'						
9'	Bottom of excavation at 8.5 feet.					
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened for volatile organic compounds using a Model 580B photoionization detector calibrated with an isobutylene-in-air standard. Readings are given in parts per million (ppm). ND indicates not detected above background.
2. Groundwater encountered 4 feet below ground surface.

Test Pit Plan



Volume = 8 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(x) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

GZA GeoEnvironmental, Inc.
Engineers/Scientists

380 Harvey Road
Manchester, New Hampshire 03103

Dover Publis Works
Dover, New Hampshire

Test Pit No. TP-14
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File No. 22457.00
Checked By:

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Clear, cold

Contractor Dover Public Works
Operator Allan Dews
Make Case Model 580 Super L
Capacity 1/3 cu.yd. Reach 16 ft.

Date 12/22/1999
Ground Elev. See Plan
Time Started
Time Completed

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0						
1'	Brown, fine to medium SAND with some construction debris, some leather clippings, scrap metal, bricks and concrete.					
2'						
3'						
4'						
5'						
6'						
7'	Grayish Clay from river dredging, some tannery waste. Sheen on water.	S-1				
8'						
9'						
10'						
11'						1
12'	Glass debris with river dredging. Bottom of excavation at 12 feet.					
13'						
14'						
15'						
16'						

Notes:

1. Groundwater may be more shallow due to presents of clarifyer walls still intact.

Test Pit Plan

10
3
NORTH

Volume = 13 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(x) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

GZA GeoEnvironmental, Inc.
Engineers/Scientists

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Dover Publis Works
Dover, New Hampshire

Test Pit No. TP-15
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File No. 22457.00
Checked By:

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Clear, cold

Contractor Dover Public Works
Operator Allan Dews
Make Case Model 580 Super L
Capacity 1/3 cu.yd. Reach 16 ft.

Date 12/22/1999
Ground Elev. See Plan
Time Started
Time Completed

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0						
1'	Sand					
2'						
3'						
4'	Fine to coarse SAND with some construction debris bricks, concrete, asphalt, blasted rock.					
5'						
6'						
7'	Sand Fill with blasted rock					
8'						
9'						1
10'	Bottom of excavation at 9 feet.					
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Groundwater was encountered at 8.5 feet below ground surface.

Test Pit Plan

12
2
NORTH

Volume = 8 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(x) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

GZA GeoEnvironmental, Inc.
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Dover Publis Works
Dover, New Hampshire

Test Pit No. TP-16
Page No. 1 of 1
File No. 22457.00
Checked By:

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Clear, cold

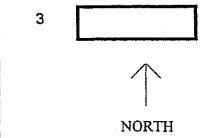
Contractor Dover Public Works
Operator Allan Dews
Make Case Model 580 Super L
Capacity 1/3 cu.yd. Reach 16 ft.

Date 12/22/1999
Ground Elev. See Plan
Time Started
Time Completed

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0						
1'	Brown Sand (virgin)					
2'						
3'						
4'	Dark brown Sand (virgin)					
5'						
6'	Light brown Sand (virgin)					
7'	Bottom of excavation at 7 feet. Refusal at bedrock.					
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

Test Pit Plan



Volume = 5 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(x) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

GZA GeoEnvironmental, Inc.
Engineers/Scientists

380 Harvey Road
Manchester, New Hampshire 03103

Dover Publis Works
Dover, New Hampshire

Test Pit No. TP-17
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File No. 22457.00
Checked By:

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Clear, cold

Contractor Dover Public Works
Operator Allan Dews
Make Case Model 580 Super L
Capacity 1/3 cu.yd. Reach 16 ft.

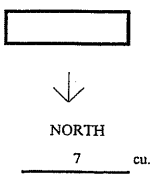
Date 12/22/1999
Ground Elev. See Plan
Time Started
Time Completed

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0						
1'	Brown, fine to coarse SAND.					
2'	Yellowish brown SAND.					
3'	Brown, fine to coarse SAND.					
4'	Reddish SAND with orange stain rock.					
5'						
6'	Blasted rock fragments with brick.					
7'						
8'						
9'						1
10'	Bottom of excavation at 9 feet.					
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Groundwater encountered at 8.6 feet below ground surface.

Test Pit Plan



Volume = 7 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(x) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

GZA GeoEnvironmental, Inc.
Engineers/Scientists

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Dover Publis Works
Dover, New Hampshire

Test Pit No. TP-18
Page No. 1 of 1
File No. 22457.00
Checked By:

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Clear, cold

Contractor Dover Public Works
Operator Allan Dews
Make Case Model 580 Super L
Capacity 1/3 cu.yd. Reach 16 ft.

