**Golder Associates Inc.**
CONSULTING ENGINEERS

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# PRE-DESIGN INVESTIGATION
# TASK GW-1
# PLUME DELINEATION
# PHASE 1 INTERIM REPORT

## INDUSTRI-PLEX SITE
## WOBURN, MASSACHUSETTS

Prepared for:

Industri-Plex Site Remedial Trust
800 North Linbergh Boulevard
St. Louis, Missouri 63167

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August 1990 Project No.: 893-6255

**Golder Associates Inc.**
CONSULTING ENGINEERS

August 31, 1990 Project No. 893-6255

United States Environmental Protection Agency, Region I
J.F.K. Federal Building, HRS-CAN-3
Boston, Massachusetts 02203-2211

Attn: Marilyn M. Wade, P.E.
Remedial Project Manager

RE: INDUSTRI-PLEX SITE PRE-DESIGN INVESTIGATION
TASK GW-1 PLUME DELINEATION PHASE 1 INTERIM REPORT

Dear Ms. Wade:

On behalf of the Industri-Plex Site Remedial Trust, we are submitting the attached Plume Delineation Phase 1 Interim Report for the Industri-Plex Site in Woburn, Massachusetts. This report is being submitted in accordance with the Pre-Design Investigation Work Plan (PDI) Task GW-1 reporting requirements (PDI Section 3.3.3.4, p. 70).

The Plume Delineation Phase 1 Interim Report describes the site hydrogeology and the groundwater analytical results, and proposes 6 PDI Phase 2 monitoring well locations to refine the extent of the benzene/toluene "hot spots".

The Task GW-1 Phase 2 fieldwork is scheduled to begin September 10, contingent upon the Agencies approval of the Phase 2 monitoring well locations proposed in this report. If you have any questions, please contact us.

Very truly yours,

GOLDER ASSOCIATES INC.

Kenneth R. Moser
Associate

C:62550831

cc: J. Naparstek, MDEP
A. Ostrofsky, NUS
D. L. Baumgartner, ISRT
W. L. Smull, ISRT
W. Sarni, Roux Associates

# PRE-DESIGN INVESTIGATION
# Task GW-1
# Plume Delineation
# Phase 1 Interim Report

## Industri-Plex Site Remedial Trust
## 36 Commerce Way
## Woburn, Massachusetts

**August 31, 1990**

*Prepared for:*

**Golder Associates Inc.**
20000 Horizon Way
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*Prepared by:*

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ROUX

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## 1.0 INTRODUCTION

As specified in the Consent Decree (CD) for the Industri-Plex Site, Woburn, Massachusetts,

> "the remedial action for ground water shall include an interim remedy of pumping and treating "hot spot" areas of ground-water contamination and the concurrent development and implementation of a Ground-Water/Surface-Water Investigation Plan (GSIP) to evaluate Site-wide ground-water and surface-water contamination . . ."

To comply with this requirement, the Scope of Work for the Pre-Design Investigation Work Plan (PDI) was developed (as outlined in the Remedial Design Action Plan [RDAP]), and is as follows (PDI, p. 57):

> "(g)... investigation to more accurately characterize the "hot spot" areas of benzene and toluene contamination, to assess the treatability of ground water, and to provide data to be used in the development of operating parameters such as pumping rates, interceptor well locations, recharge area locations and period of system performance. Included in these ground-water investigations shall be Settlers proposed performance standards for effluent water quality".

The approach for achieving the objectives of the ground-water program of the PDI is to perform a series of field tasks to develop data to supplement the data developed during the Remedial Investigation (RI) and the GSIP. The ground-water component of the PDI consists of the following tasks:

1. GW-1 Plume Delineation;
2. GW-2 Hydrogeologic Characterization for Extraction/Recharge Design; and
3. GW-3 Ground-Water Treatability.

These field tasks were developed to obtain the following data;

1. Areal extent and saturated thickness of the unconsolidated deposits;
2. The types and concentrations of Hazardous Substances in the ground-water hot spots;
3. The extent of Hazardous Substances;
4. Aquifer Characteristics;

5. Ground-Water Treatability; and
6. Performance Standards.

Task GW-1 (Plume Delineation) consists of several subtasks designed to define the areal and vertical extent of Hazardous Substances in ground water in the unconsolidated deposits at on-site and downgradient areas (Study Area). These subtasks include:

Subtask 1. Determination of Aquifer Thickness and Boundaries
Subtask 2. Installation of Pre-Design Investigation Phase 1 Monitoring Well Clusters;
Subtask 3. Sampling of Pre-Design Investigation Phase 1 Monitoring Well Clusters;
Subtask 4. Installation of Pre-Design Investigation Phase 2 Monitoring Well Clusters; and
Subtask 5. Sampling of Pre-Design Phase 2 (and Phase 1) Monitoring Well Clusters.

In accordance with the reporting requirements of the PDI (Section 3.9.3.4, p. 70), an Interim Report must be prepared and submitted to the United States Environmental Protection Agency (USEPA) and the Massachusetts Department of Environmental Protection (MDEP) for review and approval. This Interim Report fulfills this reporting requirement for Task GW-1 and presents the findings and conclusions developed from an evaluation of the data obtained during the performance of Subtasks 1, 2 and 3. In addition, it includes recommendations for the Phase 2 PDI monitoring well program.

## 2.0 METHODS OF INVESTIGATION

The initial component of Subtask 1 (Determination of Aquifer Thickness and Boundaries) was the mapping of bedrock outcrops within the Study Area. This was accomplished by an inspection of recent aerial photographs of the study area and field mapping. The following aerial photographs were inspected to assist in mapping the bedrock outcrops.

| | | | | |
|---|---|---|---|---|
| • LIU Aerial Survey | Watertown, CT | 1"=100' | November 22, 1989 | Black and White |
| • Flight Survey and Mapping | Newbury, MA | 1"=300' | January 5, 1990 | Color |
| • Flight Survey and Mapping | Newbury, MA | 1"=300' | March 27, 1990 | Color |

In addition, Massachusetts Department of Environmental Protection (MDEP) files were reviewed in an attempt to obtain foundation boring data for the study area. Although no data were available in the files, any data which becomes available through continued file searches will be incorporated into the final report prepared at the conclusion of Task GW-1.

After bedrock outcrops were located and the isopach of the unconsolidated deposits (included in the PDI Work Plan) was revised, the locations of the proposed soil borings were re-evaluated to determine if any locations needed to be relocated to better define the thickness and boundaries of the unconsolidated aquifer. Upon reviewing the aerial photographs and field mapping data, soil borings (ATB 1 through 21) were drilled to bedrock to determine the thickness, boundaries and lithology of the unconsolidated deposits.

Subtask 2 (Installation of the Phase 1 Monitoring Wells) was performed following the completion of the majority of the Aquifer Thickness and Boundary (ATB) soil borings. Fourteen monitoring wells were installed at eight locations downgradient of the site (Plate 1). The wells were installed to determine the extent of benzene and toluene (and other Hazardous Substances) in ground water as required by the RDAP. All field work was performed in accordance with the PDI Work Plan Standard Operating Procedures (SOPs).

During Subtask 3 (Sampling of Phase 1 Monitoring Wells), ground-water samples were collected from the Phase 1 monitoring wells to determine the water quality of the aquifer

downgradient of the site. All samples were analyzed for the Target Compound List/Target Analyte List (TCL/TAL) using Contract Laboratory Program - Routine Analytical Services (CLP-RAS) Methods, by Enseco-ERCO Laboratories, Cambridge, Massachusetts. Both filtered and unfiltered TAL samples were collected.

**2.1 Aquifer Thickness Borings (Subtask 1)**

Twenty one soil borings (ATB 1 through 21) were drilled to determine the thickness and boundaries of the unconsolidated deposits within the Study Area (Plate 1). The locations of many of the borings (as shown in the PDI Work Plan, Figure 24, Appendix A in this report) were relocated to the City of Woburn right-of-ways due to the lack of permission to drill on private property. The relocation of the soil borings to the right-of-ways did not affect the overall results of the task.

D.L. Maher Drilling Company (D.L. Maher), North Reading, Massachusetts was subcontracted to drill the soil borings. The soil borings were drilled with a hollow stem auger drill rig. Soil samples were collected with split-spoon samplers every five feet and the top of the bedrock was determined by coring approximately three feet into the bedrock after auger refusal. Bedrock was not reached at ATB-1 because Health and Safety monitoring precluded continued drilling in Level D. Continued drilling would have required the use of supplied air respirators (Level B).

Heaving sands occurred in many boreholes when the hollow stem augers were advanced below the water table. This was controlled by adding City of Woburn Public Supply Water to the borehole. Split-spoon samples were collected ahead of the lead auger into the unconsolidated deposits. The split-spoon sampler was opened and the concentration of volatile organic compounds (VOCs) was measured with the use of a photoionization detector (PID). Geologic logs were prepared based upon the inspection of these samples (Appendix B). A representative portion of each split-spoon sample was retained for reference. The split-spoon samplers were cleaned between each use with detergent and water, rinsed with methanol and a final rinse with deionized or distilled water.

Grain size distribution tests were performed on selected soil samples in accordance with ASTM methods of mechanical sieving (D-421 and D-422) and hydrometer analysis

(Appendix C) to estimate the areal distribution of the hydraulic conductivities of the unconsolidated deposits. The grain size data were then plotted on a graph of grain size (in inches) versus cumulative percent (Appendix C). The size of the sieve passing 10 percent of the material was then determined (Sheehan, 1965) and compared to the Rose and Smith curve (Appendix C). The hydraulic conductivities derived from the curve will be used to determine the areal variability of hydraulic conductivities.

To ensure that bedrock was encountered, the augers were advanced until auger refusal and approximately three feet of the bedrock was cored. To accomplish this, sections of three-inch diameter steel casing were threaded together and placed inside the annulus of the augers. The three-inch diameter casing was drilled into the bedrock to seal off the unconsolidated soil deposits. A six foot long two-inch diameter NX rock core barrel and rods were lowered into the annular space to collect the bedrock core sample.

The rock core was retrieved, photographed and described in detail (Appendix B). Rock core descriptions included; the competence of the bedrock, the presence of fractures and materials that filled the fractures, and lithology. The rock cores were placed in core boxes, labeled and stored on site for reference.

After the ATB soil borings were completed, the boreholes were backfilled with bentonite grout using the tremie method to approximately one foot below land surface. This was accomplished using a tremie pipe to fill the borehole with bentonite grout while withdrawing the augers. The remaining one foot was filled with cement or gravel and a layer of loam.

Drill cuttings and well development water were collected and transported back to the site and placed in ISRT assigned on-site temporary disposal areas. All drilling and sampling equipment that came in contact with the borehole was cleaned with a high pressure water wash prior to relocating to the next soil boring location.

The horizontal and vertical coordinates of all soil boring locations were surveyed by a surveyor licensed in the Commonwealth of Massachusetts. Science Applications International Corporation (SAIC) Engineering, Inc., Lakeville, Massachusetts surveyed the locations to an accuracy of ± 0.1 foot laterally and ± 0.01 foot vertically (to mean sea level).

The soil boring data (Table 1) were used to generate isopach maps and geologic cross sections to illustrate the thickness, boundaries and lithology of the unconsolidated deposits (Plates 2 through 7).

All field activities performed were consistent with the Roux Associates, Inc. and Golder Associates, Inc. Health and Safety Plan included in the PDI Work Plan. During the drilling operations, ambient air quality monitoring was measured by the Site Health and Safety Officer or an appointed representative. Continuous health and safety air monitoring was conducted with the use of a PID, flame ionization detector (OVA), and a Gastech GX-82. The instruments measure VOCs, percent oxygen, the lower explosive limit and the concentrations of hydrogen sulfide gas. The air monitoring instruments were calibrated at the beginning and end of each day of field activities. Air monitoring was recorded approximately every thirty minutes during the drilling operations.

### 2.2 Installation of Phase 1 Monitoring Wells (Subtask 2)

Based upon the hydrogeologic and water-quality data information obtained during Phase 1 of the GSIP and data from the Aquifer Thickness and Boundary borings (PDI, Subtask 1), the locations for the Phase 1 monitoring wells were finalized (Plate 1).

During an April 17, 1990 meeting with the ISRT, USEPA, MDEP and NUS Corporation (NUS), the need for additional wells was agreed upon to better define the thickness and boundaries of the unconsolidated deposits and ground-water quality. Approval for the additional wells under PDI Addendum 2 was provided in an April 24, 1990 letter from M. Wade (USEPA) to W. Smull (ISRT).

Eight monitoring well locations were selected based on the GSIP ground-water quality data and the results of Subtask 1 of the PDI. With the exception of OW-23 and OW-29, a two-well cluster was installed at each location. Each cluster consists of two wells (A and B), screened in the shallow and deeper unconsolidated deposits, respectively. Well clusters were installed at locations where the saturated thickness of the aquifer is greater than thirty feet and the screens are located in the most permeable portion of the aquifer. The actual depth of the screened zones was selected in the field by a hydrogeologist from Roux Associates and was biased toward zones of high permeability (based upon visual determination of the

sediments) or toward zones that exhibited high concentrations of VOCs (based upon screening the sediments with a PID). The PID screening data are included on the logs in Appendix B.

D.L. Maher was subcontracted to drill and install the monitoring wells. The wells were installed with the use of either a hollow stem auger rig or dual rotary rig (Barber Rig). The Barber Rig was used at locations where it was difficult to drill with augers due to the presence of glacial till. The use of the dual rotary rig method is discussed in PDI Work Plan Addendum 2. As with the ATB borings it was sometimes necessary to add City of Woburn water to the borehole to prevent the heaving of sands inside the hollow stem augers.

As stated in PDI Addendum 2, at three of the locations (OW-26, OW-29 and OW-33) the monitoring wells were installed without collecting samples of the unconsolidated deposits because data were collected during the ATB boring subtask (Subtask 1) adjacent to these wells. Soil data were collected at the remaining well cluster locations in the same manner as the ATB boring program. Split-spoon samples were collected at five-foot intervals and approximately three feet of bedrock was cored. Split- spoon samples were collected at ten-foot intervals when using the Barber Rig due to the 10 ft drilling rods required for use with the rig. The geologic logs are provided in Appendix B.

The monitoring wells were constructed of four-inch diameter Schedule 40 PVC 0.01-inch slot factory slotted screen, and four-inch diameter Schedule 40 PVC flush coupled blank casing. A gravel pack (number 20 Ottawa sand) was placed around the screen and up to a minimum of two feet above the screen. Bentonite grout was then placed in the annular space by the tremie method, to approximately two feet below land surface. A flush mounted meter box or a protective steel casing was placed over the well. A measuring point was marked on each well and a waterproof cap and locking lid were installed. Each well is marked with its designated number on the protective casing and PVC cap. A well construction diagram for each well is provided in Appendix D. Table 2 summarizes the monitoring well construction data.

The wells were surveyed from the measuring points located on the PVC casing by SAIC Engineering, Inc. The horizontal and vertical coordinates were surveyed to an accuracy of 0.01 foot and 0.1 foot, respectively. Water levels were measured on three separate occasions (June 20, 1990; June 26, 1990 and July 17, 1990). A water-table elevation map was generated using the survey data and the water-levels measured on July 17, 1990.

After the wells were installed, well development was accomplished by pumping the wells with a centrifugal pump or submersible pump. The wells were developed until the water was clear and sediment free. In addition, the wells were pumped until an equivalent amount of water introduced during drilling the well, was removed.

Dedicated polypropylene hose was used during well development and purging. The hose was disposed of after each use. The development water was collected in a 250-gallon capacity storage tank mounted on a pick-up truck and transported back to the decontamination pad and pumped into the decontamination pad tanks for temporary storage.

All soil cuttings from the drilling operations were transported back to the decontamination pad and unloaded to an on-site designated area.

Health and Safety monitoring was conducted in the same manner as the ATB boring program. All equipment that came in contact with the borehole was washed with high pressure hot water prior to moving to the next location in accordance with the Roux Associates SOP given in the Field Sampling Plan (FSP).

### 2.3 Sampling of Phase 1 Monitoring Wells (Subtask 3)

Phase 1 Monitoring Wells OW-23 through OW-27, OW-29 through OW-33 and the City of Woburn water, at the decontamination pad, were sampled from June 4 through June 6, 1990. Ground-water samples from wells OW-24A, OW-24B, OW-31 and OW-33A were split with NUS, Wilmington, Massachusetts, the USEPA on-site representative for the Industri-Plex Site. Monitoring Wells OW-31 and OW-32 (located at the base of the West and East Hide Piles respectively), installed by Golder Associates Inc., were also sampled.

The City of Woburn Public Supply water was used as potable water during drilling operations and to clean all field equipment. To ensure that the ground-water quality data were not biased by the use of this water, a water sample taken from a spigot at the decontamination pad was submitted for analysis. The ground-water samples were collected with a Teflon bailer and kept cool during delivery to the laboratory. The pH, temperature, specific conductivity, and depth to water were measured at the time of sample collection. These data are provided on the Well Sampling Forms in Appendix E.

The samples were delivered to Enseco-ERCO (ERCO) Laboratory, Cambridge, Massachusetts, a Contract Laboratory Program (CLP) laboratory for analysis. Samples were analyzed for TCL VOCs, semi-volatile organic compounds, pesticides and polychlorinated biphenyls (PCBs), and TAL dissolved metals and total metals by CLP-RAS methods. Chain-of-Custody was maintained for the collected samples and documented on the Chain of Custody Form (Appendix F).

Prior to sampling, the total depth and depth to water were measured in each monitoring well following Roux Associates' SOP (Appendix G). From these data the volume of water in each well was calculated. Each of the wells were subsequently purged using a centrifugal pump and dedicated 3/4-inch polypropylene hose to evacuate a minimum of three volumes of water from the well. Wells OW-31 and OW-32 were purged with a precleaned Teflon bailer due to the complications in transporting heavy equipment to the wells which are located on soft ground.

All purge water was stored in a 250-gallon storage tank mounted on a pick-up truck. The water was then transported to the decontamination pad and into the on-site storage tanks.

Each bottle was pre-labeled with a unique identification number. Samples collected for dissolved metals analysis were field filtered upon collection using a prefilter and 0.45 micrometer (micron) filter and peristaltic pump with disposable silicon tubing. The field sample was filtered into a laboratory supplied bottle and preserved with nitric acid.

Quality Assurance/Quality Control samples were collected as part of the well sampling program. Three trip blanks (one for each sampling day), two blind duplicate samples(OW-34 and OW-35), two field (equipment) blanks, a matrix spike, and a matrix spike duplicate sample were collected.

# 3.0 RESULTS OF THE PHASE 1 INVESTIGATION

## 3.1 Geology

The unconsolidated deposits underlying the site are comprised of the following five geologic units, listed in ascending order: 1) crystalline bedrock; 2) glacial till; 3) sand and gravel deposits; 4) peat and swamp deposits; and 5) fill. These units are shown in the generalized hydrogeologic cross sections of the site (Plates 2, 3 and 4).

A description of each geologic unit is provided below.

Crystalline Bedrock - The bedrock outcrops within the site and underlies the site at depths of between 0 and 108 feet below land surface. The variations in the depth to bedrock are primarily a function of bedrock topography as the land surface is relatively flat.

The bedrock is comprised of igneous units which have undergone low grade metamorphism and several periods of deformation to form granodiorites and gabbros. The bedrock is known locally as the Salem Gabbro-Diorite (Barosh, et al. 1977). In many locations the bedrock encountered during drilling (upper three feet) was fractured, becoming more competent with depth. However, the fractures were filled with either calcite (effectively sealing the fractures) or sand. The presence of filled fractures is consistent with the observation that the yields of the bedrock wells are generally less than 3 gallons per minute (Stauffer, 1983).

Glacial Till - Glacial till overlies the bedrock along the valley walls and in the northern portion of the site (Plates 2 and 3). The glacial till is encountered at a depth of between 0 and 32 feet below land surface. The thickness of the till is as much as 35 feet.

As shown in Cross Section C-C' (Plate 4), the till is absent in the middle of the valley. The till was deposited as lodgement till during the Pleistocene age when the region was covered by glaciers.

The *till* is comprised of unsorted boulders, cobbles, sand and gravel, silt and some clay. The till is dense and is a relatively lower permeable material compared to the overlying sand and gravel unit (Stauffer, 1983).

Sand and Gravel Deposits - As shown in Cross Sections A-A' and C-C' (Plates 2 and 4), a sand and gravel unit overlies the till and bedrock units .

The sand and gravel deposits are encountered at a depth of 0 to 10 feet below land surface and is up to 115 feet thick in the Study Area. The sand and gravel unit was deposited during the Pleistocene age as glacial outwash. The glacial outwash is comprised of fine sand and fine to coarse gravel with silt, silt lenses and some cobbles. Along the southeastern portion of the study area an extensive gravel zone was encountered. The sand and gravel unit is the most permeable unit underlying the site, based upon visual observations made during drilling.

Peat and Swamp Deposits - A thin and discontinuous unit of peat and swamp deposits are present in the northern, southern and central areas of the site. The peat and swamp deposits are found in the sand and gravel unit throughout the study area. These are encountered at land surface and up to 18 feet below land surface. The peat and swamp deposits are up to 14 feet thick. The deposits are comprised of peat (organic matter), and organic silt, clay and fine sand.

Fill - Overlying the sand, peat, and gravel deposits is a layer of fill. This is the shallowest unit in the study area, occurs at the ground surface, and is up to 10 feet thick. The fill is a mixture of construction debris, fine sands, blasted bedrock fragments, and animal hides (on site). This unit is usually encountered above the saturated sediments (above the water table).

A 1957 USGS Wilmington, Quadrangle topographic map shows that the southern portion of the site was at one time covered by a shallow lake (Lake Mishawum). Most of the lake was apparently filled prior to commercial development.

### 3.1.1 Aquifer Thickness and Boundaries

Based upon the field mapping of the outcrops of the crystalline bedrock and the evaluation of foundation boring data, the crystalline bedrock is shallow (subcrops) at the northern portion of the site (less than 2 feet below grade). Bedrock outcrops to the south of the site both west of the Massachusetts Bay Transportation Authority (MBTA) tracks and east of Commerce Way (Plate 5). These two outcrop areas located south of the site are separated by a low in the bedrock surface (buried valley). In general, the buried valley results from erosion and weathering of a fault zone, and trends north-south (Plate 6). A rock core collected at ATB-14 detected offset of plagioclase veins which is evidence of faulting. This buried valley extends from the north at well OW-16 south to well OW-27. A minor buried valley is also present extending from OW-6 south to OW-29. These buried valleys deepen to the South.

The presence of this bedrock valley results in the unconsolidated deposits and in turn, the water table aquifer, being thinner to the north (on site) and thicker to the south toward Mishawum Road (Plates 5 and 6).

As shown in the hydrogeologic cross sections of the study area (Plates 2, 3 and 4), the water-table aquifer underlying the site is comprised primarily of the unconsolidated sand and gravel deposits. Isopach maps of the unconsolidated deposits (saturated and unsaturated) are shown in Plates 5 and 7.

North of the Boston Edison Right-of-Way Number 9 the water table aquifer is relatively thin to absent, ranging in thickness from 0 to 42 feet (Plate 5). The aquifer is also relatively thin along the western and eastern boundaries of the study area. However, the thickness generally increases toward the south, coincident with the axis of the buried valley, as shown in cross section A-A' (Plate 2). The thickest portion of the aquifer is located immediately south and east of Halls Brook holding area in Wells OW-20 and OW-27B.

### 3.1.2 Hydraulic Conductivity

Ten soil samples from the site were submitted to Golder Associates, Inc. for grain size distribution analyses. The purpose of these analyses was to estimate hydraulic conductivities of the unconsolidated deposits and, in turn, compare these data to the hydraulic

conductivities to be developed during the aquifer testing (Task GW-2). In this manner, the areal variability of hydraulic conductivities could be determined. Hydraulic conductivities were to be estimated from the grain size distribution data (Appendix C) using a graphical method developed by Rose and Smith (1957) and modified by Sheehan (1965). This method was designed to estimate hydraulic conductivities of coarse grained (sand size or larger) deposits. A requirement of this method is that the effective grain size be larger than $4 \times 10^{-3}$ inches (an approximately 140 sieve size [Appendix C]). The effective grain size is determined by the intersection of the grain size curve with the 10 percent passing (90 percent retained) of the grain size graph. None of the grain size distribution analyses yielded an effective grain size greater than $4 \times 10^{-3}$ inches (the 140 sieve size). Therefore, hydraulic conductivities could not be determined. Most effective grain sizes were 200 sieve size or smaller, thereby falling into the silt and clay range. The minimum hydraulic conductivity that can be determined using this method is approximately 100 gallons per day per square foot ($gpd/ft^2$). Therefore, the estimated hydraulic conductivity of the soil samples analyzed is probably less than 100 $gpd/ft^2$ based upon these data.

## 3.2 Ground-Water Flow

### 3.2.1 Lateral Ground-water Flow

Water elevations were measured in all the monitoring wells on three occasions (Table 3). The three rounds of water-level data were contoured to evaluate ground-water flow conditions at the site. All three sets of contoured water-level data depicted similar flow conditions. A representative water-table elevation map is provided as Plate 8 (July 17, 1990 water measurements).

The depth to ground-water ranges from approximately 4 to 19 feet below land surface. Ground-water flow in the water table aquifer is generally to the south (Plate 8) and is strongly controlled by the orientation of the buried valley. In the southern half of the study area, ground-water flows towards the axis of the aquifer (axis of the buried valley) and then flows south (Plate 8). Hydraulic gradients are approximately 0.002 to 0.013 ft/ft.

### 3.2.2 Vertical Flow

A comparison of water elevations in clustered monitoring wells within the unconsolidated deposits at the site show hydraulic head differences of 0.003 ft/ft or less between the shallow and deeper portions of the water-table aquifer, with the exception of well cluster OW-27. These very low gradients indicate that there is no tendency for upward or downward flow within the unconsolidated deposit aquifer.

Well cluster 27 (OW-27A and OW-27B) shows a measurable difference in heads between the shallow and deeper unconsolidated deposits. Head differences measured during the three water-level rounds range from 1.13 feet (June 20, 1990 round) and 1.00 feet (July 17, 1990 round), with the shallower well exhibiting a somewhat higher water-level elevation on all occasions. Based upon these data, a downward flow gradient of between 0.024 foot per foot (ft/ft) and 0.022 ft/ft is present at this location. The probable reason for the moderate downward gradient at this location is because OW-27B is screened within a lower hydraulic conductivity, sandy to silty clay lens (Plate 2).

Vertical flow gradients observed between the unconsolidated deposits (water-table aquifer) and the bedrock, as evidenced by the following head differences measured at well cluster 1 (OW-1 and OW-1A) range from slightly upward to slightly downward. There is not a strong indication of gradient flow between the unconsolidated deposit and the bedrock.

| Date | Head Difference | Gradient |
|---|---|---|
| June 20, 1990 | -1.72 | -0.034 (upward) |
| June 26, 1990 | +0.47 | 0.009 (downward) |
| July 17, 1990 | +0.28 | 0.006 (downward) |

### 3.3 Ground-Water Quality

The ground-water quality results for the Phase 1 monitoring wells are summarized in Table 4. The ground-water analytical results were validated by Golder Associates Inc. (Appendix H) (The sample designations correspond to the wells in the following manner: i.e., G127B = OW-27B). A summary of the ground-water quality data from both the PDI Phase 1 and GSIP sampling programs are shown in Plates 9 and 10 and the GSIP ground-

water quality data are provided in Appendix I. Concentrations of other organic Hazardous Substances are shown in Plate 10. Concentrations of dissolved arsenic, chromium and lead are shown on Plate 11.

### 3.3.1 Extent of Benzene and Toluene

Benzene and toluene concentrations are shown in Plate 9. Benzene was detected in five monitoring wells (four on site and one off site). Benzene was detected: 1) near the East and West Hide Piles (OW-31 and OW-32); and 2) at monitoring wells OW-17, (2,000 ppb), OW-12 (46 ppb) and OW-13 (4 ppb). The highest concentrations were detected in monitoring wells OW-31 (48,000 ppb) located at the base of the West Hide Pile, and OW-17 (2,000 ppb), located on the northeastern side of Halls Brook Holding Area. During the RI, benzene was detected in monitoring wells OW-12 and OW-17 at concentrations of 491 and 747 ppb, respectively.

Toluene was detected in 13 monitoring wells (six on-site and seven off-site wells) in the study area. Detected concentrations ranged from 29,000 ppb (OW-16) to 1 ppb (OW-30B, OW-33B, OW-24B, OW-22 and OW-11). The distribution of concentrations of toluene is similar to that observed during the RI sampling which indicated that a discontinuous plume of toluene was present at the central and southern portion of the site. As with the RI data, the distribution of concentrations of toluene observed during the PDI and the GSIP may reflect the presence of multiple sources. The PDI Phase 1 and GSIP data indicate that the potential sources appear to be:

1. upgradient of Monitoring Well OW-16, north of the intersection of Commerce Way and Atlantic Avenue; and
2. the east-southeast flank of the East-Central Hide Pile.

It should be noted that toluene was detected in wells OW-32, OW-23, OW-24B, OW-27B, OW-30B and OW-33B at concentrations below the CLP Contract Required Quantitation Limits; therefore, these concentrations are estimated (Table 4). Toluene was also detected south of Mishawum Road at well OW-27B at a concentration of 2 ppb.

### 3.3.2 Types and Extent of Other Hazardous Substances

Organics - The following TCL organic compounds (excluding benzene and toluene) were detected in the GSIP and PDI monitoring wells.

| Compound | Compound Type | Location Detected | Greatest Concentration Detected (in ppb)/ (Monitoring Well) |
|---|---|---|---|
| acetone | VOC | on site | 37000/(OW-16) |
| ethylbenzene | VOC | on site | 1/(OW-32) |
| 2-methylphenol | semi volatile | on site | 9/(OW-31) |
| 4-methylphenol | semi volatile | on site | 41/(OW-31) |
| benzoic acid | semi volatile | on site | 62/(OW-31) |
| n-nitrosodiphenylamine | semi volatile | on site | 3/(OW-10, OW-11 and OW-12) |
| 1,2 dichlorobenzene | semi volatile | on site/ off site | 4/(OW-30A) |
| xylene | VOC | on site/ off site | 3/(OW-20) |
| bis(2-ethylhexyl)phthalate | semi volatile | on site/ off site | 64/(OW-16) |
| phenol | semi volatile | on site/ off site | 430/(OW-27) |
| methylene chloride | VOC | off site | 23/(OW-27A) |
| chloroethane | VOC | off site | 3/(OW-1) |
| chlorobenzene | VOC | off site | 25/(OW-1) |
| trichloroethene | VOC | off site | 110/(OW-26B) |
| 1,1,1-trichloroethane | VOC | off site | 26/(OW-26B) |
| 1,1-dichloroethene | VOC | off site | 8/(OW-26B) |
| 1,1-dichloroethane | VOC | off site | 5/(OW-20) |
| 1,2-dichloroethene | VOC | off site | 3/(OW-26B) |
| benzyl alcohol | semi volatile | off site | 4/(OW-1) |
| dichlorobenzene | semi volatile | off site | 4/(OW-30A) |
| acenapthene | semi volatile | off site | 3/(OW-26A) |
| 2,4-dinitrotoluene | semi volatile | off site | 3/(OW-27B) |

The above suite of constituents are similar to those detected during the RI study (Stauffer, 1983).

Organic compounds exhibiting the greatest concentrations (above 100 ppb) included acetone (37,000 ppb at OW-16) trichloroethene (110 ppb at OW-26B), and phenol (430 ppb at OW-27A). All other organic compounds were detected at concentrations less than 100 ppb.

The distribution of these organic compounds (Plate 10) indicate that only three constituents (bis(2-ethylhexyl)phthalate, xylene and phenol) were detected in both on-site and off-site ground water. Moreover, most of the off-site constituents are chlorinated compounds, none of which were detected on site.

The Phase 1 RI data indicated that, in general, detected concentrations of total organic priority pollutant compounds ranged from 14 ppb to 53 ppb along the northern edge of the site and from 10 ppb to 17 ppb along the southern edge of the site. The Phase 1 PDI and GSIP data indicate that the detected total concentrations of TCL organics (excluding benzene and toluene) ranged from 5 ppb to 302 ppb along the northern edge of the site to 6 ppb to 7 ppb along the southern edge of the site.

Metals - The concentrations of dissolved arsenic, chromium and lead detected are shown in Plate 11. The mobility of these metals (and mercury) in the ground water is being evaluated as part of the GSIP. The distribution of these dissolved metals indicates that, in general, their concentrations are higher on site.

Other TCL Analyses

No PCBs or pesticides were detected in PDI and GSIP the ground water samples.

### 3.4 Extent of Benzene and Toluene "Hot Spots"

The ground-water quality data (GSIP and PDI) indicate the presence of three benzene and toluene "hot spots" at the following well locations:

1) OW-31;
2) OW-16; and
3) OW-17.

Monitoring well OW-31 is located at the eastern flank of the West Hide Pile. This well contained benzene at a concentration of 48,000 ppb as well as semi-volatile organic compounds (Plate 9). Monitoring well OW-16 is located on site and adjacent to the East Central Hide Pile and contains the highest detected concentration of toluene (29,000 ppb). Monitoring well OW-17 is located off site and adjacent to the Hall's Brook Holding Area. Ground-water at this location contains benzene at a concentration of 2,000 ppb. Chlorinated hydrocarbons were also detected at this location. These benzene/toluene "hot spots" are located on site (OW-31 and OW-16 area) and 250 feet south of the site (OW-17). Based upon the Phase 1 PDI and GSIP data, "hot spots" have not migrated as far downgradient as the OW-19 well cluster.

To assist in the evaluation of the extent of the benzene and toluene hot spots, a comparison was made between the concentrations and extent of benzene and toluene developed by the PDI/GSIP with that developed during the RI and the numerical modeling of benzene (Roux, 1988). During the 1983 and 1984 RI ground-water sampling, benzene and toluene were detected upgradient of Monitoring Well OW-19 at wells OW-12, OW-14, OW-16 and OW-17. In addition, sixty-one temporary monitoring wells were sampled for benzene and toluene and the analytical data indicated benzene was detected in an area bounded to the north by Atlantic Avenue and the south by OW-17 (Roux 1988, Figure 3; PDI Work Plan, Appendix B).

The results of the numerical modeling of benzene indicated that the predicted (simulated) extent of benzene after 5 years (1988) could be as far downgradient as OW-19. The predicted extent after 10 years (1993) was as far downgradient as OW-20 (PDI Work Plan, Appendix B).

The extent of benzene (and toluene) is similar (excluding the OW-31 area) to that determined during the RI program (1983 and 1984). The numerical modeling predicted that benzene could be as far downgradient as OW-19 after 5 years. However, benzene was not detected at OW-19 after a period greater than 5 years (1984 to 1990).

The predicted extent (based upon the numerical modeling) and the actual extent of benzene (based upon Phase 1 PDI and GSIP sampling) differ due to two principal factors. The

model did not consider the degradation (biodegradation and dispersion) of benzene and the model assumed a higher hydraulic conductivity (180 gpd/ft$^2$) than currently measured (less than 100 gpd/ft$^2$) from the grain size analyses. These factors likely resulted in an over estimation of the rate of transport and consequently the downgradient extent of the benzene plume during the modeling effort.

## 4.0 FINDINGS AND CONCLUSIONS

1. The thickness and boundaries of the unconsolidated deposits aquifer have been adequately defined to support the design of the interim ground-water remedy. No additional delineation of the unconsolidated deposits is required.

2. Water-level data are adequate to characterize current ground-water flow conditions in the unconsolidated deposits so that the aquifer test (Task GW-2) can be performed and the interim remedy can be designed.

3. There is not a consistent vertical component of ground-water flow from the unconsolidated deposits to the bedrock at the site. Gradients are low ranging from slightly upward to slightly downward.

4. Most of the off-site constituents are chlorinated compounds, none of which were detected on site. This suggests that downgradient/off-site sources of these compounds are present.

5. Inorganic hazardous substances (lead and chrome) were detected off site but do not form a distinct plume. However, arsenic does form a plume generally between monitoring wells OW-16, OW-12, and OW-17.

## 5.0 PROPOSED PHASE 2 PDI PROGRAM

1. Additional monitoring wells should be installed on site to define the extent of the benzene and toluene "hot spots". Six monitoring wells (or well clusters) should be installed at the locations shown on Plate 9. These wells will define: 1) the extent of benzene downgradient of well OW-31; and 2) the extent of toluene and benzene between wells OW-17 and OW-16 (southeast of OW-12).

   These monitoring wells will be constructed as clusters if the unconsolidated deposit aquifer thickness exceeds approximately 30 feet, according to the procedures outlined in the PDI Work Plan (PDI Work Plan Page 66).

2. These six Phase 2 monitoring well clusters and selected Phase 1 PDI and RI monitoring wells, will be sampled and TCL VOC/TAL analyses performed to further refine our understanding of the extent of the benzene/toluene "hot spots". The detection limit for benzene will be 2 ppb to confirm the previous Phase 1 analyses and further define the boundaries of the plume.

   The following Phase 1 PDI and RI wells will be resampled according to the procedures outlined in the PDI Work Plan.

| WEST HIDE PILE AREA | BENZENE/TOLUENE PLUME | |
|---|---|---|
| OW-31 | OW-16 | OW-24B |
| OW-32 | OW-9 | OW-24A |
| OW-11 | OW-13 | OW-19A |
| OW-10 | OW-12 | OW-19 |
| OW-22 | OW-18A | OW-30A |
| OW-28 | OW-18 | OW-30B |
| OW-21 | OW-17 | |

These wells were selected based upon an evaluation of the analytical data obtained during the Phase 1 PDI and the GSIP, and an understanding of ground-water flow patterns and the boundaries of the aquifer.

3. Additional water-level data should be obtained approximately every two months to establish any long term or seasonal trends.