Date 12/22/1999
Ground Elev. See Plan
Time Started
Time Completed

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0						
1'	Brown SAND (virgin)					
2'		S-1				
3'	Orange stained SAND (virgin)					
4'						
5'						
6'	Brown SAND (virgin)					
7'						
8'	Bottom of excavation at 8 feet due to refusal on bedrock.					
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

Test Pit Plan
12
3
NORTH
Volume = 11 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(x) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

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Engineers/Scientists

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Dover Public Works
Dover, New Hampshire

Test Pit No.	TP2-1
Page No.	1 of 1
File No.	22457.00
Checked By:	NJN

Excavation Equipment

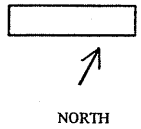
GZA Rep.	Jay Hodkinson	Contractor	Dover Public Works	Date	04/11/2000
		Operator	Shawn McClane	Ground Elev.	See Plan
Weather	Windy, 40s	Make	Case	Model	580 SuperL	Time Started	0740
		Capacity	1/3 cu. yd.	Reach	16 ft.	Time Completed	0745

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0	Blueish gray, fine to medium SAND with Cobbles, some Clay. Catchbasin grit smell.			E	2A	1
1'						
2'			ND			
3'						
4'	Black, fine to medium SAND, some Silt, little Organics.					
5'						2
6'			ND			
7'	Gray-brown, Silty CLAY, some fine to medium Sand.					
8'	Bottom of test pit at 8 feet below ground surface. No refusal.					
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened in the field for volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter reference to an isobutylene-in-air standard. Results are reported in the "PID Reading (ppm)" column in parts per million. ND indicates no VOCs detected.
2. Groundwater was encountered at a depth of 4.5 feet below ground surface.

Test Pit Plan



Volume = 6.2 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.15	4.5'

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Engineers/Scientists

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Dover Public Works
Dover, New Hampshire

Test Pit No.	TP2-2
Page No.	1 of 1
File No.	22457.00
Checked By:	NJN

Excavation Equipment

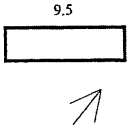
GZA Rep.	Jay Hodkinson	Contractor	Dover Public Works	Date	04/11/2000
		Operator	Shawn McClane	Ground Elev.	See Plan
Weather	Windy, 40s	Make	Case	Model	580 SuperL	Time Started	0850
		Capacity	1/3 cu. yd.	Reach	16 ft.	Time Completed	0900

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0	Brown, fine to coarse SAND, trace Silt.			E		
1'						
2'	Dark brown, fine to medium SAND, little Silt.					
3'	Brown, fine to coarse SAND, little Silt.					1
4'	Gray-blue, Silty CLAY. (FILL)					
5'			ND			2
6'	Leather clippings	S-1				3
7'	Bottom of test pit at 5.8 feet below ground surface. No refusal.					
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened in the field for volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter reference to an isobutylene-in-air standard. Results are reported in the "PID Reading (ppm)" column in parts per million. ND indicates no VOCs detected.
2. Groundwater was encountered at a depth of 4 feet below ground surface.
3. Test pit terminated due to collapsing walls.

Test Pit Plan



Volume = 6.3 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.10	4'

GZA GeoEnvironmental, Inc.		Test Pit No.	TP2-3
Engineers/Scientists	Dover Public Works	Page No.	1 of 1
	Dover, New Hampshire	File No.	22457.00
380 Harvey Road		Checked By:	NJN
Manchester, New Hampshire 03103			

Excavation Equipment

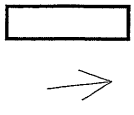
GZA Rep.	Jay Hodkinson	Contractor	Dover Public Works			Date	04/11/2000
		Operator	Shawn McClane			Ground Elev.	See Plan
Weather	Windy, 40s	Make	Case	Model	580 SuperL	Time Started	0810
		Capacity	1/3 cu. yd.	Reach	16 ft.	Time Completed	0815

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0						
1'	Light brown, fine to medium SAND, little Silt.			E		
2'	Gray-brown, fine SAND and Silt.					
3'			ND			1, 2
4'						
5'						
6'	Dark brown, fine to coarse SAND, some gray Clay, leather clippings (10-15%), wood (5-10%).	S-1				
7'			ND	▼		3
8'	Bottom of test pit at 7 feet below ground surface. No refusal.					
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened in the field for volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter reference to an isobutylene-in-air standard. Results are reported in the "PID Reading (ppm)" column in parts per million. ND indicates no VOCs detected.
2. Groundwater was encountered at a depth of 4 feet below ground surface.
3. Test pit terminated due to collapsing walls.