Respectfully Submitted,
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## 6.0 REFERENCES

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# TABLES

Table 1. Summary of Aquifer Thickness Boring Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Soil Boring Designation | Date Drilled | Total Depth (ft below land surface) | Measuring Point Elevation (1) (ft above mean sea level) | Depth to Bedrock (ft below land surface) | Elevation of Bedrock (ft above mean sea level) | Depth to Till (ft below land surface) | Elevation of Till (ft above mean sea level) |
|---|---|---|---|---|---|---|---|
| ATB-1 | 2/28/90 | 8.0 | 64.5 | -- | -- | -- | -- |
| ATB-2 | 2/27/90 | 54.0 | 64.5 | 41.5 | 23.0 | -- | -- |
| ATB-3 | 2/28/90 | 50.0 | 61.7 | 46.0 | 15.7 | -- | -- |
| ATB-4 | 3/5/90 | 49.5 | 57.2 | 45.0 | 12.2 | -- | -- |
| ATB-5 | 3/7/90 | 10.0 | 74.1 | 7.0 | 67.1 | -- | -- |
| ATB-6 | 3/7/90 | 50.0 | 65.7 | 40.25 | 25.45 | -- | -- |
| ATB-7 | 3/12/90 | 14.0 | 68.0 | 9.5 | 58.5 | -- | -- |
| ATB-8 | 3/12/90 | 53.5 | 84.4 | 46.0 | 38.4 | 15.0 | 69.4 |
| ATB-9 | 3/19/90 | 43.5 | 62.7 | 39.0 | 23.7 | 30.5 | 32.2 |
| ATB-10 | 3/20/90 | 73.5 | 62.0 | 69.5 | -7.5 | 38.5 | 23.5 |
| ATB-11 | 3/20/90 | 46.5 | 62.6 | 39.0 | 23.6 | 25.0 | 37.6 |
| ATB-12 | 3/21/90 | 11.0 | 120.7 | 7.0 | 113.7 | 6.0 | 114.7 |
| ATB-13 | 4/4/90 | 98.5 | 54.0 | 92.5 | -38.5 | -- | -- |
| ATB-14 | 4/9/90 | 47.3 | 54.1 | 43.0 | 11.1 | -- | -- |
| ATB-15 | 4/11/90 | 116.0 | 54.2 | 108.0 | -53.8 | -- | -- |
| ATB-16 | 4/16/90 | 74.0 | 53.7 | 68.0 | -14.3 | 65.0 | -11.3 |
| ATB-17 | 5/3/90 | 71.0 | 63.0 | 68.0 | -5.0 | -- | -- |
| ATB-18 | 4/24/90 | 21.0 | 72.5 | 17.0 | 55.5 | 15.0 | 57.5 |
| ATB-19 | 6/27/90 | 21.0 | 93.5 | 17.0 | 76.5 | -- | -- |
| ATB-20 | 6/28/90 | 40.5 | 80.1 | 36.0 | 44.1 | 35.0 | 45.1 |
| ATB-21 | 7/2/90 | 19.0 | 94.2 | 16.0 | 78.2 | -- | -- |

Notes:
(1) Measuring point at land surface.
-- Not encountered.

Table 2. Summary of PDI Phase I and Remedial Investigation Monitoring Well Construction Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Well Number | | Well Diameter/ Well Material | Total Depth of Well (ft below land surface) | Elevation of Measuring Point (ft above mean sea level) | Screened Interval* (ft below land surface) | Formation |
|---|---|---|---|---|---|---|
| OW-1 | RI/FS | 6" steel | 108.03 | 80.32 | 24.03 - 108.03 | bedrock |
| OW-1A | RI/FS | 4" PVC | 24.32 | 79.72 | 4.32 - 24.32 | overburden |
| OW-4 | RI/FS | 6" steel | 42.76 | 71.54 | 22.76 - 42.76 | bedrock |
| OW-6 | RI/FS | 4" PVC | 16.85 | 62.67 | 6.85 - 16.85 | overburden |
| OW-7 | RI/FS | 4" PVC | 31.49 | 57.88 | 1.49 - 31.49 | overburden |
| OW-9 | RI/FS | 6" steel | 127.31 | 68.88 | 32.31 - 127.31 | bedrock |
| OW-10 | RI/FS | 4" PVC | 31.42 | 64.63 | 1.42 - 31.42 | overburden |
| OW-11 | RI/FS | 4" PVC | 41.11 | 71.22 | 1.11 - 41.11 | overburden |
| OW-12 | RI/FS | 4" PVC | 50.67 | 63.74 | 10.67 - 50.67 | overburden |
| OW-13 | RI/FS | 4" PVC | 32.15 | 64.99 | 7.15 - 32.15 | overburden |
| OW-14 | RI/FS | 4" PVC | 47.39 | 65.54 | 2.39 - 47.39 | overburden |
| OW-15 | RI/FS | 6" steel | 25.82 | 64.60 | 5.82 - 25.82 | overburden |
| OW-16 | RI/FS | 4" PVC | 35.83 | 67.29 | 15.83 - 35.83 | overburden |
| OW-17 | RI/FS | 4" PVC | 25.27 | 57.86 | 5.27 - 25.27 | overburden |
| OW-18 | RI/FS | 6" PVC | 55.15 | 62.76 | 15.15 - 55.15 | overburden |
| OW-18A | RI/FS | 4" PVC | 15.20 | 62.08 | 5.20 - 15.20 | overburden |
| OW-19 | RI/FS | 6" PVC | 67.00 | 55.97 | 37.00 - 67.00 | overburden |
| OW-19A | RI/FS | 4" PVC | 38.60 | 55.87 | 3.60 - 38.60 | overburden |
| OW-20 | RI/FS | 4" PVC | 90.72 | 57.33 | 40.72 - 90.72 | overburden |
| OW-23 | PDI | 4" PVC | 27.00 | 68.54 | 16.85 - 27.00 | overburden |
| OW-24A | PDI | 4" PVC | 24.97 | 57.47 | 14.82 - 24.97 | overburden |
| OW-24B | PDI | 4" PVC | 59.65 | 57.26 | 49.50 - 59.65 | overburden |
| OW-25A | PDI | 4" PVC | 23.00 | 66.00 | 12.85 - 23.00 | overburden |
| OW-25B | PDI | 4" PVC | 39.42 | 65.34 | 29.22 - 39.42 | overburden |
| OW-26A | PDI | 4" PVC | 23.20 | 64.15 | 13.05 - 23.20 | overburden |
| OW-26B | PDI | 4" PVC | 41.46 | 63.80 | 31.31 - 41.46 | overburden |
| OW-27A | PDI | 4" PVC | 40.32 | 70.84 | 30.17 - 40.32 | overburden |
| OW-27B | PDI | 4" PVC | 94.57 | 70.52 | 84.42 - 94.57 | overburden |
| OW-29 | PDI | 4" PVC | 25.70 | 61.17 | 15.55 - 25.7 | overburden |
| OW-30A | PDI | 4" PVC | 18.72 | 65.90 | 8.57 - 18.72 | overburden |
| OW-30B | PDI | 4" PVC | 57.83 | 65.60 | 47.68 - 57.83 | overburden |
| OW-33A | PDI | 4" PVC | 44.40 | 56.83 | 34.20 - 44.40 | overburden |
| OW-33B | PDI | 4" PVC | 84.01 | 56.66 | 73.86 - 84.01 | overburden |

* Bedrock wells are finished as unscreened holes.
PDI Well installed as part of PDI program.
RI/FS Well installed as part of RI/FS program.

Table 3. Ground-Water Elevation Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Well Number | Elevation of Measuring Point (ft above mean sea level) | June 20, 1990 | | June 26, 1990 | | July 17, 1990 | |
|---|---|---|---|---|---|---|---|
| | | Depth to Water from Measuring Point (ft below measuring point) | Elevation of Groundwater (ft above mean sea level) | Depth to Water from Measuring Point (ft below measuring point) | Elevation of Groundwater (ft above mean sea level) | Depth to Water from Measuring Point (ft below measuring point) | Elevation of Groundwater (ft above mean sea level) |
| OW-1 (1) | 80.32 | 6.50 | 73.82 | 7.86 | 72.46 | 8.24 | 72.08 |
| OW-1A | 79.72 | 7.62 | 72.10 | 6.79 | 72.93 | 7.36 | 72.36 |
| OW-4 (1) | 71.54 | 6.91 | 64.63 | 7.40 | 64.14 | 8.75 | 62.79 |
| OW-6 | 62.67 | 8.70 | 53.97 | 8.92 | 53.75 | 9.05 | 53.62 |
| OW-7 | 57.88 | 6.93 | 50.95 | 7.09 | 50.79 | 7.35 | 50.53 |
| OW-9 (1) | 68.88 | 10.00 | 58.88 | 10.33 | 58.55 | 11.03 | 57.85 |
| OW-10 | 64.63 | 5.22 | 59.41 | 5.58 | 59.05 | 6.38 | 58.25 |
| OW-11 | 71.22 | 4.50 | 66.72 | 4.71 | 66.51 | 4.99 | 66.23 |
| OW-12 | 63.74 | 7.49 | 56.25 | 7.75 | 55.99 | 8.31 | 55.43 |
| OW-13 | 64.99 | 4.74 | 60.25 | 5.00 | 59.99 | 5.42 | 59.57 |
| OW-14 | 65.54 | 7.54 | 58.00 | 7.87 | 57.67 | 8.56 | 56.98 |
| OW-15 | 64.60 | 4.43 | 60.17 | 4.64 | 59.96 | 5.06 | 59.54 |
| OW-16 | 67.29 | 4.21 | 63.08 | 4.40 | 62.89 | 5.01 | 62.28 |
| OW-17 | 57.86 | 6.04 | 51.82 | 6.21 | 51.65 | 6.35 | 51.51 |
| OW-18 | 62.76 | 9.06 | 53.70 | 9.30 | 53.46 | 9.55 | 53.21 |
| OW-18A | 62.08 | 8.40 | 53.68 | 8.66 | 53.42 | 8.89 | 53.19 |
| OW-19 | 55.97 | 4.53 | 51.44 | 4.68 | 51.29 | 5.02 | 50.95 |
| OW-19A | 55.87 | 4.45 | 51.42 | 4.74 | 51.13 | 4.95 | 50.92 |
| OW-20 | 57.33 | 6.57 | 50.76 | 6.72 | 50.61 | 6.97 | 50.36 |
| OW-21 | 76.28 | 5.44 | 70.84 | 5.79 | 70.49 | 6.19 | 70.09 |
| OW-22 | 81.76 | 9.16 | 72.60 | 9.52 | 72.24 | 10.82 | 70.94 |
| OW-23 | 68.54 | 14.62 | 53.92 | 15.66 | 52.88 | 15.34 | 53.20 |
| OW-24A | 57.47 | 5.15 | 52.32 | 5.35 | 52.12 | 5.70 | 51.77 |
| OW-24B | 57.26 | 5.04 | 52.22 | 5.24 | 52.02 | 5.59 | 51.67 |
| OW-25A | 66.00 | 14.87 | 51.13 | 15.10 | 50.90 | 15.31 | 50.69 |
| OW-25B | 65.34 | 14.19 | 51.15 | 14.44 | 50.90 | 14.65 | 50.69 |
| OW-26A | 64.15 | 9.37 | 54.78 | 9.68 | 54.47 | 10.22 | 53.93 |
| OW-26B | 63.80 | 9.09 | 54.71 | 9.39 | 54.41 | 9.81 | 53.99 |
| OW-27A | 70.84 | 18.34 | 52.50 | 18.53 | 52.31 | 18.88 | 51.96 |
| OW-27B | 70.52 | 19.15 | 51.37 | 19.32 | 51.20 | 19.56 | 50.96 |
| OW-28 | 77.195 | 11.51 | 65.685 | 11.51 | 65.685 | dry | dry |
| OW-29 | 61.17 | 5.05 | 55.67 | 5.62 | 55.55 | 5.93 | 55.24 |
| OW-30A | 65.90 | 11.80 | 54.10 | 12.52 | 53.38 | 12.85 | 53.05 |
| OW-30B | 65.60 | 12.14 | 53.46 | 12.36 | 53.24 | 12.65 | 52.95 |
| OW-33A | 56.83 | 5.83 | 51.00 | 6.02 | 50.81 | 6.27 | 50.56 |
| OW-33B | 56.66 | 5.63 | 51.03 | 5.77 | 50.89 | 6.10 | 50.56 |

Note: (1) Bedrock well.

Table 4. Summary of PDI Phase I Monitoring Well Ground-Water Quality Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Well Designation: | | G123 | G124A | G124B | G125A | G125B | G126A | G126B | G127A | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 6/5/90 | 6/4/90 | 6/4/90 | 6/5/90 | 6/5/90 | 6/5/90 | 6/5/90 | 6/5/90 | |
| Volatile Organic Compounds (Concentrations in ug/L) | CRQL | | | | | | | | | IDL |
| Chloromethane | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 2 |
| Bromomethane | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 2 |
| Vinyl chloride | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 2 |
| Chloroethane | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 2 |
| Methylene chloride | 5 | 22 A | <5 B | 5 U | 5 U | 11 U | <5 B | 5 U | 23 A | 2 |
| Acetone | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 2 |
| Carbon disulfide | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 1,1-Dichloroethene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 8 B | <5 B | 1 |
| 1,1-Dichloroethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 2 A | <5 B | 1 |
| 1,2-Dichloroethylene (total) | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 3 A | <5 B | 1 |
| Chloroform | 5 | 5 U | <5 B | 14 U | <5 B | <5 B | <5 B | <5 B | 5 U | 1 |
| 1,2-Dichloroethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 2-Butanone | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 1 |
| 1,1,1-Trichloroethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 26 B | <5 B | 1 |
| Carbon tetrachloride | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Vinyl acetate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 2 |
| Bromodichloromethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 1,2-Dichloropropane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| cis-1,3-Dichloropropene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Trichloroethene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 110 B | <5 B | 1 |
| Dibromochloromethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 1,1,2-Trichloroethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Benzene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| trans-1,3-Dichloropropene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Bromoform | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 4-Methyl-2-pentanone | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 2 |
| 2-Hexanone | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 1 |
| Tetrachloroethene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 2 |
| 1,1,2,2-Tetrachloroethene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 2 |
| Toluene | 5 | 2 A | <5 B | 1 A | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Chlorobenzene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Ethylbenzene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Styrene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Total xylenes | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |

* - Indicates a replicate sample
CRQL - Contract Required Quantitation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Table 4. Summary of PDI Phase I Monitoring Well Ground-Water Quality Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Sample Designation: | | G127B | G129 | G134* | G130A | G135* | G130B | G131 | G132 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 6/5/90 | 6/4/90 | 6/4/90 | 6/5/90 | 6/5/90 | 6/5/90 | 6/6/90 | 6/6/90 | |
| Volatile Organic Compounds (Concentrations in ug/L) | CRQL | | | | | | | | | IDL |
| Chloromethane | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <5000 B | <10 B | 2 |
| Bromomethane | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <5000 B | <10 B | 2 |
| Vinyl chloride | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <5000 B | <10 B | 2 |
| Chloroethane | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <5000 B | <10 B | 2 |
| Methylene chloride | 5 | 19 A | 5 U | 5 U | 5 U | 5 U | 5 U | <2500 B | <5 B | 2 |
| Acetone | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <5000 B | <10 B | 2 |
| Carbon disulfide | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <2500 B | <5 B | 1 |
| 1,1-Dichloroethene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <2500 B | <5 B | 1 |
| 1,1-Dichloroethane | 5 | <5 B | <5 B | <5 B | 2 A | <5 B | <5 B | <2500 B | <5 B | 1 |
| 1,2-Dichloroethylene (total) | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <2500 B | <5 B | 1 |
| Chloroform | 5 | 5 U | <5 B | <5 B | <5 B | <5 B | 6 U | <2500 B | <5 B | 1 |
| 1,2-Dichloroethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <2500 B | <5 B | 1 |
| 2-Butanone | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <5000 B | <10 B | 1 |
| 1,1,1-Trichloroethane | 5 | <5 B | <5 B | <5 B | <5 B | 1 A | <5 B | <2500 B | <5 B | 1 |
| Carbon tetrachloride | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <2500 B | <5 B | 1 |
| Vinyl acetate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <5000 B | <10 B | 2 |
| Bromodichloromethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <2500 B | <5 B | 1 |
| 1,2-Dichloropropane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <2500 B | <5 B | 1 |
| cis-1,3-Dichloropropene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <2500 B | <5 B | 1 |
| Trichloroethene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <2500 B | <5 B | 1 |
| Dibromochloromethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <2500 B | <5 B | 1 |
| 1,1,2-Trichloroethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <2500 B | <5 B | 1 |
| Benzene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 48000 B | 41 B | 1 |
| trans-1,3-Dichloropropene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <2500 B | <5 B | 1 |
| Bromoform | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <2500 B | <5 B | 1 |
| 4-Methyl-2-pentanone | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <5000 B | <10 B | 2 |
| 2-Hexanone | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <5000 B | <10 B | 1 |
| Tetrachloroethene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <2500 B | <5 B | 2 |
| 1,1,2,2-Tetrachloroethene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <2500 B | <5 B | 2 |
| Toluene | 5 | 2 A | <5 B | <5 B | <5 B | <5 B | 1 A | <2500 B | 2 A | 1 |
| Chlorobenzene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <2500 B | <5 B | 1 |
| Ethylbenzene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <2500 B | 1 A | 1 |
| Styrene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <2500 B | <5 B | 1 |
| Total xylenes | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <2500 B | 1 A | 1 |

* - Indicates a replicate sample
CRQL - Contract Required Quantitation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Table 4. Summary of PDI Phase I Monitoring Well Ground-Water Quality Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Sample Designation: | | G133A | G133B | G1PUB | |
|---|---|---|---|---|---|
| Sample Date: | | 6/4/90 | 6/4/90 | 6/4/90 | |
| Volatile Organic Compounds (Concentrations in ug/L) | CRQL | | | | IDL |
| Chloromethane | 10 | <10 B | <10 B | <10 B | 2 |
| Bromomethane | 10 | <10 B | <10 B | <10 B | 2 |
| Vinyl chloride | 10 | <10 B | <10 B | <10 B | 2 |
| Chloroethane | 10 | <10 B | <10 B | <10 B | 2 |
| Methylene chloride | 5 | <5 B | 5 U | 5 U | 2 |
| Acetone | 10 | <10 B | <10 B | <10 B | 2 |
| Carbon disulfide | 5 | <5 B | <5 B | <5 B | 1 |
| 1,1-Dichloroethene | 5 | <5 B | 2 A | <5 B | 1 |
| 1,1-Dichloroethane | 5 | <5 B | 3 A | <5 B | 1 |
| 1,2-Dichloroethylene (total) | 5 | <5 B | <5 B | <5 B | 1 |
| Chloroform | 5 | <5 B | 5 U | 23 U | 1 |
| 1,2-Dichloroethane | 5 | <5 B | <5 B | <5 B | 1 |
| 2-Butanone | 10 | <10 B | <10 B | <10 B | 1 |
| 1,1,1-Trichloroethane | 5 | <5 B | <5 B | <5 B | 1 |
| Carbon tetrachloride | 5 | <5 B | <5 B | <5 B | 1 |
| Vinyl acetate | 10 | <10 B | <10 B | <10 B | 2 |
| Bromodichloromethane | 5 | <5 B | <5 B | 5 B | 1 |
| 1,2-Dichloropropane | 5 | <5 B | <5 B | <5 B | 1 |
| cis-1,3-Dichloropropene | 5 | <5 B | <5 B | <5 B | 1 |
| Trichloroethene | 5 | <5 B | 92 B | <5 B | 1 |
| Dibromochloromethane | 5 | <5 B | <5 B | 1 A | 1 |
| 1,1,2-Trichloroethane | 5 | <5 B | <5 B | <5 B | 1 |
| Benzene | 5 | <5 B | <5 B | <5 B | 1 |
| trans-1,3-Dichloropropene | 5 | <5 B | <5 B | <5 B | 1 |
| Bromoform | 5 | <5 B | <5 B | <5 B | 1 |
| 4-Methyl-2-pentanone | 10 | <10 B | <10 B | <10 B | 2 |
| 2-Hexanone | 10 | <10 B | <10 B | <10 B | 1 |
| Tetrachloroethene | 5 | <5 B | <5 B | <5 B | 2 |
| 1,1,2,2-Tetrachloroethene | 5 | <5 B | <5 B | <5 B | 2 |
| Toluene | 5 | <5 B | 1 A | <5 B | 1 |
| Chlorobenzene | 5 | <5 B | <5 B | <5 B | 1 |
| Ethylbenzene | 5 | <5 B | <5 B | <5 B | 1 |
| Styrene | 5 | <5 B | <5 B | <5 B | 1 |
| Total xylenes | 5 | <5 B | <5 B | <5 B | 1 |

* - Indicates a replicate sample
CRQL - Contract Required Quantitation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Table 4. Summary of PDI Phase I Monitoring Well Ground-Water Quality Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Well Designation: | | G123 | G124A | G124B | G125A | G125B | G126A | G126B | G127A | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 6/5/90 | 6/4/90 | 6/4/90 | 6/5/90 | 6/5/90 | 6/5/90 | 6/5/90 | 6/5/90 | |
| Semi-Volatile Organic Compounds (Concentrations in ug/L) | CRQL | | | | | | | | | IDL |
| Phenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 430 B | 5 |
| bis (2-Chloroethyl) ether | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| 2-Chlorophenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| 1,3-Dichlorobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| 1,4-Dichlorobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| Benzyl alcohol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 10 |
| 1,2-Dichlorobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| 2-Methylphenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| bis (2-Chloroisopropyl) ether | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| 4-Methylphenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| N-Nitroso-di-n-propylamine | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 10 |
| Hexachloroethane | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 10 |
| Nitrobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| Isophorone | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| 2-Nitrophenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 10 |
| 2,4-Dimethylphenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 10 |
| Benzoic acid | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <250 B | 25 |
| bis (2-Chloroethoxy) methane | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| 2,4-Dichlorophenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| 1,2,4-Trichlorobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| Naphthalene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 3 |
| 4-Chloroaniline | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| Hexachlorobutadiene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| 4-Chloro-3-methylphenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 10 |
| 2-Methylnaphthalene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 10 |
| Hexachlorocyclopentadiene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 10 |
| 2,4,6-Trichlorophenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 10 |
| 2,4,5-Trichlorophenol | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <250 B | 10 |
| 2-Chloronaphthalene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 4 |
| 2-Nitroaniline | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <250 B | 10 |
| Dimethyl phthalate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 4 |
| Acenaphthylene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 3 |
| 2,6-Dinitrotoluene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 10 |
| 3-Nitroaniline | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <250 B | 10 |
| Acenaphthene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | 3 A | <10 B | <50 B | 3 |
| 2,4-Dinitrophenol | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <250 B | 25 |
| 4-Nitrophenol | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <250 B | 15 |
| Dibenzofuran | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 4 |
| 2,4-Dinitrotoluene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 10 |
| Diethylphthalate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 4 |
| 4-Chlorophenyl-phenylether | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| Fluorene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 4 |
| 4-Nitroaniline | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <250 B | 10 |
| 4,6-Dinitro-2-methylphenol | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <250 B | 15 |

(1) Cannot be separated from Diphenylamine
* - Indicates a replicate sample
CRQL - Contract Required Quantation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Table 4. Summary of PDI Phase I Monitoring Well Ground-Water Quality Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Well Designation: | | G123 | G124A | G124B | G125A | G125B | G126A | G126B | G127A | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 6/5/90 | 6/4/90 | 6/4/90 | 6/5/90 | 6/5/90 | 6/5/90 | 6/5/90 | 6/5/90 | |
| Semi-Volatile Organic Compounds (Concentrations in ug/L) | CRQL | | | | | | | | | IDL |
| N-Nitrosodiphenylamine (1) | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| 4-Bromophenyl-phenylether | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| Hexachlorobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| Pentachlorophenol | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <250 B | 10 |
| Phenanthrene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 3 |
| Anthracene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 3 |
| Di-n-butylphthalate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 3 |
| Fluoranthene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 3 |
| Pyrene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 3 |
| Butylbenzylphthalate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 5 |
| 3,3'-Dichlorobenzidine | 20 | <20 B | <20 B | <20 B | <20 B | <20 B | <20 B | <20 B | <100 B | 5 |
| Benzo (a) anthracene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 3 |
| Chrysene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 3 |
| bis (2-Ethylhexyl) phthalate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 4 |
| Di-n-octyl phthalate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 3 |
| Benzo (b) fluoranthene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 3 |
| Benzo (k) fluoranthene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 3 |
| Benzo (a) pyrene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 3 |
| Indeno (1,2,3-cd) pyrene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 4 |
| Dibenzo (a,h) anthracene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 3 |
| Benzo (g,h,i) perylene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <50 B | 3 |

(1) Cannot be separated from Diphenylamine
* - Indicates a replicate sample
CRQL - Contract Required Quantation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Table 4. Summary of PDI Phase I Monitoring Well Ground-Water Quality Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Sample Designation: | | G127B | G129 | G134* | G130A | G135* | G130B | G131 | G132 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 6/5/90 | 6/4/90 | 6/4/90 | 6/5/90 | 6/5/90 | 6/5/90 | 6/6/90 | 6/6/90 | |
| Semi-Volatile Organic Compounds (Concentrations in ug/L) | CRQL | | | | | | | | | IDL |
| Phenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 190 B | <10 B | 5 |
| bis (2-Chloroethyl) ether | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 2-Chlorophenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 1,3-Dichlorobenzene | 10 | <10 B | <10 B | <10 B | 4 A | 2 A | <10 B | <10 B | <10 B | 5 |
| 1,4-Dichlorobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Benzyl alcohol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| 1,2-Dichlorobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 A | 5 |
| 2-Methylphenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 9 A | <10 B | 5 |
| bis (2-Chloroisopropyl) ether | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 4-Methylphenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 41 B | <10 B | 5 |
| N-Nitroso-di-n-propylamine | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| Hexachloroethane | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| Nitrobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Isophorone | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 2-Nitrophenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| 2,4-Dimethylphenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| Benzoic acid | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | 62 B | <50 B | 25 |
| bis (2-Chloroethoxy) methane | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 2,4-Dichlorophenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 1,2,4-Trichlorobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Naphthalene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| 4-Chloroaniline | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Hexachlorobutadiene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 4-Chloro-3-methylphenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| 2-Methylnaphthalene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| Hexachlorocyclopentadiene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| 2,4,6-Trichlorophenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| 2,4,5-Trichlorophenol | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | 10 |
| 2-Chloronaphthalene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 4 |
| 2-Nitroaniline | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | 10 |
| Dimethyl phthalate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 4 |
| Acenaphthylene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| 2,6-Dinitrotoluene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| 3-Nitroaniline | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | 10 |
| Acenaphthene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| 2,4-Dinitrophenol | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | 25 |
| 4-Nitrophenol | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | 15 |
| Dibenzofuran | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 4 |
| 2,4-Dinitrotoluene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| Diethylphthalate | 10 | 3 A | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 4 |
| 4-Chlorophenyl-phenylether | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Fluorene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 4 |
| 4-Nitroaniline | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | 10 |
| 4,6-Dinitro-2-methylphenol | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | 15 |

(1) Cannot be separated from Diphenylamine
* - Indicates a replicate sample
CRQL - Contract Required Quantation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Table 4. Summary of PDI Phase I Monitoring Well Ground-Water Quality Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Sample Designation: | | G127B | G129 | G134* | G130A | G135* | G130B | G131 | G132 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 6/5/90 | 6/4/90 | 6/4/90 | 6/5/90 | 6/5/90 | 6/5/90 | 6/6/90 | 6/6/90 | |
| Semi-Volatile Organic Compounds (Concentrations in ug/L) | CRQL | | | | | | | | | IDL |
| N-Nitrosodiphenylamine (1) | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 4-Bromophenyl-phenylether | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Hexachlorobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Pentachlorophenol | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | 10 |
| Phenanthrene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Anthracene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Di-n-butylphthalate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Fluoranthene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Pyrene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Butylbenzylphthalate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 3,3'-Dichlorobenzidine | 20 | <20 B | <20 B | <20 B | <20 B | <20 B | <20 B | <20 B | <20 B | 5 |
| Benzo (a) anthracene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Chrysene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| bis (2-Ethylhexyl) phthalate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 4 |
| Di-n-octyl phthalate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Benzo (b) fluoranthene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Benzo (k) fluoranthene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Benzo (a) pyrene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Indeno (1,2,3-cd) pyrene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 4 |
| Dibenzo (a,h) anthracene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Benzo (g,h,i) perylene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |

(1) Cannot be separated from Diphenylamine
* - Indicates a replicate sample
CRQL - Contract Required Quantation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Table 4. Summary of PDI Phase I Monitoring Well Ground-Water Quality Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Sample Designation: | | G133A | G133B | G1PUB | |
|---|---|---|---|---|---|
| Sample Date: | | 6/4/90 | 6/4/90 | 6/4/90 | |
| Semi-Volatile Organic Compounds (Concentrations in ug/L) | CRQL | | | | IDL |
| Phenol | 10 | <10 B | <10 B | <10 B | 5 |
| bis (2-Chloroethyl) ether | 10 | <10 B | <10 B | <10 B | 5 |
| 2-Chlorophenol | 10 | <10 B | <10 B | <10 B | 5 |
| 1,3-Dichlorobenzene | 10 | <10 B | <10 B | <10 B | 5 |
| 1,4-Dichlorobenzene | 10 | <10 B | <10 B | <10 B | 5 |
| Benzyl alcohol | 10 | <10 B | <10 B | <10 B | 10 |
| 1,2-Dichlorobenzene | 10 | <10 B | <10 B | <10 B | 5 |
| 2-Methylphenol | 10 | <10 B | <10 B | <10 B | 5 |
| bis (2-Chloroisopropyl) ether | 10 | <10 B | <10 B | <10 B | 5 |
| 4-Methylphenol | 10 | <10 B | <10 B | <10 B | 5 |
| N-Nitroso-di-n-propylamine | 10 | <10 B | <10 B | <10 B | 10 |
| Hexachloroethane | 10 | <10 B | <10 B | <10 B | 10 |
| Nitrobenzene | 10 | <10 B | <10 B | <10 B | 5 |
| Isophorone | 10 | <10 B | <10 B | <10 B | 5 |
| 2-Nitrophenol | 10 | <10 B | <10 B | <10 B | 10 |
| 2,4-Dimethylphenol | 10 | <10 B | <10 B | <10 B | 10 |
| Benzoic acid | 50 | <50 B | <50 B | <50 B | 25 |
| bis (2-Chloroethoxy) methane | 10 | <10 B | <10 B | <10 B | 5 |
| 2,4-Dichlorophenol | 10 | <10 B | <10 B | <10 B | 5 |
| 1,2,4-Trichlorobenzene | 10 | <10 B | <10 B | <10 B | 5 |
| Naphthalene | 10 | <10 B | <10 B | <10 B | 3 |
| 4-Chloroaniline | 10 | <10 B | <10 B | <10 B | 5 |
| Hexachlorobutadiene | 10 | <10 B | <10 B | <10 B | 5 |
| 4-Chloro-3-methylphenol | 10 | <10 B | <10 B | <10 B | 10 |
| 2-Methylnaphthalene | 10 | <10 B | <10 B | <10 B | 10 |
| Hexachlorocyclopentadiene | 10 | <10 B | <10 B | <10 B | 10 |
| 2,4,6-Trichlorophenol | 10 | <10 B | <10 B | <10 B | 10 |
| 2,4,5-Trichlorophenol | 50 | <50 B | <50 B | <50 B | 10 |
| 2-Chloronaphthalene | 10 | <10 B | <10 B | <10 B | 4 |
| 2-Nitroaniline | 50 | <50 B | <50 B | <50 B | 10 |
| Dimethyl phthalate | 10 | <10 B | <10 B | <10 B | 4 |
| Acenaphthylene | 10 | <10 B | <10 B | <10 B | 3 |
| 2,6-Dinitrotoluene | 10 | <10 B | <10 B | <10 B | 10 |
| 3-Nitroaniline | 50 | <50 B | <50 B | <50 B | 10 |
| Acenaphthene | 10 | <10 B | <10 B | <10 B | 3 |
| 2,4-Dinitrophenol | 50 | <50 B | <50 B | <50 B | 25 |
| 4-Nitrophenol | 50 | <50 B | <50 B | <50 B | 15 |
| Dibenzofuran | 10 | <10 B | <10 B | <10 B | 4 |
| 2,4-Dinitrotoluene | 10 | <10 B | <10 B | <10 B | 10 |
| Diethylphthalate | 10 | <10 B | <10 B | <10 B | 4 |
| 4-Chlorophenyl-phenylether | 10 | <10 B | <10 B | <10 B | 5 |
| Fluorene | 10 | <10 B | <10 B | <10 B | 4 |
| 4-Nitroaniline | 50 | <50 B | <50 B | <50 B | 10 |
| 4,6-Dinitro-2-methylphenol | 50 | <50 B | <50 B | <50 B | 15 |

(1) Cannot be separated from Diphenylamine
* - Indicates a replicate sample
CRQL - Contract Required Quantation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Table 4. Summary of PDI Phase I Monitoring Well Ground-Water Quality Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Sample Designation: | | G133A | G133B | G1PUB | |
|---|---|---|---|---|---|
| Sample Date: | | 6/4/90 | 6/4/90 | 6/4/90 | |
| Semi-Volatile Organic Compounds (Concentrations in ug/L) | CRQL | | | | IDL |
| N-Nitrosodiphenylamine (1) | 10 | <10 B | <10 B | <10 B | 5 |
| 4-Bromophenyl-phenylether | 10 | <10 B | <10 B | <10 B | 5 |
| Hexachlorobenzene | 10 | <10 B | <10 B | <10 B | 5 |
| Pentachlorophenol | 50 | <50 B | <50 B | <50 B | 10 |
| Phenanthrene | 10 | <10 B | <10 B | <10 B | 3 |
| Anthracene | 10 | <10 B | <10 B | <10 B | 3 |
| Di-n-butylphthalate | 10 | <10 B | <10 B | <10 B | 3 |
| Fluoranthene | 10 | <10 B | <10 B | <10 B | 3 |
| Pyrene | 10 | <10 B | <10 B | <10 B | 3 |
| Butylbenzylphthalate | 10 | <10 B | <10 B | <10 B | 5 |
| 3,3'-Dichlorobenzidine | 20 | <20 B | <20 B | <20 B | 5 |
| Benzo (a) anthracene | 10 | <10 B | <10 B | <10 B | 3 |
| Chrysene | 10 | <10 B | <10 B | <10 B | 3 |
| bis (2-Ethylhexyl) phthalate | 10 | <10 B | <10 B | <10 B | 4 |
| Di-n-octyl phthalate | 10 | <10 B | <10 B | <10 B | 3 |
| Benzo (b) fluoranthene | 10 | <10 B | <10 B | <10 B | 3 |
| Benzo (k) fluoranthene | 10 | <10 B | <10 B | <10 B | 3 |
| Benzo (a) pyrene | 10 | <10 B | <10 B | <10 B | 3 |
| Indeno (1,2,3-cd) pyrene | 10 | <10 B | <10 B | <10 B | 4 |
| Dibenzo (a,h) anthracene | 10 | <10 B | <10 B | <10 B | 3 |
| Benzo (g,h,i) perylene | 10 | <10 B | <10 B | <10 B | 3 |

(1) Cannot be separated from Diphenylamine
* - Indicates a replicate sample
CRQL - Contract Required Quantation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Table 4. Summary of PDI Phase I Monitoring Well Ground-Water Quality Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Well Designation: | | G123 | G124A | G124B | G125A | G125B | G126A | G126B | G127A | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 6/5/90 | 6/4/90 | 6/4/90 | 6/5/90 | 6/5/90 | 6/5/90 | 6/5/90 | 6/5/90 | |
| Pesticide\PCB Compounds (Concentrations in ug/L) | CRQL | | | | | | | | | IDL |
| alpha-BHC | 0.050 | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | 0.01 |
| beta-BHC | 0.050 | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | 0.02 |
| delta-BHC | 0.050 | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | 0.01 |
| gamma-BHC (Lindane) | 0.050 | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | 0.01 |
| Heptachlor | 0.050 | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | 0.01 |
| Aldrin | 0.050 | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | 0.01 |
| Heptachlor epoxide | 0.050 | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | 0.01 |
| Endosulfan I | 0.050 | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | 0.02 |
| Dieldrin | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| 4,4'-DDE | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| Endrin | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.05 |
| Endosulfan II | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| 4,4'-DDD | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| Endosulfan sulfate | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.08 |
| 4,4'-DDT | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.08 |
| Methoxychlor | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.06 |
| Endrin ketone | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.08 |
| alpha-Chlordane | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.12 |
| gamma-Chlordane | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.12 |
| Toxaphene | 1.0 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 0.40 |
| Aroclor-1016 | 0.50 | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | 0.38 |
| Aroclor-1221 | 0.50 | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | 0.29 |
| Aroclor-1232 | 0.50 | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | 0.40 |
| Aroclor-1242 | 0.50 | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | 0.45 |
| Aroclor-1248 | 0.50 | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | 0.31 |
| Aroclor-1254 | 0.50 | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | 0.42 |
| Aroclor-1260 | 0.50 | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | 0.25 |

* - Indicates a replicate sample
CRQL - Contract Required Quantitation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Table 4. Summary of PDI Phase I Monitoring Well Ground-Water Quality Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Sample Designation: | | G127B | G129 | G134* | G130A | G135* | G130B | G131 | G132 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 6/5/90 | 6/4/90 | 6/4/90 | 6/5/90 | 6/5/90 | 6/5/90 | 6/6/90 | 6/6/90 | |
| Pesticide\PCB Compounds (Concentrations in ug/L) | CRQL | | | | | | | | | IDL |
| alpha-BHC | 0.050 | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <5.0 B | <0.050 B | 0.01 |
| beta-BHC | 0.050 | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <5.0 B | <0.050 B | 0.02 |
| delta-BHC | 0.050 | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <5.0 B | <0.050 B | 0.01 |
| gamma-BHC (Lindane) | 0.050 | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <5.0 B | <0.050 B | 0.01 |
| Heptachlor | 0.050 | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <5.0 B | <0.050 B | 0.01 |
| Aldrin | 0.050 | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <5.0 B | <0.050 B | 0.01 |
| Heptachlor epoxide | 0.050 | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <5.0 B | <0.050 B | 0.01 |
| Endosulfan I | 0.050 | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <0.050 B | <5.0 B | <0.050 B | 0.02 |
| Dieldrin | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <10 B | <0.10 B | 0.02 |
| 4,4'-DDE | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <10 B | <0.10 B | 0.02 |
| Endrin | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <10 B | <0.10 B | 0.05 |
| Endosulfan II | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <10 B | <0.10 B | 0.02 |
| 4,4'-DDD | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <10 B | <0.10 B | 0.02 |
| Endosulfan sulfate | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <10 B | <0.10 B | 0.08 |
| 4,4'-DDT | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <10 B | <0.10 B | 0.08 |
| Methoxychlor | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <50 B | <0.05 B | 0.06 |
| Endrin ketone | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <10 B | <0.10 B | 0.08 |
| alpha-Chlordane | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <50 B | <0.05 B | 0.12 |
| gamma-Chlordane | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <50 B | <0.05 B | 0.12 |
| Toxaphene | 1.0 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <100 B | <1.0 B | 0.40 |
| Aroclor-1016 | 0.50 | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <50 B | <0.50 B | 0.38 |
| Aroclor-1221 | 0.50 | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <50 B | <0.50 B | 0.29 |
| Aroclor-1232 | 0.50 | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <50 B | <0.50 B | 0.40 |
| Aroclor-1242 | 0.50 | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <50 B | <0.50 B | 0.45 |
| Aroclor-1248 | 0.50 | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <50 B | <0.50 B | 0.31 |
| Aroclor-1254 | 0.50 | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <50 B | <0.50 B | 0.42 |
| Aroclor-1260 | 0.50 | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <0.50 B | <50 B | <0.50 B | 0.25 |