Test Pit Plan



Volume = 10.4 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.07	4'

GZA GeoEnvironmental, Inc.
Engineers/Scientists

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Dover Public Works
Dover, New Hampshire

Test Pit No.	TP2-4
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File No.	22457.00
Checked By:	NJN

Excavation Equipment

GZA Rep.	Jay Hodkinson	Contractor	Dover Public Works	Date	04/11/2000
		Operator	Shawn McClane	Ground Elev.	See Plan
Weather	Windy, 40s	Make	Case	Model	580 SuperL	Time Started	0825
		Capacity	1/3 cu. yd.	Reach	16 ft.	Time Completed	0835

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0	Brown, fine to coarse SAND, trace Silt.			E		1
1'						
2'	Gray-brown, Silty CLAY.					
3'	Black, fine to medium SAND with Organics, wood (5-10%), 1 tire, brick (10-12%).					
4'		S-1	ND			2
5'	Bottom of test pit at 4.2 feet below ground surface. No refusal.					3
6'						
7'						
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened in the field for volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter reference to an isobutylene-in-air standard. Results are reported in the "PID Reading (ppm)" column in parts per million. ND indicates no VOCs detected.
2. Groundwater was encountered at a depth of 3.6 feet below ground surface.
3. Test pit terminated due to collapsing walls.

Test Pit Plan

12
3
NORTH

Volume = 5.6 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.1	3.6'

GZA GeoEnvironmental, Inc.
Engineers/Scientists

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Dover Public Works
Dover, New Hampshire

Test Pit No.	TP2-5
Page No.	1 of 1
File No.	22457.00
Checked By:	NJN

Excavation Equipment

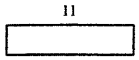
GZA Rep.	Jay Hodkinson	Contractor	Dover Public Works	Date	04/11/2000
		Operator	Shawn McClane	Ground Elev.	See Plan
Weather	Windy, 40s	Make	Case Model 580 SuperL	Time Started	0855
		Capacity	1/3 cu. yd. Reach 16 ft.	Time Completed	0845

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0	Brown, fine to coarse SAND, trace Silt.			E		1, 2
1'						
2'	Gray-brown, Silty CLAY with brick.					
3'						
4'			ND			
5'						
6'	Black, fine to medium SAND and debris, newspapers, leather clippings, wood, bottles, catchbasin grit smell, metal cans.	S-1				3
7'						
8'	Bottom of test pit at 7.7 feet below ground surface. No refusal.		ND			
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened in the field for volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter reference to an isobutylene-in-air standard. Results are reported in the "PID Reading (ppm)" column in parts per million. ND indicates no VOCs detected.
2. Sheen on water.
3. Groundwater was encountered at a depth of 5.3 feet below ground surface.

Test Pit Plan



Volume = 7.8 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.10	5.3'

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Engineers/Scientists

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Dover Public Works
Dover, New Hampshire

Test Pit No. TP2-6
Page No. 1 of 1
File No. 22457.00
Checked By: NJN

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Windy, 40s

Contractor Dover Public Works
Operator Shawn McClane
Make Case Model 580 SuperL
Capacity 1/3 cu. yd. Reach 16 ft.

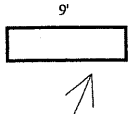
Date 04/11/2000
Ground Elev. See Plan
Time Started 0850
Time Completed 0905

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0	Dark brown, fine to coarse SAND, some Silt. (TOPSOIL)			E		1
1'						
2'						
3'	Brown, Clayey SILT, trace Organics.					
4'						
5'						
6'						2, 3
7'	Bottom of test pit at 7 feet below ground surface. No refusal.					
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened in the field for volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter reference to an isobutylene-in-air standard. Results are reported in the "PID Reading (ppm)" column in parts per million. ND indicates no VOCs detected.
2. Groundwater was encountered at a depth of 6 feet below ground surface.
3. All natural soil.

Test Pit Plan



Volume = 4.7 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.10	6'

GZA GeoEnvironmental, Inc.
Engineers/Scientists

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Dover Public Works
Dover, New Hampshire

Test Pit No.	TP2-7
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File No.	22457.00
Checked By:	NJN

Excavation Equipment

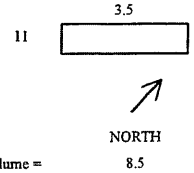
GZA Rep.	Jay Hodkinson	Contractor	Dover Public Works	Date	04/11/2000
		Operator	Shawn McClane	Ground Elev.	See Plan
Weather	Windy, 40s	Make	Case	Model	580 SuperL	Time Started	0920
		Capacity	1/3 cu. yd.	Reach	16 ft.	Time Completed	0930

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0	Gray-brown, fine to coarse SAND, some Clay with bricks (5-10%) and wood (5-10%).			E		1
1'						
2'			ND			
3'	Light brown, fine SAND, little Silt.					
4'	Brown, Clayey SILT, little Organics.					
5'						
6'	Bottom of test pit at 6 feet below ground surface. No refusal.					
7'						
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened in the field for volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter reference to an isobutylene-in-air standard. Results are reported in the "PID Reading (ppm)" column in parts per million. ND indicates no VOCs detected.