* - Indicates a replicate sample
CRQL - Contract Required Quantation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Table 4. Summary of PDI Phase I Monitoring Well Ground-Water Quality Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Sample Designation: | | G133A | G133B | G1PUB | |
|---|---|---|---|---|---|
| Sample Date: | | 6/4/90 | 6/4/90 | 6/4/90 | |
| Pesticide\PCB Compounds (Concentrations in ug/L) | CRQL | | | | IDL |
| alpha-BHC | 0.050 | <0.050 B | <0.050 B | <0.050 B | 0.01 |
| beta-BHC | 0.050 | <0.050 B | <0.050 B | <0.050 B | 0.02 |
| delta-BHC | 0.050 | <0.050 B | <0.050 B | <0.050 B | 0.01 |
| gamma-BHC (Lindane) | 0.050 | <0.050 B | <0.050 B | <0.050 B | 0.01 |
| Heptachlor | 0.050 | <0.050 B | <0.050 B | <0.050 B | 0.01 |
| Aldrin | 0.050 | <0.050 B | <0.050 B | <0.050 B | 0.01 |
| Heptachlor epoxide | 0.050 | <0.050 B | <0.050 B | <0.050 B | 0.01 |
| Endosulfan I | 0.050 | <0.050 B | <0.050 B | <0.050 B | 0.02 |
| Dieldrin | 0.10 | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| 4,4'-DDE | 0.10 | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| Endrin | 0.10 | <0.10 B | <0.10 B | <0.10 B | 0.05 |
| Endosulfan II | 0.10 | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| 4,4'-DDD | 0.10 | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| Endosulfan sulfate | 0.10 | <0.10 B | <0.10 B | <0.10 B | 0.08 |
| 4,4'-DDT | 0.10 | <0.10 B | <0.10 B | <0.10 B | 0.08 |
| Methoxychlor | 0.05 | <0.05 B | <0.05 B | <0.05 B | 0.06 |
| Endrin ketone | 0.10 | <0.10 B | <0.10 B | <0.10 B | 0.08 |
| alpha-Chlordane | 0.05 | <0.05 B | <0.05 B | <0.05 B | 0.12 |
| gamma-Chlordane | 0.05 | <0.05 B | <0.05 B | <0.05 B | 0.12 |
| Toxaphene | 1.0 | <1.0 B | <1.0 B | <1.0 B | 0.40 |
| Aroclor-1016 | 0.50 | <0.50 B | <0.50 B | <0.50 B | 0.38 |
| Aroclor-1221 | 0.50 | <0.50 B | <0.50 B | <0.50 B | 0.29 |
| Aroclor-1232 | 0.50 | <0.50 B | <0.50 B | <0.50 B | 0.40 |
| Aroclor-1242 | 0.50 | <0.50 B | <0.50 B | <0.50 B | 0.45 |
| Aroclor-1248 | 0.50 | <0.50 B | <0.50 B | <0.50 B | 0.31 |
| Aroclor-1254 | 0.50 | <0.50 B | <0.50 B | <0.50 B | 0.42 |
| Aroclor-1260 | 0.50 | <0.50 B | <0.50 B | <0.50 B | 0.25 |

* - Indicates a replicate sample
CRQL - Contract Required Quantation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Table 4. Summary of PDI Phase I Monitoring Well Ground-Water Quality Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Sample Designation: | | G123 | G124A | G124B | G125A | G125B | G126A | G126B | G127A | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 6/5/90 | 6/4/90 | 6/4/90 | 6/5/90 | 6/5/90 | 6/5/90 | 6/5/90 | 6/5/90 | |
| Total Inorganic Compounds (Concentrations in ug/L) | IDL | | | | | | | | | CRDL |
| Aluminum | 27 | 4550 A | 896 A | 1570 A | 5130 A | 468 A | 3730 A | 4700 A | 29100 A | 200 |
| Antimony | 37 | 103 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | 60 |
| Arsenic | 2 | 9.0 A | <2.0 B | 3.4 B | 6.8 A | 2.0 B | 24.3 B | 5.4 A | 40.4 B | 10 |
| Barium | 2 | 72.8 A | 14.3 A | 29.8 U | 36.5 A | 10.9 A | 33.8 A | 49 A | 176 A | 200 |
| Beryllium | 1 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 1.6 A | 5 |
| Cadmium | 5 | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | 5 |
| Calcium | 20 | 310000 A | 42200 A | 20900 U | 3810 A | 25200 A | 28600 A | 39700 A | 211000 A | 5000 |
| Chromium | 3 | 42.8 B | <3.0 B | 3.9 B | 9.8 A | 3.4 A | 5.4 A | 4.4 A | 66.5 B | 10 |
| Cobalt | 7 | 50.4 B | <7.0 B | <7.0 B | <7.0 B | <7.0 B | 7.8 A | <7.0 B | 16.1 A | 50 |
| Copper | 6 | 18.2 A | <6.0 B | 9.1 A | 15.3 A | <6.0 B | 13.9 A | 12.1 A | 69.9 A | 25 |
| Iron | 3 | 10000 A | 1100 A | 3220 U | 6080 A | 1080 A | 9820 A | 5720 A | 31400 A | 100 |
| Lead | 2 | 18.0 A | 3.4 A | 3.10 A | 5.2 A | 2.0 B | 4.3 A | 4.3 A | 31.2 A | 5 |
| Magnesium | 37 | 47500 B | 8650 B | 4850 B | 1940 A | 3720 A | 7670 B | 12000 B | 22400 B | 5000 |
| Manganese | 1 | 28700 A | 70.4 A | 1160 U | 150 A | 72.1 A | 1080 A | 418 A | 678 A | 15 |
| Mercury | 0.2 | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | 0.2 |
| Nickel | 12 | 31.4 B | <12.0 B | 16.0 B | 13.6 A | <12.0 B | <12.0 B | <12.0 B | 38.0 A | 40 |
| Potassium | 900 | 11000 B | 1980 B | 5280 B | 2020 A | 15200 A | 3800 A | 3840 A | 20600 B | 5000 |
| Selenium | 2 | <2.0 B | <2.0 B | <2.0 B | <2.0 B | <2.0 B | <2.0 B | <2.0 B | 15.8 A | 5 |
| Silver | 3 | 4.9 A | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | 10 |
| Sodium | 38 | 24400 A | 16800 A | 56200 U | 9960 A | 35300 A | 8210 A | 32800 A | 104000 B | 5000 |
| Thallium | 4 | <4.0 B | <4.0 B | <4.0 B | <4.0 B | <4.0 B | <4.0 B | <4.0 B | <4.0 B | 10 |
| Vanadium | 6 | 9.6 B | <6.0 B | <6.0 B | 11.9 A | <6.0 B | 7.6 A | 7.0 A | 51.4 B | 50 |
| Zinc | 8 | 57.0 A | 35.2 A | 28.3 A | 22.1 A | 12.4 A | 16.4 A | 22.3 A | 215 A | 20 |

* - Indicates a replicate sample
CRDL - Contract Required Detection Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Table 4. Summary of PDI Phase I Monitoring Well Ground-Water Quality Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Sample Designation: | | G127B | G129 | G134* | G130A | G135* | G130B | G131 | G132 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 6/5/90 | 6/4/90 | 6/4/90 | 6/5/90 | 6/5/90 | 6/5/90 | 6/6/90 | 6/6/90 | |
| Total Inorganic Compounds (Concentrations in ug/L) | IDL | | | | | | | | | CRDL |
| Aluminum | 27 | 2270 A | 9730 A | 8390 A | 1900 A | 1590 A | 515 A | 479 A | 6670 A | 200 |
| Antimony | 37 | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | 40.6 A | 40.3 A | 60 |
| Arsenic | 2 | 3.0 A | 30.0 B | 23.2 B | 63.9 B | 58.6 B | 35.9 B | 449 B | 31.8 B | 10 |
| Barium | 2 | 33.2 A | 124 A | 116 A | 52.5 A | 48.4 A | 20.1 A | 230 A | 234 A | 200 |
| Beryllium | 1 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 5 |
| Cadmium | 5 | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | 5 |
| Calcium | 20 | 28300 A | 77200 A | 76900 A | 60800 A | 60400 A | 45400 A | 317000 A | 239000 A | 5000 |
| Chromium | 3 | 7.1 A | 18.4 B | 16.0 B | 3.7 A | <3.0 A | <3.0 B | 33.0 B | 28.0 B | 10 |
| Cobalt | 7 | <7.0 B | 9.7 A | 7.8 A | <7.0 B | <7.0 B | <7.0 B | <7.0 B | <7.0 B | 50 |
| Copper | 6 | 12.2 A | 43.7 A | 38.8 A | 8.5 A | 6.7 A | 7.2 A | 10.9 A | 27.1 A | 25 |
| Iron | 3 | 9100 A | 13500 A | 12000 A | 20000 A | 19700 A | 1650 A | 5370 A | 14500 A | 100 |
| Lead | 2 | 7.0 A | 14.2 A | 12.1 A | 3.6 A | 3.5 A | <2.0 B | 10.4 A | 9.00 A | 5 |
| Magnesium | 37 | 4790 A | 12800 B | 12600 B | 5580 B | 5460 B | 7980 B | 146000 B | 46100 B | 5000 |
| Manganese | 1 | 302 A | 741 A | 709 A | 2330 A | 2320 A | 1470 A | 4620 A | 7920 A | 15 |
| Mercury | 0.2 | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | 0.2 |
| Nickel | 12 | <12.0 B | 19.5 A | 19.5 A | <12.0 B | <12.0 B | <12.0 B | 14.6 B | <12.0 B | 40 |
| Potassium | 900 | 4100 B | 6800 A | 6620 B | 8160 B | 7980 B | 5650 B | 38800 B | 11800 B | 5000 |
| Selenium | 2 | <2.0 A | 2.2 A | <2.0 B | <2.0 B | <2.0 B | <2.0 B | 2.1 A | <2.0 B | 5 |
| Silver | 3 | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 A | <3.0 A | 10 |
| Sodium | 38 | 27400 A | 244000 A | 245000 A | 25000 A | 24300 A | 32300 B | 93400 A | 17600 A | 5000 |
| Thallium | 4 | <4.0 B | <4.0 B | <4.0 B | <4.0 B | <4.0 B | <4.0 B | <4.0 B | <4.0 B | 10 |
| Vanadium | 6 | <6.0 B | 18.8 A | 17.3 A | <6.0 B | <6.0 B | <6.0 B | 30.4 A | 17.9 A | 50 |
| Zinc | 8 | 36.3 A | 49.1 A | 47.4 A | 95.1 A | 102 A | 17.4 A | 31.6 A | 54.7 A | 20 |

* - Indicates a replicate sample
CRDL - Contract Required Detection Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Table 4. Summary of PDI Phase I Monitoring Well Ground-Water Quality Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Sample Designation: | | G133A | G133B | G1PUB | |
|---|---|---|---|---|---|
| Sample Date: | | 6/4/90 | 6/4/90 | 6/6/90 | |
| Total Inorganic Compounds (Concentrations in ug/L) | IDL | | | | CRDL |
| Aluminum | 27 | 1190 A | 3720 A | 55.1 A | 200 |
| Antimony | 37 | <37.0 B | <37.0 B | <37.0 B | 60 |
| Arsenic | 2 | 4.2 A | 10.0 B | <2.0 B | 10 |
| Barium | 2 | 18.1 A | 37.2 A | 12.2 A | 200 |
| Beryllium | 1 | <1.0 B | <1.0 B | <1.0 B | 5 |
| Cadmium | 5 | <5.0 B | <5.0 B | <5.0 B | 5 |
| Calcium | 20 | 7810 A | 24300 A | 12400 A | 5000 |
| Chromium | 3 | 3.6 A | 9.9 A | <3.0 B | 10 |
| Cobalt | 7 | <7.0 B | 7.4 A | <7.0 B | 50 |
| Copper | 6 | 10.0 A | 27.3 A | 65.6 A | 25 |
| Iron | 3 | 1270 A | 7240 A | 188 A | 100 |
| Lead | 2 | 3.1 A | 6.1 A | 3.4 A | 5 |
| Magnesium | 37 | 1160 A | 7180 B | 1820 A | 5000 |
| Manganese | 1 | 666 A | 1080 A | 23.3 A | 15 |
| Mercury | 0.2 | <0.2 B | <0.2 B | <0.2 B | 0.2 |
| Nickel | 12 | <12.0 B | 13.9 A | <12.0 B | 40 |
| Potassium | 900 | 923 A | 5390 B | 2030 A | 5000 |
| Selenium | 2 | <2.0 B | <2.0 B | <2.0 B | 5 |
| Silver | 3 | <3.0 B | <3.0 B | <3.0 B | 10 |
| Sodium | 38 | 9770 A | 37400 A | 23200 A | 5000 |
| Thallium | 4 | <4.0 B | <4.0 B | <4.0 B | 10 |
| Vanadium | 6 | <6.0 B | 8.4 A | <6.0 B | 50 |
| Zinc | 8 | 29.3 A | 46.6 A | 12.2 A | 20 |

* - Indicates a replicate sample
CRDL - Contract Required Detection Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Table 4. Summary of PDI Phase I Monitoring Well Ground-Water Quality Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Sample Designation: | | G123 | G124A | G124B | G125A | G125B | G126A | G126B | G127A | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 6/5/90 | 6/4/90 | 6/4/90 | 6/5/90 | 6/5/90 | 6/5/90 | 6/5/90 | 6/5/90 | |
| Dissolved Inorganic Compounds (Concentrations in ug/L) | CRDL | | | | | | | | | IDL |
| Aluminum | 200 | 242 A | 263 A | 277 A | 50.9 A | 280 A | 138 A | 49.2 A | 199 A | 27 |
| Antimony | 60 | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | 37 |
| Arsenic | 10 | <2.0 B | <2.0 B | 2.9 A | <2.0 B | <2.0 B | 17.1 B | <2.0 B | 2.2 A | 2 |
| Barium | 200 | 79.7 A | 34.3 A | 48.2 A | 85.8 A | 106 A | 114 A | 105 A | 86.5 A | 2 |
| Beryllium | 5 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 1 |
| Cadmium | 5 | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | 5 |
| Calcium | 5000 | 19300 A | 46900 A | 22400 A | 4040 A | 33300 A | 29200 A | 41000 A | 203000 A | 20 |
| Chromium | 10 | 9.8 A | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | 11.7 B | 3 |
| Cobalt | 50 | <7.0 B | <7.0 B | <7.0 B | <7.0 B | <7.0 B | <7.0 B | <7.0 B | <7.0 B | 7 |
| Copper | 25 | 7.5 A | 7.6 A | 10.3 A | <6.0 B | 9.9 A | 12.1 A | <6.0 B | 9.3 A | 6 |
| Iron | 100 | 18.6 A | 14.8 A | 1220 A | 88.8 A | 64.4 A | 5270 A | 190 A | 21.9 A | 3 |
| Lead | 5 | <2.0 B | <2.0 B | <2.0 B | <2.0 B | <2.0 B | <2.0 B | <2.0 B | <2.0 B | 2 |
| Magnesium | 5000 | 13100 B | 9410 A | 4800 A | 467 A | 4920 A | 7200 A | 11100 A | 13800 B | 37 |
| Manganese | 15 | 297 A | 60.4 A | 1200 A | 51.2 A | 796 A | 1070 A | 370 B | 304 A | 1 |
| Mercury | 0.2 | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | 0.2 |
| Nickel | 40 | <12.0 B | <12.0 B | <12.0 B | <12.0 B | <12.0 B | <12.0 B | <12.0 B | <12.0 B | 12 |
| Potassium | 5000 | 15300 B | 1930 A | 5180 B | <900 B | 15100 B | 3450 A | 3260 A | 16200 B | 900 |
| Selenium | 5 | <2.0 B | <2.0 B | <2.0 B | <2.0 B | <2.0 B | <2.0 B | <2.0 B | 14.1 A | 2 |
| Silver | 10 | <3.0 B | <3.0 B | 3.1 A | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | 3 |
| Sodium | 5000 | 102000 A | 21300 A | 61900 A | 13500 A | 40300 B | 12300 A | 39500 A | 109000 A | 38 |
| Thallium | 10 | <4.0 B | <4.0 B | <4.0 B | <4.0 B | <4.0 B | <4.0 B | <4.0 B | <4.0 B | 4 |
| Vanadium | 50 | <6.0 B | <6.0 B | <6.0 B | <6.0 B | <6.0 B | <6.0 B | <6.0 B | <6.0 B | 6 |
| Zinc | 20 | 64.8 A | 50.9 A | 40.9 A | 25.9 A | 40.1 A | 50.5 A | 64.8 A | 61.6 A | 8 |

* - Indicates a replicate sample
CRDL - Contract Required Detection Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Table 4. Summary of PDI Phase I Monitoring Well Ground-Water Quality Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Sample Designation: | | G127B | G129 | G134* | G130A | G135* | G130B | G131 | G132 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 6/5/90 | 6/4/90 | 6/4/90 | 6/5/90 | 6/5/90 | 6/5/90 | 6/6/90 | 6/6/90 | |
| Dissolved Inorganic Compounds (Concentrations in ug/L) | CRDL | | | | | | | | | IDL |
| Aluminum | 200 | 178 A | 149 A | 156 A | 164 A | 239 A | 340 A | 147 A | 42.5 A | 27 |
| Antimony | 60 | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | 58.4 A | 45.1 A | 37 |
| Arsenic | 10 | <2.0 B | <2.0 B | <2.0 B | 47.0 B | 41.4 A | 16.4 B | 518 B | 23.0 B | 2 |
| Barium | 200 | 52.7 A | 132 A | 118 A | 69.0 A | 80.7 A | 92.9 A | 231 A | 206 A | 2 |
| Beryllium | 5 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 1 |
| Cadmium | 5 | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | 5 |
| Calcium | 5000 | 28100 A | 76100 A | 76400 A | 64500 A | 60900 A | 48600 A | 305000 A | 249000 A | 20 |
| Chromium | 10 | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | 28.0 B | 10.0 B | 3 |
| Cobalt | 50 | <7.0 B | <7.0 B | <7.0 B | <7.0 B | <7.0 B | <7.0 B | <7.0 B | <7.0 B | 7 |
| Copper | 25 | <6.0 B | 9.9 A | <6.0 B | <6.0 B | <6.0 B | 8.8 A | <6.0 B | <6.0 B | 6 |
| Iron | 100 | 3550 A | 21.5 A | 84.6 A | 15600 A | 14700 A | 679 A | 397 A | 5000 A | 3 |
| Lead | 5 | <2.0 B | <2.0 B | <2.0 B | <2.0 B | <2.0 B | <2.0 B | <2.0 B | <2.0 B | 2 |
| Magnesium | 5000 | 4230 A | 10100 A | 10000 A | 5710 B | 5310 B | 8330 B | 141000 A | 46800 B | 37 |
| Manganese | 15 | 269 A | 547 A | 554 A | 2400 A | 2330 A | 1470 A | 4980 A | 8130 A | 1 |
| Mercury | 0.2 | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | 0.2 |
| Nickel | 40 | <12.0 B | <12.0 B | <12.0 B | <12.0 B | <12.0 B | <12.0 B | <12.0 B | <12.0 B | 12 |
| Potassium | 5000 | 3900 A | 5800 B | 5540 B | 8060 A | 7510 B | 5740 B | 37500 A | 10500 A | 900 |
| Selenium | 5 | <2.0 A | <2.0 B | <2.0 B | <2.0 B | <2.0 B | <2.0 B | 3.1 A | <2.0 B | 2 |
| Silver | 10 | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 A | 3 |
| Sodium | 5000 | 30900 A | 252000 A | 250000 A | 30500 B | 28600 A | 39200 A | 94000 A | 21300 A | 38 |
| Thallium | 10 | <4.0 B | <4.0 B | <4.0 B | <4.0 B | <4.0 B | <4.0 B | <4.0 B | <4.0 B | 4 |
| Vanadium | 50 | <6.0 B | <6.0 B | <6.0 B | <6.0 B | <6.0 B | <6.0 B | 25.6 A | <6.0 B | 6 |
| Zinc | 20 | 31.4 A | 72.9 A | 37.6 A | 100 A | 128 A | 58.2 A | 27.2 A | 26.4 A | 8 |

* - Indicates a replicate sample
CRDL - Contract Required Detection Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Table 4. Summary of PDI Phase I Monitoring Well Ground-Water Quality Data, Pre-Design Investigation, Industri-Plex Site, Woburn, Massachusetts.

| Sample Designation: | | G133A | G133B | G1PUB | |
|---|---|---|---|---|---|
| Sample Date: | | 6/4/90 | 6/4/90 | 6/4/90 | |
| Dissolved Inorganic Compounds (Concentrations in ug/L) | CRDL | | | | IDL |
| Aluminum | 200 | 298 A | 437 A | 158 A | 27 |
| Antimony | 60 | <37.0 B | <37.0 B | <37.0 B | 37 |
| Arsenic | 10 | <2.0 B | 3.1 A | <2.0 B | 2 |
| Barium | 200 | 54.0 A | 51.8 A | 236 A | 2 |
| Beryllium | 5 | <1.0 B | <1.0 B | <1.0 B | 1 |
| Cadmium | 5 | <5.0 B | <5.0 B | <5.0 B | 5 |
| Calcium | 5000 | 8830 A | 26500 A | 13700 A | 20 |
| Chromium | 10 | <3.0 B | <3.0 B | <3.0 B | 3 |
| Cobalt | 50 | <7.0 B | <7.0 B | <7.0 B | 7 |
| Copper | 25 | 10.1 A | 8.4 A | 18.4 A | 6 |
| Iron | 100 | 48.4 A | 1210 A | 114 A | 3 |
| Lead | 5 | <2.0 B | <2.0 B | 2.2 A | 2 |
| Magnesium | 5000 | 1160 A | 6510 B | 2070 A | 37 |
| Manganese | 15 | 636 A | 1150 A | 10.5 A | 1 |
| Mercury | 0.2 | <0.2 B | <0.2 B | <0.2 B | 0.2 |
| Nickel | 40 | <12.0 B | <12.0 B | <12.0 B | 12 |
| Potassium | 5000 | 935 A | 4020 A | 900 B | 900 |
| Selenium | 5 | <2.0 B | <2.0 B | <2.0 B | 2 |
| Silver | 10 | <3.0 B | <3.0 B | <3.0 B | 3 |
| Sodium | 5000 | 13400 A | 45300 A | 37300 A | 38 |
| Thallium | 10 | <4.0 B | <4.0 B | <4.0 B | 4 |
| Vanadium | 50 | <6.0 B | <6.0 B | <6.0 B | 6 |
| Zinc | 20 | 54.7 A | 68.2 A | 46.5 A | 8 |

* - Indicates a replicate sample
CRDL - Contract Required Detection Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

# APPENDICES

## APPENDIX A

Locations of Proposed PDI Soil Borings

US EPA New England
Superfund Document Management System
Image Target Sheet

SDMS Document ID #: 230850

Site Name: INDUSTRI-PLEX

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FIGURE 24: ISOPACH OF THE UNCONSOLIDATED DEPOSITS AND PROPOSED SOIL BORING LOCATIONS

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## APPENDIX B

Geologic Log Forms

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 4/24/90
Project Industri-Plex Site PDI
Client Golder Associates
Page 1 of 1
Logged By L. McTiernan
Well No. ATB-1
Loc. Woburn, Mass
M.P. Elevation 64.53
Drilling Started 2/28/90 Ended 2/28/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.) 10"
Final Depth (ft.) 8.0'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type Split spoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| Hnu | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 2.7 | | 1.65 | 0-2' | | | 0 | Top 1.0': Brown medium to coarse SAND, trace organic material. Bottom: Black fine SAND; trace organic material, stiff |
| 1.8 | | 0.35 | 5-7' | | | 5 | Brown fine-medium SAND, some fine gravel; bottom is black organic material, Strong $H_2S$ odor. B.O.B @ 8.0' |
| | | | | | | 10 | |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 3/1/90
Project Industri-Plex PDI
Client Golder Associates
Page 1 of 2
Logged By L.McTiernan
Well No. ATB-2
Loc. Woburn, Mass
M.P. Elevation 64.50
Drilling Started 2/27/90 Ended 3/21/90
Driller D.L. Maher Company
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 54'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| — | 1 | 1.25' | 0-2' | | SP | | 0-0.5' Woody mulch<br>0.5-1.25 Light to dark brown fine to coarse (+) SAND, little fine to coarse (+) Gravel. |
| 4.6 | 2 | 1.0' | 5-7' | | SW | 5 | Dark brown fine (+) to medium SAND, little coarse Gravel, trace woody debris, wet. |
| 9.1 | 3 | 1.05' | 10-12' | | GW<br>SW | 10 | 0-0.95 Gray fine to coarse GRAVEL and coarse sand.<br>0.45-1.05 Gray fine to medium SAND. |
| 5.2 | 4 | 1.9' | 15-17' | | SP | 15 | Gray fine to medium SAND, trace fine to medium Gravel. |
| 10.0 | 5 | 1.25' | 20-22' | | SP | 20 | Gray fine (+) to coarse SAND, little fine Gravel. |
| 9.4 | 6 | 0.5' | 25-27' | | SP | 25 | Brown medium to coarse SAND, little fine Gravel. |
| — | 7 | 0.9' | 30-32' | | SP | 30 | Fine to coarse (+) SAND, and fine Gravel. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

PID erratic due to high humidity.

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 1610IY Date 3/21/90
Project Industri-Plex PDI
Client Golder Associates
Page 2 of 2
Logged By L. McTiernan
Well No. ATB-2
Loc. Woburn, Mass
M.P. Elevation 64.60
Drilling Started 2/27/90 Ended 3/21/90
Driller D.L. Maher Company
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 54'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| — | 8 | 1.4' | 35-36.5' | | SW | 35 | Brown fine to medium SAND, trace fine Gravel. |
| — | 9 | 1.4' | 40-41' | | SW | 40 | Brown medium SAND<br>Auger refusal @ 41.5'<br>Soft weathered bedrock 41.5 to 54.0. |
| | 10 | 0.2' | 47.5.0' | | | 45 | Soft weathered mafic rock. |
| | 11 | 0.65' | 51-54' | 22%recovery | | 50 | Gray-green fine grain gabbro, little magnetite, fractured, weathered. |
| | | | | | | 55 | |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 3/1/90
Project Industri-Plex P.D.I.
Client Golder Associates
Page 1 Of 2
Logged By L. McTiernan
Well No. ATB-3
Loc. Woburn, MA
M.P. Elevation 61.7
Drilling Started 2/28/90 Ended 3/11/90
Driller D.L. Maher
Type Of Rig Hollow-stem auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 50'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split-Spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 6.5 | 1 | 1.5 | 0-2' | | SM | | Dark brown fine sand and silt, little organic debris, stiff. Brown medium sand, little fine gravel at 0.35-0.95'. |
| 4.1 | 2 | 0.6' | 5-7' | | OL<br>SW | 5 | Dark brown silt and clay, some organic material, stiff. Coarse sand 0-0.1'. |
| 18.2 | 3 | 0.95' | 10-12' | | ML<br>SP | 10 | Dark brown silt and fine sand, little coarse gravel. Fine-coarse sand at 0.85-0.95'. |
| 9.8 | 4 | 1.15' | 15-17' | | SW | 15 | Gray medium to coarse sand, some fine gravel. Wet. |
| 8.9 | 5 | 1.0 | 20-22' | | SW | 20 | 0-0.7' Gray coarse sand and fine gravel.<br>0.7-1.0' Light brown fine sand. |
| 7.4 | 6 | 1.7' | 25-27' | | SW<br>OL | 25 | 0-1.05' Gray-brown coarse sand, some fine gravel.<br>1.05-1.7' Light brown silt & clay, trace organic material very stiff. |
| --- | 7 | NR | 30-32' | | | 30 | No recovery. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 3/1/90
Project Industri-Plex P.D.I.
Client Golder Associaties
Page 2 Of 2
Logged By L. McTiernan
Well No. ATB-3
Loc. Woburn, MA
M.P. Elevation 61.7
Drilling Started 2/28/90 Ended 3/11/90
Driller D.L. Maher
Type Of Rig Hollow-Stem Auger

## WELL DATA

Hole Diam. (in.) 10
Final Depth (ft.) 50'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type Split Spoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 1.3 | 8 | 0.55' | 35-37' | | GW | 35 | Gray fine gravel and coarse sand. |
| 6.3 | 9 | 0.7' | 40-40.3 | 100/4" | SW | 40 | Gray fine sand, some fine gravel. |
| 25.3 | 10 | 0.6 | 45-45.3 | 200/4" | SP | 45 | Gray fine to coarse sand, some fine gravel (Gabbro). Auger refusal at 46.0'. |
| --- | 11 | 0.2 | 46-46.2 | | | | |
| | 12 | 2.3' | 46.4-49.4' | 77% recovery | | 50 | Dark grey fine grain gabbro trace pyrite, calcite veins. Oblique fractures, two sand seams. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 3/5/90
Project Industri-Plex PDI
Client Golder Associates, Inc.
Page 1 of 2
Logged By L. McTiernan
Well No. ATB-4
Loc. Woburn, MA
M.P. Elevation 57.20
Drilling Started 3/5/90 Ended 3/26/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 49.5'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | 1 | 1.2' | 0-2' | 4,12,11,12 | SW$^{d}_{u}$ SM | | 0-0.75'-Brown medium SAND, little fine gravel. |
| | | | | | | | 0.75-0.95'-Artificial fill material light brown fine SAND and silt. |
| 8.3 | 2 | 1.25' | 5-7' | 5,20,20,23 | SM$^{d}_{u}$ | 5 | Light brown fine SAND and silt. Stiff. Wet below 0.3'. |
| 0.0 | 3 | 1.1' | 10-12' | 4,6,8,10 | SW | 10 | Brown fine to medium SAND. |
| 12.1 | 4 | 1.4' | 15-17' | 6,8,13,15 | SW | 15 | Brown fine to medium SAND. Graded (fining upwards) Iron staining from 0.9-1.1'. |
| 0.0 | 5 | 1.35' | 20-22' | 6,8,11,11 | SW | 20 | Brown fine (+) to medium SAND. Medium sand in lense from 0.9-1.1'. |
| 0.0 | 6 | 1.5' | 25-27' | 8,13,16,20 | SW | 25 | Brown fine (+) to medium SAND. |
| 0.0 | 7 | 1.65' | 30-32' | 9,16,22,29 | SM$^{d}_{u}$ | 30 | Gray fine SAND and silt. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 3/5/90
Project Industri - Plex PDI
Client Golder Associates
Page 2 of 2
Logged By L. McTiernan
Well No. ATB-4
Loc. Woburn, MA
M.P. Elevation 57.20
Drilling Started 3/5/90 Ended 3/26/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 49.5
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 2.3 | 3 | 1.4' | 35-37' | 7,12,15,17 | SW | 35 | Gray fine SAND. Stiff |
| 0.0 | 9 | 1.6' | 40-42' | 4,6,7,14 | SW | 40 | Gray fine SAND. Stiff. |
| | 10 | 2.5' | 45-49.5' | 62% recovery | | 45 | Auger refusal @ 45.0' (bedrock) Dark grey-green fine grain gabbro calcite veins, no fractures |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 3/8/90
Project Industri-Plex PDI
Client Golder Assoiciates
Page 1 of 1
Logged By L. McTiernan
Well No. ATB-5
Loc. Woburn, MA
M.P. elevation 74.10
Drilling Started 3/7/90 Ended 3/19/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.) 8"
Final Depth (ft.) 10'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type split spoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | 1 | 0.6 | 0-2' | 8;16;23;28 | SP | | 0-0.45' - Dark brown, medium to coarse SAND, some fine gravel little organic material<br>0.45-0.6' - Artificial fill material |
| 0.0 | 2 | 1.4 | 5-7' | 11,20,34, 50/5" | GP<br>SW | 5 | 0-0.1' - Gray fine to coarse gravel, some coarse sand. Wet.<br>1.0-1.4' - Gray medium to coarse SAND. Auger refusal @ 7.0' (bedrock) |
| | 3 | 2.9 | 7-10' | 97%recovery | | 10 | Grey coarse grain diorite pyrite as accessory mineral, calcite veins. Rock has undergone low grade metamorphism. Oblique and horizontal fractures contain sand seams, weathered. |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS

**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 3/8/90
Project Industri-Plex P.D.I
Client Golder Associates
Page 1 Of 2
Logged By L. McTiernan
Well No. ATB-6
Loc. Woburn, MA
M.P. Elevation 65.70
Drilling Started 3/7/90 Ended 3/9/90
Driller D.L. Maher
Type Of Rig Hollow-Stem Auger

## WELL DATA

Hole Diam. (in.) 8"
Final Depth (ft.) 50'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type Split-spoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | 1 | 0.85' | 0-2 ' | 5,9,11,14 | SP | | Brown fine to medium SAND, trace fine Gravel, trace organic material |
| ___ | 2 | 0.5' | 5-7' | 6,5,5,5 | SW | 5 | Brown fine to medium SAND. |
| 0.0 | 3 | 1.1' | 10-12' | 5,8,6,4 | SP | 10 | Light brown, fine to medium SAND, oxidized brown-orange. Lense of coarse sand and fine gravel from 0.1-0.3'. Wet. |
| 0.0 | 4 | 2.0' | 15-17' | 8,8,8,10 | SW | 15 | Light brown, medium to coarse SAND. |
| 0.0 | 5 | 2.0' | 20-22' | 12,12,12,23 | SW | 20 | Brown fine to medium(+) SAND, trace organic material at 0.6' (fine from 0.6-1.2'). |
| 0.0 | 6 | 1.7' | 25-27' | 6,14,11,22 | SW | 25 | Light brown, fine to medium SAND (fining downwards), |
| 0.0 | 7 | 1.5' | 30-32' | 4,8,38,31 | $SW_d$ $SM_u$ | 30 | 0-0.8'-Brown medium SAND<br>0.8-1.5'-Brown fine SAND and silt, trace coarse gravel. Stiff. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 3/9/90
Project Industri-Plex P.D.I.
Client Golder Associates
Page 2 Of 2
Logged By L. McTiernan
Well No. ATB-6
Loc. Woburn, MA
M.P. Elevation 5.7
Drilling Started 3/7/90 Ended 3/9/90
Driller D.L. Maher
Type Of Rig Hollow-Stem Auger

**WELL DATA**
Hole Diam. (in.)
Final Depth (ft.) 50'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| Hnu | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | 8 | | 35-40' | | | 35 | No sample. |
| 0.0 | 9 | 0.5' | 40-40.25' | 100/3" | | 40 | Auger refusal at 40.25' (bedrock). |
| | 10 | 2.0' | 46.6-50.1' | 57% recovery | | 45 | Fractured, weathered gabbro with numerous veins of quartz and low -quartz granite(syanite?) |
| | | | | | | 50 | (41-50' was mostly weathered bedrock and seams of sand) (Cored with 3" bedrock corer) B.O.B 50'. |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS

**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 3/14/90
Project Industri-Plex P.D.I.
Client Golder Associates
Page 1 Of
Logged By L. McTiernan
Well No. ATB-7
Loc. Woburn, MA
M.P. Elevation 68.00
Drilling Started 3/12/90 Ended 3/19/90
Driller D.L. Maher
Type Of Rig Hollow-Stem Auger

**WELL DATA**

Hole Diam. (in.) 8"
Final Depth (ft.) 14'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**

Type Split-Spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 2.5 | 1 | 1.2' | 0-2' | 10,10,18, 18 | SP | | Brown to black, fine to coarse sand and fine to coarse gravel. |
| 4.1 | 2 | 0.2' | 5-7' | 3,3,5,25 | SP | 5 | Brown medium to coarse Sand, some fine to coarse gravel. |
| — | 3 | 0.3' | 9-5-10.1' | 70,50/1 | — | 10 | Auger refusal @ 9.5' (bedrock) Brown-gray fine to medium grain gabbro, severely fractured. Oblique and horizontal fractures some (+) sand seams, weathered. |
| | 4 | 2.9' | | 89.6%recovery | | | |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 3/14/90
Project Industri-Plex P.D.I.
Client Golder Associates
Page 1 Of 2
Logged By L. McTiernan
Well No. ATB-8
Loc. Woburn, MA
M.P. Elevation 84.40
Drilling Started 3/12/90 Ended 3/23/90
Driller D.L. Maher
Type Of Rig Hollow-stem auger

## WELL DATA

Hole Diam. (in.) 8"
Final Depth (ft.) 53.5
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev.W.T. |
|---|---|---|
| | | |

## SAMPLER

Type Split-spoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.7 | 1 | 1.1' | 0-2' | 7,4,9,23 | SP | | Brown fine to medium (+) sand, trace fine to coarse gravel. |
| 4.7 | 2 | 0.75' | 5-7' | 9,19,21,22 | SP | 5 | 0-0.4 dark brown fine sand, some fine to coarse gravel. Wet 0.4-0.75 light brown laminated fine sand and silt. Stiff lense of fine gravel and coarse sand at 0.55-0.6. |
| 1.6 | 3 | NR | 10-10.5' | 65/6" | | 10 | No recovery. |
| 1.9 | 4 | 1.1' | 15-17' | 8,14,23,29 | SP | 15 | Gray fine to coarse sand, some fine to coarse gravel, trace silt and clay |
| 5.9 | 5 | 1.55' | 20-22' | 7,38,50,30 | SP | 20 | Gray fine to coarse sand, some fine to coarse gravel, trace silt and clay. |
| 2.5 | 6 | 0.45' | 25-27' | 20,41,50/1" | SP | 25 | Gray fine to coarse (+) sand, some fine to coarse gravel, trace silt and clay. |
| 4.4 | 7 | NR | 30-30.4' | 100/5" | | 30 | No recovery. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS

**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 3/14/90
Project Industri-Plex P.D.I.
Client Golder Associates
Page 2 Of 2
Logged By L. McTiernan
Well No. ATB-8
Loc. Woburn, MA
M.P. Elevation 84.40
Drilling Started 3/12/90 Ended 3/23/90
Driller D.L. Maher
Type Of Rig Hollow-Stem Auger

**WELL DATA**

Hole Diam. (in.) 8"
Final Depth (ft.) 53.5'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**

Type Split Spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | 8 | NR | 35-35,25' | 100/3" | | 35 | No recovery |
| 0.0 | 9 | NR | 40-40,25' | 100/3" | | 40 | No recovery |
| 0.0 | 10 | 0.9' | 45-46' | 49,130 | SP | 45 | Gray fine to coarse sand, some fine gravel, trace silt and clay. Barely wet. Auger refusal @ 46' (bedrock). |
| | 11 | 2.7' | 50-53.5' | 90% recovery | | 50 | Grey coarse grain diorite, low quartz, trace pyrite as accessory mineral. Oblique fractures filled with calcite sand; weathered. |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS

**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 3/5/90
Project Industri - Plex PDI
Client Golder Associates
Page 1 of 2
Logged By Hillary Hollister
Well No. ATB-9
Loc. Woburn, MA
M.P. Elevation 62.7
Drilling Started 3/19/90 Ended 3/22/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.) 8"
Final Depth (ft.) 43.5
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