Test Pit Plan



Volume = 8.5 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(X) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

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Engineers/Scientists

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Dover, New Hampshire

Test Pit No.	TP2-8a
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File No.	22457.00
Checked By:	NJN

Excavation Equipment

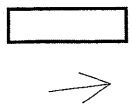
GZA Rep.	Jay Hodkinson	Contractor	Dover Public Works	Date	04/11/2000
		Operator	Shawn McClane	Ground Elev.	See Plan
Weather	Windy, 40s	Make	Case	Model	580 SuperL	Time Started	0930
		Capacity	1/3 cu. yd.	Reach	16 ft.	Time Completed	0945

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0	Dark brown, fine to coarse SAND, little Silt, some Root. (TOPSOIL)			E		1
1'						
2'						
3'	Light brown, fine SAND, some Silt.					
4'						
5'	Bottom of test pit at 4.5 feet below ground surface. No refusal.					
6'						
7'						
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened in the field for volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter reference to an isobutylene-in-air standard. Results are reported in the "PID Reading (ppm)" column in parts per million. ND indicates no VOCs detected.

Test Pit Plan



Volume = 4 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(X) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

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Test Pit No. TP2-8
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Checked By: NJN

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Windy, 40s

Contractor Dover Public Works
Operator Shawn McClane
Make Case Model 580 SuperL
Capacity 1/3 cu. yd. Reach 16 ft.

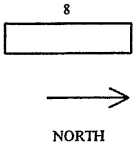
Date 04/11/2000
Ground Elev. See Plan
Time Started 0947
Time Completed 0953

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0	Leather clippings (5%), brick (10%), gray-brown Silty SAND.		ND	E		1
1'				↓		
2'						2
3'	Bottom of test pit at 2.3 feet below ground surface. Refusal on boulder.			D		
4'						
5'						
6'						
7'						
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened in the field for volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter reference to an isobutylene-in-air standard. Results are reported in the "PID Reading (ppm)" column in parts per million. ND indicates no VOCs detected.
2. Refusal on boulder, moved 10 feet.

Test Pit Plan



Volume = 3 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(X) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

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Test Pit No.	TP2-9
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File No.	22457.00
Checked By:	NJN

Excavation Equipment

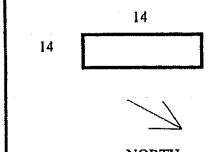
GZA Rep.	Jay Hodkinson	Contractor	Dover Public Works	Date	04/11/2000
		Operator	Shawn McClane	Ground Elev.	See Plan
Weather	Windy, 40s	Make	Case	Model	580 SuperL	Time Started	1000
		Capacity	1/3 cu. yd.	Reach	16 ft.	Time Completed	1020

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0	Brown, fine to coarse SAND, some Gravel, trace Silt.			E		1
1'						
2'						
3'	Gray-brown, fine to coarse SAND, little Silt, brick (5%), wood (10%), shingles (5%), rags (5%).					
4'						
5'		S-1				
6'			ND	M		
7'				M		
8'				D		
9'						
10'						2
11'	Bottom of test pit at 10.5 feet below ground surface. No refusal.					
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened in the field for volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter reference to an isobutylene-in-air standard. Results are reported in the "PID Reading (ppm)" column in parts per million. ND indicates no VOCs detected.
2. Test pit terminated due to collapsing walls.

Test Pit Plan



Volume = 21.8 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(X) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water

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Test Pit No. TP2-10
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Checked By: NJN

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Windy, 40s

Contractor Dover Public Works
Operator Shawn McClane
Make Case Model 580 SuperL
Capacity 1/3 cu. yd. Reach 16 ft.

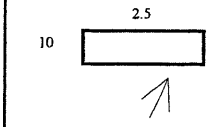
Date 04/11/2000
Ground Elev. See Plan
Time Started 1030
Time Completed 1045

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0	Brown, fine to coarse SAND, some Gravel, trace Silt.			E		1
1'						
2'						
3'	Fabric Liner		ND			
4'	Gray-black, fine to coarse SAND, some Silt, leather clippings (10%), metal wire (1%), wood (5%), newspaper (5%), bottles (1%).					2
5'						3
6'	Bottom of test pit at 4.7 feet below ground surface. No refusal.					
7'						
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened in the field for volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter reference to an isobutylene-in-air standard. Results are reported in the "PID Reading (ppm)" column in parts per million. ND indicates no VOCs detected.
2. Groundwater was encountered at a depth of 3.9 feet below ground surface.
3. Test pit terminated due to collapsing walls.

Test Pit Plan



Volume = 4.4 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Groundwater
0.10	3.9'

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Test Pit No.	TP2-11
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File No.	22457.00
Checked By:	NJN

Excavation Equipment

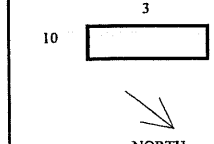
GZA Rep.	Jay Hodkinson	Contractor	Dover Public Works	Date	04/11/2000
		Operator	Shawn McClane	Ground Elev.	See Plan
Weather	Windy, 40s	Make	Case	Model	580 SuperL	Time Started	1100
		Capacity	1/3 cu. yd.	Reach	16 ft.	Time Completed	1115

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0	Brown, fine to coarse SAND, trace Silt.			E		1
1'	Orange-brown, fine SAND, little Silt.					
2'						
3'	Brown, fine to coarse SAND, trace Silt.		ND			
4'						
5'						
6'						2
7'	Blackish brown, fine to coarse SAND, trace Silt, wood, leather clippings (5-15%). (River Dredgings)					
8'						
9'			ND			
10'	Bottom of test pit at 9.5 feet below ground surface. No refusal.					3
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened in the field for volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter reference to an isobutylene-in-air standard. Results are reported in the "PID Reading (ppm)" column in parts per million. ND indicates no VOCs detected.
2. Groundwater was encountered at at depth of 6.8 feet below ground surface.
3. Test pit terminated due to collapsing walls.

Test Pit Plan



Volume = 10.6 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
( ) Encountered
(X) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.15	6.8'

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Checked By: NJN

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Windy, 40s

Contractor Dover Public Works
Operator Shawn McClane
Make Case Model 580 SuperL
Capacity 1/3 cu. yd. Reach 16 ft.

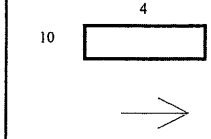
Date 04/11/2000
Ground Elev. See Plan
Time Started 1130
Time Completed 1150

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0	Dark brown, fine to coarse SAND, some Silt. (TOPSOIL)			E		1
1'						
2'	Orange-brown, fine SAND, some Silt. (Loess)					
3'						
4'						
5'	Gray-brown, fine to medium SAND, some Silt, Organics. (Peat)					2
6'						
7'						
8'				▼		
9'	Bottom of test pit at 8.3 feet below ground surface. No refusal.					
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened in the field for volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter reference to an isobutylene-in-air standard. Results are reported in the "PID Reading (ppm)" column in parts per million. ND indicates no VOCs detected.
2. Groundwater was encountered at a depth of 6 feet below ground surface.

Test Pit Plan



Volume = 12.3 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.10	~6

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Test Pit No.	TP2-13
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File No.	22457.00
Checked By:	NJN

Excavation Equipment

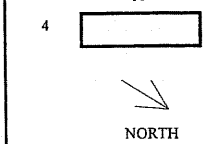
GZA Rep.	Jay Hodkinson	Contractor	Dover Public Works	Date	04/11/2000
		Operator	Shawn McClane	Ground Elev.	See Plan
Weather	Windy, 40s	Make	Case	Model	580 SuperL	Time Started	1200
		Capacity	1/3 cu. yd.	Reach	16 ft.	Time Completed	1220

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0	Dark brown, fine to coarse SAND, little Silt, roots.			E		1
1'						
2'	Black, fine to coarse SAND, trace Silt, leather clippings, bricks, etc.		ND			
3'						
4'	Gray-brown, fine to coarse SAND, trace Silt.		ND			
5'						2
6'						
7'	Bottom of test pit at 6.8 feet below ground surface.					
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened in the field for volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter reference to an isobutylene-in-air standard. Results are reported in the "PID Reading (ppm)" column in parts per million. ND indicates no VOCs detected.
2. Groundwater encountered at a depth of 5.5 feet below ground surface.

Test Pit Plan



Volume = 10.1 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.05	5.5'

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Dover, New Hampshire

Test Pit No. TP2-14
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File No. 22457.00
Checked By: NJN

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Windy, 40s

Contractor Dover Public Works
Operator Shawn McClane
Make Case Model 580 SuperL
Capacity 1/3 cu. yd. Reach 16 ft.

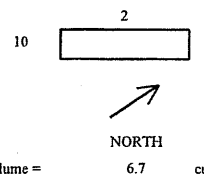
Date 04/11/2000
Ground Elev. See Plan
Time Started 1240
Time Completed 1250

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0	Blackish brown, fine to coarse SAND, trace Silt, Asphalt, bricks, clay pipe scraps.			E		1
1'						
2'	(CONSTRUCTION DEBRIS)	S-1	ND			
3'	Brown, fine to coarse SAND, some Silt. some Organics.					
4'						
5'						
6'						
7'						
8'						2
9'	Bottom of test pit at 9 feet below ground surface. No refusal.					
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened in the field for volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter reference to an isobutylene-in-air standard. Results are reported in the "PID Reading (ppm)" column in parts per million. ND indicates no VOCs detected.
2. Groundwater encountered at a depth of 7.5 feet below ground surface.