## G W READINGS(1)

| Date | DTW | MP(2) | Elev. W.T. |
|---|---|---|---|

## SAMPLER

Type split spoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | 1 | 1.4 | 0-2' | 6,6,8,8 | $SM^{d}_{u}$ SP | | 0-0.3' Organic SAND<br>0.3-0.9' Brown medium SAND, some coarse gravel. |
| 11.2 | 2 | 0.3 | 5-7' | 5,9,5,9 | SW | 5 | Buff fine SAND, little coarse gravel |
| --- | 3 | NR | 10-12' | 13,16,15,29 | | 10 | No recovery |
| 7.3 | 4 | 0.9 | 15-17' | 2,2,5,7 | SP | 15 | Brown coarse SAND, some coarse to fine gravel. |
| 0.0 | 5 | 0.9 | 20-22' | 8,20,30,30 | SP<br>CL | 20 | 0-0.4' Brown coarse SAND, some coarse to fine gravel.<br>0.4-0.9' Brown/red clayey silt and coarse gravel, poorly sorted matrix |
| 0.0 | 6 | 0.4 | 25-27' | 62,17,10,6 | GP | 25 | Brown coarse to fine GRAVEL, some coarse sand. |
| 0.0 | 7 | 1.6 | 30-32' | 60,35,34,36 | GW<br>$SM^{d}_{u}$ | 30 | 0-0.5' Fine to coarse GRAVEL,<br>0.5-1.6' Grey brown fine SAND, some clay, little coarse to fine gravel, poorly sorted, tight, till |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 1610LY Date 3/5/90
Project Industri - Plex PDI
Client Golder Associates
Page 2 Of 2
Logged By Hillary Hollister
Well No. ATR-9
Loc. Woburn, MA
M.P. Elevation 62.7'
Drilling Started 3/19/90 Ended 3/22/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 43.5
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW | MP(2) | Elev. W.T. |
|---|---|---|---|

**SAMPLER**
Type split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | 8 | NR | 35-37' | | | 35 | Three feet of heaving sands; no recovery. |
| | | | | | | | Refusal at 39 feet. (Bedrock) |
| | 9 | 2.8 | 40.5-43.5' | | | 40 | Grey-green medium to coarse grain gabbro, pyrite as accessory mineral large amount of plagioclase at top of sample. Vertical and oblique fractures filled with calcite, some sand seams in oblique fractures; weathered. |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 3/5/90
Project Industri - Plex PDI
Client Golder Associates
Page 1 of 3
Logged By Hillary Hollister
Well No. ATB-10
Loc. Woburn, MA
M.P. Elevation 62.0'
Drilling Started 3/20/90 Ended 3/30/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 73.5
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 3.7 | 1 | 1.4' | 0-2' | 3,3,8,12 | OL d<br>SM u | | 0-0.5' Organic SILT with roots<br>0.5-0.9' Dark brown silt and fine sand, little coarse to fine (+) gravel. |
| | | | | | OL | | 0-4' Cuttings black organic SILT. |
| 0.0 | 2 | 1.3' | 5-7' | 3,3,4,4 | OL | 5 | Grey organic SILT and clay, laminated silt seams wet. |
| 0.0 | 3 | 2.0' | 10-12' | 1,2,1,2 | PT | 10 | Dark brown organic SILT and clay, wooded fragments, (immature peat) moist. |
| 36.1 | 4 | 2.0' | 15-17' | 1,2,1,2 | OH | 15 | Grey organic SILT, little coarse sand, trace fine gravel, sand seams throughout sample, wooded fragments? |
| 0.4 | 5 | 1.1' | 20-22' | 13,35,32,30 | GP | 20 | Brown coarse to fine GRAVEL and coarse (+) to medium sand. |
| 0.0 | 6 | 0.4' | 25-27' | 4,5,7,10 | GP | 25 | Brown coarse to fine GRAVEL, trace coarse sand. |
| 0.0 | 7 | 0.3' | 30-30.5' | 100/6" | GP | 30 | Dark grey coarse GRAVEL, trace coarse sand. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 3/5/90
Project Industri - Plex PDI
Client Golder Associates
Page 2 Of 3
Logged By Hillary Hollister
Well No. ATB-10
Loc. Woburn, MA
M.P. Elevation 62.0
Drilling Started 3/20/90 Ended
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8
Final Depth (ft.) 73.5
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev.W.T |
|---|---|---|

**SAMPLER**
Type split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | 8 | 0.2' | 33-33.5' | 100/5" | | 33 | Auger refusal at 33.5'. |
| 0.0 | 9 | 1.1' | 34-37' | | | 35 | Spun 3" casing through a gabbro boulder and grantic boulder. |
| 0.0 | 10 | 0.4' | 38.5-39.5' | 72, 120/4" | SP | 40 | Brown fine to medium SAND, some fine gravel, some silt. |
| 0.0 | 11 | 0.75' | 42.5-44.5' | 30,120,90,120 | SP | | Brown fine to coarse SAND, some fine gravel, some silt. |
| | | | | | | 45 | |
| 0.3 | 12 | 1.0' | 48-49' | 100 120/3" | GP | | Grey fine (+) to coarse GRAVEL and fine to coarse (+) sand. Gravel is angular. |
| | | | | | | 50 | |
| 3.0 | 13 | 0.7' | 54-55' | 30,100,100/2" | SP | 55 | Brown medium (+) to coarse SAND Some fine (+) to coarse gravel. |
| 3.9 | 14 | 0.8' | 59-60.25' | 56,125,168/3" | SP | 60 | Grey fine to coarse SAND, some fine to coarse gravel, tight. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS

**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 1610lY Date 3/5/90
Project Industri-Plex PDI
Client Golder Associates
Page 3 of 3
Logged By H. Hollister
Well No. ATB-10
Loc. Woburn, MA
M.P. Elevation 62.00
Drilling Started 3/20/90 Ended 3/30/90
Driller D.L. Maher Company
Type Of Rig Hollow Stem Auger

**WELL DATA**

Hole Diam. (in.) 8"
Final Depth (ft.) 73.5'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T |
|---|---|---|

**SAMPLER**

Type split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | | | | | 65 | |
| 0.0 | 15 | 0.25 | 67.5-68.25' | 38,155/3" | | | Roller bit drives hard. Grey fine t coarse SAND, little fine gravel little silt. |
| — | 16 | 2.2' | 70.5-73.5' | 73% recovery | | 70 | Refusal @ 69.5'. (Bedrock) Grey low quartz, hornblende diorite epidote as accessory mineral, oblique fractures and vertical fractures, weathered no sand seams. |
| | | | | | | 75 | |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 3/5/90
Project Industri - Plex PDI
Client Golder Associates
Page 1 of 2
Logged By Hillary Hollister
Well No. ATB-11
Loc. Woburn, MA
M.P. Elevation 62.6
Drilling Started 3/20/90 Ended 4/3/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 46.5'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | 1 | | 0-2' | | SP | | Coarse to medium SAND, trace coarse gravel. 2-5' Cuttings: light brown medium to coarse SAND, little coarse gravel. |
| 0.0 | 2 | 1.5' | 5-7' | 6,8,8,8 | SW | 5 | Buff fine to medium SAND. |
| 0.0 | 3 | 1.6' | 10-12' | 3,7,7,8 | $SM^{d}_{u}$ | 10 | Light tan fine sand and silt, laminated sand seams. |
| 0.0 | 4 | 1.2' | 15-17' | 2,4,6,8 | SP<br>SP | 15 | Top 0-0.6' Grey fine to medium SAND, some fine gravel, trace silt. Bottom 0.6-1.2' Brown coarse to medium SAND and coarse to fine (+) gravel (oxidized between top and bottom layer) |
| 0.0 | 5 | 0.5' | 20-22' | 4,4,4,4 | GP | 20 | Brown coarse to fine GRAVEL, some coarse to medium sand, poorly sorted. |
| 0.0 | 6 | 1.4' | 25-27' | 8,12,11,19 | $GM^{d}_{u}$<br>SP | 25 | Top 0-1.2' Brown coarse to fine (+) GRAVEL and coarse to fine sand, trace silt. Bottom 1.2-1.4' Brown medium to fine SAND, trace gravel, trace silt. |
| 0.0 | 7 | 0.9' | 30-32' | 9,14,19,21 | SP | 30 | Light brown coarse to fine (+) SAND, trace silt, trace fine gravel (oxidized layer 0.6-0.7'). |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 3/5/90
Project Industri - Plex PDI
Client Golder Associates
Page 2 Of 2
Logged By Hillary Hollister
Well No. ATB-11
Loc. Woburn, MA
M.P. Elevation 62.60
Drilling Started 3/20/90 Ended 4/3/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8
Final Depth (ft.) 46.5'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | 8 | 0.5' | 35-37' | 6/15/32/52 | GP | 35 | Brown and black coarse GRAVEL, some coarse sand, poorly sorted. |
| | 9 | 5.1' | 40-46.5' | 85% recovery | | 39 | Auger refusal at 39'. (Bedrock) Dark grey-green fine grain gabbro. Vertical and horizontal fractures; foliated; weathered. Vertical fractures filled with calcite (secondary mineralization). Horizontal fractures are sand seams. |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 3/5/90
Project Industri - Plex PDI
Client Golder Associates
Page 1 of 1
Logged By Hillary Hollister
Well No. ATB-12
Loc. Woburn, MA
M.P. Elevation 120.68
Drilling Started 3/21/90 Ended
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8
Final Depth (ft.)
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**SAMPLER**
Type split spoon
Hammer 140 lb.
Fall 30 in.

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | 1 | 1.7' | 0-2' | 5,6,7,8 | SW<br>SW | | 0-0.6' Dark brown medium organic SAND, some roots.<br>0.6-1.7' Orange/brown medium SAND, well sorted |
| 0.0 | 2 | 1.2 | 5-6.5' | 27 40,50,4 | SP | 5 | Brown medium sand and coarse gravel; moist. |
| | | | | | | | uttings: grey till; hard. |
| | | | | | | 7 | Auger refusal at 7'<br>cutting: hard grey till. |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 4/6/90
Project Inddustri-Plex PDI
Client Golder Associates
Page 1 of 4
Logged By L. McTiernan
Well No. ATB-13
Loc. Woburn, Mass
M.P. Elevation 54.0
Drilling Started 4/4/90 Ended 4/5/90
Driller D.L. Maher Company
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 98.5'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 4.6 | 1 | 1.6 | 0-2.0 | 2,7,9,11 | SW | 0 | 0-0.9 dark brown fine to medium SAND, trace fine gravel, trace silt trace organics. Bottom: Orange brown medium SAND with laminae of dark brown fine SAND, and silt. |
| 4.2 | 2 | 1.2 | 5-7.0' | 8,15,15,18 | GP | 5 | Light brown fine GRAVEL and coarse sand, trace coarse gravel, oxidized from 0.7-0.8'. |
| 5.1 | 3 | 0.6 | 10-12.0' | 10,12,12,25 | SP | 10 | Brown medium to coarse SAND and fine gravel; wet. cuttings: fine gravel. |
| 6.6 | 4 | 1.75' | 15-17.0' | 6,8,4,8 | MH | 15 | Grey SILT, little fine sand, iron staining 0-0.3'; Thin (less than 0-0.25) lenses of dark gray clay. Obliquely oriented. |
| 5.8 | 5 | 1.6 | 20-22.0' | 6,7,6,5 | MH | 20 | Gray SILT, little fine Sand, little black clay; laminated clay seams in top 0.5' of sample. |
| 5.5 | 6 | 1.5 | 25-27.0' | 4,6,5,5 | $SM_u^d$ | 25 | Gray Silt and fine sand; coarsening downward; stiff. |
| 3.8 | 7 | 1.5 | 30-32.0' | 6,10,16,28 | $SM_u^d$ | 30 | Gray fine SAND and silt, trace fine gravel, laminated in lcaceous sand; stiff. 2" Diameter rockcore collected |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101 Date 4/6/90
Project Industri-Plex Site
Client Golder Associates
Page 2 Of 4
Logged By H. Hollister
Well No. ATB-13
Loc. Woburn, MA.
M.P. Elevation 54.0
Drilling Started 4/4/90 Ended 4/5/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 98.5"
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|
| 6.8 | 8 | 1.65 | 35-37' | 8,11,8,16 | SP | 35 | Brown fine(+) to Medium SAND, some silt trace fine gravel; Laminated in lower half of sample. |
| 4.0 | 9 | 0.8 | 40-42' | 55,97/5" | GW | 40 | Fine GRAVEL, large Pebble in tip. |
| 6.3 | 10 | 0.5 | 45-47' | 100,89 | SP | 45 | Brown fine to medium SAND, some fine to coarse gravel. |
| 3.4 | 11 | 0.55 | 50-52' | 100,130,50/0 | SM GP | 50 | Top 0.2': Brown fine SAND and silt. Bottom: Brown fine to coarse GRAVEL and fine to coarse Sand. |
| 6.2 | 12 | 1.7 | 55-57' | 30,55,27,30 | SW GP | 55 | Top 1.15': Brown to grey fine(+) to medium SAND, trace fine gravel. Bottom: Grey to green fine to coarse GRAVEL, some medium to coarse sand. |
| 0.0 | 13 | 2.0 | 60-62' | 6,7,11,15 | SP | 60 | Grey fine to coarse SAND, trace fine gravel, trace silt; very Stiff; fining downward. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

2" diameter rock core collected

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101 Date 4/6/90
Project Industri-Plex Site
Client Golder Associates
Page 3 Of 4
Logged By H. Hollister
Well No. ATB-13
Loc. Woburn, MA
M.P. Elevation 54.0'
Drilling Started 4/4/90 Ended 4/5/90
Driller D.L. Maher Company
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 98.5'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| Hnu | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | 14 | 1.7 | 64-66' | 4,4,10,14 | SP | 64 | Grey fine to coarse SAND, trace fine gravel. |
| 2.2 | 15 | 1.6 | 70-72' | 4,6,8,8 | SW | 70 | Grey fine to medium SAND. |
| 1.1 | 16 | 2.0 | 75-77' | 6,12,12,23 | SW | 75 | Same as above |
| 2.5 | 17 | 1.8 | 80-82' | 5,10,15,22 | $SM_u^d$ | 80 | Grey fine SAND and Silt; Some medium sand; coarsening downward; well sorted. |
| 0.3 | 18 | 1.7 | 85-87' | 6,14,15,15 | GW<br>$SM_u^d$<br>GW | 85 | Grey fine GRAVEL, little fine to coarse sand, trace silt.<br>middle Grey fine SAND and Silt, trace clay, trace fine gravel.<br>back to grey fine GRAVEL. |
| | | | | | | 90 | little fine to coarse sand, trace silt |
| | | | 92.5' | | Bedrock | | Auger refusal @ 92.5' (Bedrock) |
| | | | 95-98.5' | 91'6 recovery | | 95 | |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

2" Diameter rockcore collected

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101 Date 4/6/90
Project Industri-Plex Site
Client Golder Associates
Page 4 Of 4
Logged By H. Hollister
Well No. ATB-13
Loc. Woburn, MA
M.P. Elevation 54.0
Drilling Started 4/4/90 Ended 4/5/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.) 8"
Final Depth (ft.) 98.5'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type Split spoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| Ft. | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | | 95-98.5' | 91'6 recovery | Bedrock | | Some fractures, oblique and vertical Fractures in rock. sand Seamsin fractures near top of rock. |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

2" Diameter rock core collected

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 4-11-90
Project INDUSTRI-PLEX PDI
Client Golder Associates
Page 1 Of 3
Logged By H.H.
Well No. ATB-14
Loc. Woburn, MA
M.P. Elevation 54.10
Drilling Started 4-9-90 Ended 4-10-90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.)
Final Depth (ft.) 47.3
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split Spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID (ppm) | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | 1 | 0.7' | 0-1' | 4,35 | SP | | 0-0.3' Brown Coarse SAND, little fine Gravel, some organic materials, Larvae. 0.3-0.5' Brown fine to medium SAND, little fine Gravel. 0.5-0.7' Orange Medium to Coarse SAND, little fine Gravel. Split Spoon refusal at 1'-hit a rock |
| | | | | | | | 0-5' Cuttings-Brown Medium SAND, coarse Gravel(cobbles), hard drilling. DTW at 3' |
| | 2 | 1.1' | 5-7' | 6,10,22,35 | SW | 5 | 0-0.6' Grey medium to coarse SAND. |
| | | | | | SP | | 0.6-0.7' Light brown coarse SAND and fine to coarse Gravel. |
| | | | | | SM | | 0.7-1.1' Light brown fine SAND, trace silt, stiff. |
| | | | | | | | 5-10' Cuytings- Coarse SAND and cobbles. |
| | 3 | NR | 10-12' | 30,51,30,31 | | 10 | No recovery |
| | 4 | 0.9' | 15-17' | 26,22,19,11 | SP SW | 15 | 0.5' Brown coarse SANDand fine Gravel. 0.5-0.9' Light brown fine |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 4-11-90
Project INDUSTRI-PLEX PDI
Client Golder Associates
Page 2 of 3
Logged By H.H.
Well No. ATB-14
Loc. Woburn, MA.
M.P. Elevation 54.10
Drilling Started 4-9-90 Ended 4-10-90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 47.3
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split Spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID (ppm) | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | | | | | | SAND, trace silt. |
| | 5 | 1.2' | 20-22' | 3,13,12,12 | SP | 20 | Brown fine SAND, trace fine Gravel. |
| | 6 | 0.9' | 25-27' | 10,11,12,14 | SP | 25 | Brown fine SAND, trace fine Gravel. |
| | 7 | 1.1' | 30-32' | 5,8,5,8 | $SM^{d}_{u}$ | 30 | Brown fine SAND, little (+) Silt, red thin laminations. |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16I01Y Date 4/11/90
Project Industri-Plex PDI
Client Golder Associates
Page 3 Of 3
Logged By Hillary Hollister
Well No. ATB-14
Loc. Woburn, MA
M.P. Elevation 54.10
Drilling Started 4/9/90 Ended 4/10/90
Driller D.L. Maher
Type Of Rig Hollow stem auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 47.3
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID (ppm) | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | 8 | 1.6' | 35-37' | 5,13,27,70 | SP<br>SM<sup>d</sup><sub>u</sub><br>SP | 35 | 0-0.4' Brown medium to coarse SAND and fine gravel.<br>0.4-1.1'Brown fine SAND, some silt, trace fine gravel.<br>1.1-1.6' Brown medium to coarse SAND, trace fine gravel.<br>Auger refusal at 37'. |
| | 9 | 1.1' | 39.5-43.3' | 29% recovery | | 39<br>39.5 | GABBRO, veins of feldspar with mica, oblique fracture filled with calcite and sand, sand seams, very weathered |
| | 10 | 4.0' | 43.3-47.3' | 100%recovery | | 43<br>43.3 | Top 0-1.5' Grey green GABBRO with feldspar musconite, veins, sand seams, weathered.<br>Bottom 1.5-4.0' Grey green GABBRO, plagioclose with calcite veins, two fractures over 3' filled with calcite, small veins are off-set possibly fault fractures at 44.5-45.0', sand seams at 44.0 and 47.3'. |

**REMARKS:** (1) In feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS

**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 4|12|90
Project Industri-Plex PDI
Client Golder Associates
Page 1 Of 4
Logged By H. Hollister
Well No. ATB-15
Loc. Woburn, MA
M.P. Elevation 54.24
Drilling Started 4|11|90 Ended 4|12|90
Driller D.L. Maher
Type Of Rig Hollow-stem Auger