Test Pit Plan



Volume = 6.7 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.10	7.5

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Test Pit No.	TP2-15
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File No.	22457.00
Checked By:	NJN

Excavation Equipment

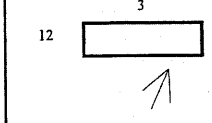
GZA Rep.	Jay Hodkinson	Contractor	Dover Public Works	Date	04/11/2000
		Operator	Shawn McClane	Ground Elev.	See Plan
Weather	Windy, 40s	Make	Case	Model	580 SuperL	Time Started	1300
		Capacity	1/3 cu. yd.	Reach	16 ft.	Time Completed	1320

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0	Brown, fine to coarse SAND, trace Silt, Gravel.			E		1
1'						
2'						
3'		S-1	ND			
	Black, fine to coarse SAND, little Silt, brick (30%), metal (5%).		ND			
4'	Gray, ASH (50%) and GRAVEL.	S-2	ND			
5'	Bottom of test pit at 4.7 feet below ground surface. No refusal.					3
6'						
7'						
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened in the field for volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter reference to an isobutylene-in-air standard. Results are reported in the "PID Reading (ppm)" column in parts per million. ND indicates no VOCs detected.
2. Groundwater was encountered 4.3 feet below ground surface.
3. Test pit terminated due to collapsing walls.

Test Pit Plan



Volume = 6.3 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.10	4.3'

GZA GeoEnvironmental, Inc.
Engineers/Scientists

380 Harvey Road
Manchester, New Hampshire 03103

Dover Public Works
Dover, New Hampshire

Test Pit No. TP2-16
Page No. 1 of 1
File No. 22457.00
Checked By: NJN

Excavation Equipment

GZA Rep. Jay Hodkinson
Weather Windy, 40s

Contractor Dover Public Works
Operator Shawn McClane
Make Case Model 580 SuperL
Capacity 1/3 cu. yd. Reach 16 ft.

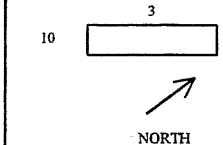
Date 04/11/2000
Ground Elev. See Plan
Time Started 1315
Time Completed

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0	Brown, fine to coarse SAND, trace Silt.			E		1
1'						
2'						
3'			ND			
4'	Black, fine to coarse SAND, leather clippings, bottles. Heavy sheen on soil, bricks (5%), newspaper (5%). (RIVER DREDGINGS)	S-1				2
5'						
	Bottom of test pit at 9.5 feet below ground surface. No refusal.					3
6'						
7'						
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened in the field for volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter reference to an isobutylene-in-air standard. Results are reported in the "PID Reading (ppm)" column in parts per million. ND indicates no VOCs detected.
2. Groundwater was encountered at at depth of 3.2 feet below ground surface.
3. Test pit terminated due to collapsing walls.

Test Pit Plan



Volume = 5.6 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.15	3.2'

GZA GeoEnvironmental, Inc.
Engineers/Scientists

380 Harvey Road
Manchester, New Hampshire 03103

Dover Public Works
Dover, New Hampshire

Test Pit No. TP2-17
Page No. 1 of 1
File No. 22457.00
Checked By: NJN

GZA Rep. Jay Hodkinson
Weather Windy, 40s

Excavation Equipment
Contractor Dover Public Works
Operator Shawn McClane
Make Case Model 580 SuperL
Capacity 1/3 cu. yd. Reach 16 ft.

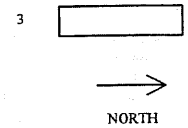
Date 04/11/2000
Ground Elev. See Plan
Time Started 1315
Time Completed 1330

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0	Brown, fine to coarse SAND, little Silt.			E		1
1'						
2'						
3'	Black, fine to coarse SAND, little Silt, Clay pockets, bottles (1%), bricks (5%), 1 tire, ash (15%), wood (10%).					
4'						2
5'	Bottom of test pit at 5 feet below ground surface. No refusal.					3
6'						
7'						
8'						
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened in the field for volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter reference to an isobutylene-in-air standard. Results are reported in the "PID Reading (ppm)" column in parts per million. ND indicates no VOCs detected.
2. Groundwater was encountered at a depth of 4 feet below ground surface.
3. Test pit terminated due to collapsing walls.

Test Pit Plan



Volume = 6.1 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.10	4.0'

GZA GeoEnvironmental, Inc.
Engineers/Scientists

380 Harvey Road
Manchester, New Hampshire 03103

Dover Public Works
Dover, New Hampshire

Test Pit No. TP2-18
Page No. 1 of 1
File No. 22457.00
Checked By: NJN

GZA Rep. Jay Hodkinson
Weather Windy, 40s

Excavation Equipment
Contractor Dover Public Works
Operator Shawn McClane
Make Case Model 580 SuperL
Capacity 1/3 cu. yd. Reach 16 ft.

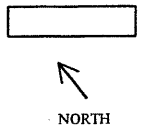
Date 04/11/2000
Ground Elev. See Plan
Time Started 1445
Time Completed 1500

Depth	Soil Description	Sample No.	PID Reading (ppm)	Excav. Effort	Boulders: Count/ Class	Note No.
0	Brown, fine to coarse SAND, trace Silt with Gravel.			E		1
1'						
2'						
3'	Black, fine to coarse SAND, little Silt with bricks.		ND			
4'	Orange-brown, fine SAND, some Silt.					
5'						
6'						
7'						
8'	Bottom of test pit at 7.4 feet below ground surface.					2
9'						
10'						
11'						
12'						
13'						
14'						
15'						
16'						

Notes:

1. Soil samples were screened in the field for volatile organic compounds (VOCs) using a TEI Model 580B Organic Vapor Meter reference to an isobutylene-in-air standard. Results are reported in the "PID Reading (ppm)" column in parts per million. ND indicates no VOCs detected.
2. Groundwater encountered at a depth of 7 feet below ground surface.

Test Pit Plan



Volume = 9.0 cu. yd.

Boulder Class

Letter Designation	Size Range Classification
A	6" - 17"
B	18" - 36"
C	36" and Larger

Excavation Effort
E-----Easy
M-----Moderate
D-----Difficult

Proportions Used

TRACE (TR.)	0 - 10%
LITTLE (LI.)	10 - 20%
SOME (SO.)	20 - 35%
AND	35 - 50%

Abbreviations
F = Fine
M = Medium
C = Coarse
V = Very
F/M = Fine to medium
F/C = Fine to coarse
GR = Gray
BN = Brown
YEL = Yellow

GROUNDWATER
(X) Encountered
( ) Not Encountered

Elapsed Time to Reading (Hours)	Depth to Ground-water
0.1	7.0'

APPENDIX D

DECEMBER 1999 AND APRIL 2000 SAMPLING SUMMARY,
ANALYTICAL LABORATORY REPORTS, AND DATA VALIDATION

TABLE 1
Sample Summary Table

Dover Department of Public Works
River Street, Dover, New Hampshire

						Soil						Groundwater			
Sample Location/ Designation	Date	Approx. G.S. Elev. (feet)	Depth to Bottom (feet)	Depth to Water (feet)	Sample Depth (feet)	ABNs 8270C	PAH 8270C	VOCs 8260B	Metals 6010B/ 7474	Herb. 8151A	Pest. 8081A/ 8082	ABNs 8270C	PAH 8270C	VOCs 8260B	Metals 6010B/ 7474
TP - 1	12/20/1999	48	15	15	11 - 12			X							
TP - 2	12/20/1999	36	8.5	8	5 - 7	X			X			X		X	X
TP - 3	12/20/1999	38	11	11.5	11 - 11.5		X	X	X				X	X	X
TP - 4	12/21/1999	26	8.6	7	5 - 6	X	X	X	X				X	X	X
TP - 5	12/21/1999	22	6	-	5.5 - 6		X	X							
TP - 6	12/21/1999	8	7	7	4 - 5	X		X	X				X	X	X
TP - 8	12/21/1999	8	6	6	3 - 4		X		X						
TP - 9	12/21/1999	16	4.5	4.5	2 - 3	X	X	X	X				X	X	X
TP - 10	12/21/1999	14	10	10	6 - 7		X	X	X			X		X	X
TP - 11	12/22/1999	14	13	13	4 - 5	X		X	X					X	
TP - 12	12/22/1999	14	9	9	4 - 5		X		X				X		X
TP - 13	12/22/1999	16	8.5	8.5	2 - 3		X	X					X		X
TP - 14	12/22/1999	14	12	12	7 - 9				X				X		X
TP - 17	12/22/1999	32	9	9	6 - 7								X		X
TP - 18	12/22/1999	32	8	8	2 - 3			X							
TP - 19	12/22/1999	56	1.5	-	0 - 0.5					X	X				
TP2-5	04/11/2000	15	7.7	5.3	5.5-7		X		X						
TP2-16	04/11/2000	10	9.5	3.2	3-4		X		X						
WP - 1	12/20/1999	-	5	2.7	-								X	X	X
MW-1	04/21/2000	-	17	10.4	-								X		X
MW - 5	12/22/1999	-	10	5.4	-							X		X	X
MW- 8A	12/20/1999	-	10	5.0	-							X		X	X
MW - 10	12/21/1999	-	10	1.9	-								X	X	X
MW - 12	12/20/1999	-	13	8.3	-								X		X
MW - 13	12/21/1999	-	10	7.1	-								X		X
MW-14	04/21/2000	-	13	4.6	-								X		X
GZ-1	04/21/2000	-	13	6.0	-								X		X
GZ-2	04/21/2000	-	14	9.6	-								X		X
GZ-3	04/21/2000	-	8	3.7	-								X		X
SS-1	04/21/2000	16	0.5	NE	0-0.5		X		X						
SS-2	04/21/2000	14	1	NE	0-1				X						
SS-3	04/21/2000	10	1	NE	0-1				X						
SS-4	04/21/2000	16	1	NE	0-1		X		X						
SS-5	04/21/2000	12	1	NE	0-1		X		X						
SS-6	04/21/2000	12	1	NE	0-1		X		X						
SS-7	04/21/2000	40	0.5	NE	0-0.5		X		X						
SS-8	04/21/2000	39	1	NE	0-1				X						
SS-9	04/21/2000	19	1	NE	0-1				X						
SS-10	04/21/2000	47	1	NE	0-1				X						

Notes:
1. GZA GeoEnvironmental, Inc. collected soil and groundwater sample at December 1999 test pit excavations (TP-series), soil samples at April 2000 test pits (TP2-series), soil samples at surficial sampling locations (SS-series), and groundwater samples at existing monitoring wells (WP-1 and MW-series) and new monitoring wells (GZ-series) for the analyses indicated in the table. Samples were analyzed by Eastern Analytical, Inc. for volatile organic compounds (VOCs) for acid/base/neutral (ABNs) extractable semi-VOCs, polynuclear aromatic hydrocarbons (PAHs), the eight RCRA metals, and/or herbicides (herb) and pesticides (pest). EPA Method numbers are indicated below the parameter heading.
2. Refer to laboratory analytical results on Tables 1 and 2.

Dover Department of Public Works
River Street, Dover, New Hampshire

Data Validation and Data Usability

The selected laboratory (Eastern Analytical, Inc) prepared a Level I data validation type data package for the analytical work performed by this study and included in this Appendix. GZA GeoEnvironmental, Inc. reviewed the laboratory's data package to determine whether there would be any qualifications in regards to the use of the analytical data.

Eastern Analytical, Inc. noted no sample irregularities in preservation or sample condition when the samples were received. All samples were analyzed within the allowed holding times. Duplicate field samples were comparable to the their corresponding field sample. Matrix spikes and matrix spike duplicates had comparable analytical results and acceptable recoveries.

Method blanks were free of any contamination, with one exception; specifically, the method blank for EPA Method 8260B (12-20-99) contained low levels of four analytes that were the result of carryover from a prior analysis. With the exception of naphthalene, these analytes were not found in the field samples. Naphthalene was detected at appreciable concentrations in only one soil sample and two aqueous samples. The naphthalene concentration for the soil sample from TP-5 is an estimate due to an instrument problem. This estimate and the other detected and appreciable napthalene concentrations were reasonable in consideration of field observations and site conditions in the vicinity of the sampling locations.

Sample surrogate recoveries and matrix spike(s) and/or laboratory control sample(s) met project criteria with the following exceptions:

- For the soil sample from TP-5, the surrogate recoveries of 1,2-dichlorobenzene-D4 is high due to high concentrations of hydrocarbons. There is a possible high bias for the reported volatile organic compound (VOC) concentrations. Of the VOCs detected in the soil sample from TP-5, only alkylbenzenes are reported to be above S-1 and S-2 standards. TP-5 is located in the vicinity of tank area A/B/C, which is currently under corrective action in accordance with New Hampshire Underground Storage Tank Rules.

- The TP-2 aqueous sample surrogate recovery (2-Fluorobiphenyl 40%) was outside acceptance limits for Acid Extractable/Base Neutral analysis. However, there is no data impact as the method allows one acid extractable and one base neutral surrogate to be out of control with no further action necessary. Surrogate recoveries reported as diluted outside recovery.

- The recovery for mercury in the matrix spike duplicate (12/30/99) was just outside the acceptable limits. No appreciable impact on the reported concentrations is expected.

- The matrix spike and matrix spike duplicate (12/30/99) were below acceptance limits for both barium and lead. The concentration of the parent sample for these two elements were greater than four times the spiking concentration. There is no impact on the reported concentrations.

- Aqueous sample GZ-1 (5/3/00) exceeded surrogate recovery limits (low) for p-Terphenyl-d14 (18%). A severe emulsion was noted during the extraction procedure. Reported polynuclear aromatic hydrocarbon (PAH) concentrations are estimates with possible low bias. Reported PAH concentrations for the GZ-1 sample are very low or non-detect. Very low PAH concentrations are also reported for a grab groundwater sample from nearby test pit TP-12 (within about 100 feet) in similar buried materials, which collaborates the GZ-1 data.

- Soil samples SS-4, SS-5, SS-6 and SS-6A exceeded Internal Standard (ISTD) Area limits (low) for Perylene-d12. Samples were reanalyzed with similar ISTD failures and results. Suspected failures are due to the presence of non-target compounds in the sample matrix. A high concentration bias is possible for the following compounds in the affected samples: benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, and benzo(g,h,I)perylene. None of these analytes were reported at concentrations that would require a response action.

The data completeness goal of 90 percent was achieved.

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