## WELL DATA

Hole Diam. (in.) 8"
Final Depth (ft.) 116'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type Splitspoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| PID (ppm) | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 7.4 | 1 | 1.0' | 0-2' | 2,4,8,8 | SP | | Dark brown fine to medium SAND trace silt, trace fine Gravel trace organic material Cuttings 0-5': Light brown fine to medium SAND, trace silt. |
| 5.2 | 2 | 1.4' | 5-7' | 6,10,9,10 | SP | 5 | Light brown to gray fine to medium SAND, trace SILT, trace fine Gravel, trace organic material. Moist. Laminated. |
| 1.7 | 3 | 1.3' | 10-12' | 3,5,6,7 | SP | 10 | Light brown to gray fine coarse SAND, trace organic material. Wet. |
| 1.2 | 4 | 1.3' | 15-17' | 1,4,5,8 | SW | 15 | Light brown to gray fine to medium SAND, iron-stained and laminated. |
| 0.0 | 5 | 1.5' | 20-22' | 4,8,5,7 | SW | 20 | Orange-brown to gray fine (+) to medium SAND, iron-stained and laminated. |
| 0.0 | 6 | 2.0' | 25-27' | 6,8,9,14 | SW | 25 | Brown medium SAND, iron-stained at 0.5' and 1.4'. |
| 0.0 | 7 | 1.6' | 30-32' | 8,25,23,22 | SP | 30 | Brown to gray fine coarse SAND, little fine(+) to coarse Gravel |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 4/12/90
Project Industri-Plex PDI
Client Golder Associates
Page 2 Of 4
Logged By H. Hollister
Well No. ATB-15
Loc. Woburn, MA
M.P. Elevation 54.24
Drilling Started 4/11/90 Ended 4/12/90
Driller D.L. Maher
Type Of Rig Hollow-stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 116'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Splitspoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID (ppm) | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 2.0. | 8 | 1.6' | 35-37' | 9,12,15,19 | SP<br>GP<br>SP | 35 | Red to brown coarse SAND, and fine(+) to coarse Gravel; iron-stained; Gravel abundant from 0.6-0.9'. |
| 2.1 | 9 | 1.5' | 40-42' | 12,23,22,24 | SP | 40 | Orange to brown coarse SAND, and fine(+) to coarse Gravel; iron-stained. |
| 2.4 | 10 | 1.4' | 45-47' | 14,21,15,16 | SP | 45 | Orange to brown medium to coarse(+) SAND, and fine(+) to coarse Gravel; coarsening downward, iron-stained. |
| 2.0 | 11 | 0.5' | 50-52' | 24,18,22,34 | SW | 50 | Brown coarse SAND, trace fine Gravel |
| 3.0 | 12 | 0.9' | 55-57' | 10,12,18,14 | SP | 55 | Brown coarse SAND, little fine(+) to coarse Gravel. |
| 3.2 | 13 | 1.3' | 60-62' | 17,16,18,20 | SP | 60 | Brown coarse SAND, some fine(+) to coarse Gravel, coarsening downward; iron-stained. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 4/12/90
Project Industri-Plex PDI
Client Golder Associates
Page 3 of 4
Logged By H. Hollister
Well No. ATB-15
Loc. Woburn, MA
M.P. Elevation 54.24
Drilling Started 4/11/90 Ended 4/12/90
Driller D.L. Maher
Type Of Rig Hollow-stem Auger

## WELL DATA

Hole Diam. (in.) 8"
Final Depth (ft.) 116'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type Splitspoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| PID (ppm) | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 1.8 | 14 | 1.1' | 65-67' | 8,11,12,14 | SP | 65 | Brown medium to coarse SAND, little fine(+) to coarse Gravel, trace Silt; Silt in lamination at 0.1'; coarsening downward. |
| 1.9 | 15 | 1.1' | 70-72' | 10,35,32,42 | SP CL | 70 | Brown fine to coarse(+) SAND, trace clay, trace fine gravel; Silt and Clay in lamination at 0.75'-0.95'. |
| 1.5 | 16 | 1.0' | 75-77' | 20,28,23,26 | SP CL | 75 | Brown medium to coarse SAND, little silt, little clay, trace fine(-) to coarse(+) Gravel; silt and clay found in lowest 0.3'. |
| 2.0 | 17 | 0.8' | 80-82' | 40,60,14,28 | SP | 80 | Brown fine to coarse SAND, trace fine (+) to coarse Gravel; coarsening downward; Tight. |
| 1.2 | 18 | 2.0' | 85-87' | 45,56,29,20 | SP | 85 | Brown medium to coarse(+) SAND little fine to coarse(+) Gravel; iron-stained. |
| 1.5 | 19 | 1.0' | 90-92' | 36,34,45,57 | SP | 90 | Brown to gray fine to coarse SAND, trace Silt, trace fine Gravel; fining downward; Tight |
| - | 20 | 1.8' | 95-97' | 16,45,55,57 | $SM^{d}_{u}$ | 95 | Brown to gray fine(+) SAND and Silt, little Clay. Coarsening downward. |

REMARKS: (1) In feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16010Y Date 4/12/90
Project Industri-Plex PDI
Client Golder Associates
Page 4 Of 4
Logged By H. hollister
Well No. ATB-15
Loc. Woburn, MA
M.P. Elevation 54.24
Drilling Started 4/11/90 Ended 4/12/90
Driller D.L. Maher
Type Of Rig Hollow-stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 116'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Splitspoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID (ppm) | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| - | 21 | 1.6' | 100-102' | 38,37,60,71 | $SM_u^d$ | 100 | Light brown to gray fine to medium SAND, some Silt. |
| - | 22 | 1.7' | 105-107' | 12,21,32,40 | $SM_u^d$ | 105 | Light brown to gray fine SAND, and Silt, little Clay |
| - | 23 | 0.4' | 108-108.5' | 100/4" | | 108 | Grey fine GRAVEL, some coarse gravel angular rock fragments. Auger refusal at 108' (bedrock). |
| | | | | | | 110 | Soft weathered bedrock 108'-112'. Grey-green grabbro some oblique and horizontal fractures. Sand seams in fractures. |
| | | 3.0' | 112-116' | 75% recovery | | 115 | |
| | | | | | | 120 | |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 4/19/90
Project Industri-Plex Site PDI
Client Golder Associates
Page 1 of 3
Logged By B. Thomas
Well No. ATB-16
Loc. Woburn, Mass
M.P. Elevation 53.75
Drilling Started 4/16/90 Ended 4/17/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 74'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Splitspoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| Hnu | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.2 | | 1.3 | 0-2' | 2,5,12,15 | $SM^d_u$ SW | 0 | Top 0.6'. Dark brown fine -medium SAND, little coarse gravel, little silt; moist Bottom: Buff medium SAND,little fine gravel; moist |
| 0.2 | | 1.0 | 5-7' | 13,14,12,10 | SW | 5 | Brown medium to coarse SAND, well sorted; wet @ 4.6'. |
| 0.0 | | 1.3 | 10-12' | 17,65,44,53 | $SM^d_u$ SP | 10 | Top 1.0' Grey coarse SAND some fine to coarse gravel, some silt, trace clay. Bottom 0.3': Brown coarse SAND, some fine gravel;oxidized tight. |
| 0.0 | | 1.0 | 15-17' | 14,18,19,15 | $SM^d_u$ | 15 | Grey fine SAND, little silt; laminated orange fine sand seams. |
| 0.1 | | 1.1 | 20-22' | 17,10,10,14 | SW | 20 | Brown medium SAND, trace fine gravel; well sorted; oxidized sand seams near 20'. |
| 0.0 | | 1.3 | 25-27' | 5,5,8,8 | SW | 25 | Brown coarse to medium SAND well sorted; coarse sand in middle of sample. |
| 0.1 | | 1.5 | 30-32' | 3,6,7,13 | SW | 30 | Brown medium SAND, little coarse sand @ bottom; well sorted |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 1610lv Date 4/19/90
Project Industri-Plex Site PDI
Client Golder Associates
Page 2 of 3
Logged By B. Thomas
Well No. ATB-16
Loc. Woburn Mass
M.P. Elevation 53.75
Drilling Started 4/16/90 Ended
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 74'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type splitspoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| Hnu | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | | 1.6' | 35-37' | 7,14,15,26 | SW | 35 | Brown medium to coarse SAND, well sorted |
| 0.2 | | 1.7' | 40-42' | 4,7,7,8 | SW | 40 | Top 1.0': Brown coarse SAND . Bottom: Grey medium SAND, little grey clay; clay seame 41.3'. |
| 0.0 | | 1.3' | 45-47' | 5,8,10,15 | SW | 45 | Brown medium to coarse SAND. |
| 0.0 | | 1.3' | 50-52' | 7,7,6,8 | SW | 50 | Grey medium SAND. |
| 0.0 | | 1.5' | 55-57' | 8,10,11,11 | SM$_u^d$ | 55 | Grey fine to medium SAND, little silt. |
| 0.0 | | 1.4' | 60-62 | 5,6,17,50 | SM$_u^d$ | 60 | Grey fine to medium SAND, little coarse gravel, little silt. Gravel is red sandstone fragments. |
| | | 0.5' | 62-64' | 2,5,19,20 | SM$_u^d$ | | Grey fine to medium SAND, little silt, little red sand from crushed sandstone. |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 4/19/90
Project Industri-Plex Site PDI
Client Golder Associates
Page 3 of 3
Logged By B. Thomas
Well No. ATB-16
Loc. Woburn Mass
M.P. Elevation 53.75
Drilling Started 4/16/90 Ended 4/17/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.) 8"
Final Depth (ft.) 74'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type splitspoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| Hnu | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | | 0.3' | 65-67' | 17,26,62,90 | GP | 65 | Auger refusal @<br>Grey coarse GRAVEL and medium to coarse sand, little silt. (till). |
| | | | | | | | Bedrock @ 68.0' |
| | | 2.8' | 70-74' | 70% recovery | | 70 | Grey-green medium grain Gabbro. Calcite veins, little plagioclase. Vertical and oblique fractures. Sand seams in fractures; weathered. |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 5/8/90
Project Industri-Plex Site
Client Golder Associates
Page 1 Of 1
Logged By H. Hollister
Well No. ATB-17
Loc. Woburn, MA
M.P. Elevation 63.0
Drilling Started 5/3/90 Ended
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.)
Final Depth (ft.)
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type Split spoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| Hnu | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | | | | | | See log of OW-30B |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date
Project Industri-Plex Site
Client Golder Associates
Page 1 Of 1
Logged By L. McTiernan
Well No. ATB-18
Loc. Woburn, Mass.
M.P. Elevation 72.5
Drilling Started 4/24/90 Ended 4/24/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 26.5
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev.W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split Spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0 | | 1.0 | 0-2 | 3,4,4,5 | SW | 0 | Dark brown fine(+) to medium SAND, trace coarse sand, trace fine to coarse gravel. |
| 0 | | 1.4 | 5-7' | 2,2,2,2 | SW | 5 | Dark brown fine to medium SAND, trace coarse gravel, trace organic material; moist. |
| 0 | | 1.9 | 10-12' | 7,10,10,11 | SW<br>ML<br>SW | 10 | Top 0.3': Black fine SAND trace organic material;<br>Middle 1.2': Tan SILT; iron stained.<br>Bottom: Orange-tan fine SAND; well sorted. |
| 0 | | 0.9 | 15-16' | 10,60,50/1' | SP | 15 | Brown fine to coarse SAND some fine gravel, trace silt.<br>Duger refusal @ 17.0'(Bedrock) |
| | | 4.3 | 22-26.5' | 96%recovery | | 20<br>25 | Green-grey medium grain gabbro accessory minerals of pyrite and epidate. Oblique fractures in rock filled with sand or calcite. |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 1610LY Date 7/3/90
Project Industri-Plex Site
Client Golder Associates
Page 1 of 1
Logged By B. Thomas
Well No. ATB-19
Loc. Woburn, Mass
M.P. Elevation 93.53
Drilling Started 6/27/90 Ended 6/27/90
Driller D.L. Maher Company
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 21'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | | 0.7 | 1-3' | 12,18,15,11 | SP | 0 | Top 0.1': Grey coarse gravel (crushed Gabbro). Bottom 0.6: Brown fine medium SAND some coarse gravel, little silt, (fill |
| 0.0 | | 0.8 | 4.5-6.5' | 6,14,24,45 | SP | 5 | Dark brown to brown fine to coarse sand and coarse gravel. Sharp angular gravel; moist (fill). cuttings: light brown medium coarse sand and coarse gravel, little cobble (fill). |
| | | NR | 10-12' | 38,100/1" | | 10 | No recovery; pushed a cobble. |
| 0.0 | | 0.9 | 15-17' | 79,45,19,18 | GP | 15 | Grey coarse GRAVEL, little medium sand; gravel is fractured bedrock Auger refusal @17' (bedrock). Green-grey medium grain Gabbro. 2 fractures horizontal fracture @ 19.5' oblique fracture @20'; both |
| | | | | | | 20 | fractures filled with calcite. Note: Petroleum hydrocarbon sheen and odor detected on drill rods. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No 16101Y Date 7/3/90
Project Industri-Plex Site
Client Golder Associates
Page 1 Of 2
Logged By H. Ernst
Well No. ATB-20
Loc. Woburn, Mass
M.P. Elevation 80.12
Drilling Started 6/28/90 Ended 6/28/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 40.5
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | | 1.4 | 0-2' | 3,9,9,9 | SW | 0 | Top 0.3:Dark brown organic SILT. Bottom 1.1': Light brown coarse (+) to medium SAND, little gravel. |
| 0.0 | | 1.0' | 4-6' | 3,3,5,6 | SW | 5 | Top 0.6': Light brown coarse (+) to medium SAND, trace gravel. Bottom 0.4': Coarse SAND, trace gravel coarsening downward. |
| 0.0 | | 0.9 | 10-12' | 4,5,8,20 | SW | 10 | Brown medium to coarse (+) SAND some fine gravel; coarsening downward. |
| 0.0 | | 1.1 | 15-17' | 6,9,7,8 | SP | 15 | Brown coarse sand and fine gravel; uniform; moist. |
| 0.0 | | 0.4 | 20-22' | 13,34,27,12 | SW | 20 | Brown coarse SAND and fine gravel; uniform; pushed a cobble. |
| 0.0 | | 0.4 | 25-27' | 10,8,9,10 | SW | 25 | Light brown medium (+) to fine SAND; wet; pushed a cobble. |
| 0.0 | | 1.4 | 30-32' | 5,7,18,15 | SW | 30 | Brown, black, orange to grey fine SAND; sand is oxidized; wet. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 7/3/90
Project Industri-Plex Site
Client Golder Associates
Page 2 Of 2
Logged By H. Ernst
Well No. ATB-20
Loc. Woburn, Mass
M.P. Elevation 80.12
Drilling Started 6/28/90 Ended 6/28/90
Driller D.L. Maher Company
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 40.5
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | | 0.5 | 35-36' | 4,24 | SP | 35 | Grey fine (+) to medium SAND and coarse grave; little silt, and gravel appears to be fractured bedrock. Auger refusal 36'. |
| | | 1.1 | 37.5-40.5 | 37% recovery | | 40 | Green-grey medium grain Gabbro, weathered, severely fractured, oblique and vertical fractures some sand seams. |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 7/3/90
Project Industri-Plex Site
Client Golder Associates
Page 1 of 1
Logged By H. Ernst
Well No. ATB-21
Loc. Woburn, Mass
M.P. Elevation 94.22
Drilling Started 6/29/90 Ended 7/2/90
Driller D.L. Maher Company
Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.) 8"
Final Depth (ft.) 20.5
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type split spoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | | 0.85 | 0-2' | 12,20,31,25 | SP | 0 | Top 0.4': Organic SILT<br>Bottom 0.45'; Brown coarse gravel and medium to coarse (+) sand.<br>Cuttings: Brown medium to coarse sand and cobbles (fill). |
| 0.0 | | 1.0 | 4.5-6.5' | 7,7,4,6 | SP<br>SW | 5 | Light brown medium to coarse (+) SAND, little fine gravel; coarsening downward.<br>cuttings: Brown medium to coarse SAND, and cobbles. |
| 0.0 | | 0.9 | 9-11' | 8,5,6,7 | SP<br>SW | 10 | Top 0.5': same as above.<br>Bottom : Brown medium (+) to fine SAND, moist. |
| 0.0 | | 0.8 | 14-16' | 15,43,100/3" | SW | 15 | Top 0.3': Brown medium to coarse (+) SAND, some fine gravel; uniform.<br>Bottom 0.5': Green grey medium sand and fractured rock.<br>Auger refusal @16.0'.<br>Grey coarse grain low quartz diorite trace epidote, trace magnetive, weathered; severely fractured oblique fractures filled with sand. |
| | | 0.9 | 16.5-20.5 | 22% recovery | SP | 20 | |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101 Date 5/30/90
Project Industri-Plex Site PDI
Client Golder Associates
Page 1 of 2
Logged By H. Hollister
Well No. OW-23
Loc. Woburn, Mass
M.P. Elevation 68.54
Drilling Started 5/16/90 Ended
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.) 10"
Final Depth (ft.) 27'
Casing Diam. (in.) 4"
Casing Length (ft.) 20'
Screen Setting (ft.) 17-27'
Screen Slot & Type .010" PVC
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type Split spoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 3.5 | | 0.8 | 0-2' | 1,1,1,1 | SP | 0 | Dark brown medium(+) to coarse SAND, little fine gravel, organic material. |
| | | | | | | | Cuttings: Dark brown medium to coarse SAND, some fine gravel; moist. |
| 0.0 | | 0.8 | 5-7' | 1,2,1,1 | SP | 5 | Dark brown fine to coarse SAND, little fine gravel, trace silt organic material. |
| 0.0 | | 1.2 | 10-12' | 1,1,1,1 | PT | 10 | Dark brown fine to medium organic SAND, trace fine gravel some PEAT throughout Sample. |
| 0.0 | | 1.2 | 15-17' | 3,9,12,12 | PT<br>SW | 15 | Top 0.5': Dark brown PEAT.<br>Bottom: Grey fine(+) to medium SAND, little organic material, trace coarse gravel. |
| 0.0 | | 1.8 | 20-22' | 8,10,10,11 | SM[d]u<br>SW | 20 | Top 1.65': Light brown fine SAND, some silt, trace coarse sand, iron stained laminated.<br>Bottom 0.1': Light brown medium to coarse(+) SAND, Little fine gravel. |
| 0.0 | | 1.1 | 25-27' | 30,45,33,20 | SW<br>GW[d]u | 25 | Top 0.5': Brown medium to coarse SAND.<br>Bottom: Brown medium to coarse SAND and fine(+) to coarse gravel. |
| 0.0 | | 1.0 | 30-32' | 27,24,22,20 | SP | 30 | Brown Medium to coarse(+) SAND, some fine gravel, trace coarse gravel; iron stained. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101 Date 5/30/90
Project Industri-Plex PDI
Client Golder Associates
Page 2 of 2
Logged By H. Hollister
Well No. OW-23
Loc. Woburn, Mass
M.P. Elevation 68.54
Drilling Started 5/16/90 Ended 5/17/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 10"
Final Depth (ft.) 27'
Casing Diam. (in.) 4
Casing Length (ft.) 20'
Screen Setting (ft.) 17-27'
Screen Slot & Type .010" PVC
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 5.2 | | 0.5 | 35-36' | 32,20 | SP | 35 | Grey fine to coarse SAND and fine gravel, little coarse gravel. Auger refusal @ 37.6' |
| | | 2.2 | 38.5-41.5' | 73% recovery | Bedrock | 40 | Green-grey granodiorite some quartsome calcite veins, Oblique andvertical fractures |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101 Date 4/30/90
Project Industri_plex PDT
Client Golder Associates
Page 1 of 1
Logged By L. McTiernan
Well No. OW-24a
Loc. Woburn, M.A.
M.P. Elevation 57.47
Drilling Started 4/30/90 Ended 4/30/90
Driller D.L. Maher Company
Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.) 10"
Final Depth (ft.) 24.97
Casing Diam. (in.) 4"
Casing Length (ft.) 14.87
Screen Setting (ft.) 14.87-24.97
Screen Slot & Type 10 Slot PVC
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type
Hammer lb.
Fall in.

## DEVELOPMENT

| SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|
| | | | | | | See log of OW-24b |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 4/30/90
Project Industri-Plex PDI
Client Golder Associates
Page 1 Of
Logged By L. McTiernan
Well No. OW-24b
Loc. Woburn, M.A.
M.P. Elevation 57.26'
Drilling Started 4/25/90 Ended 4/27/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 10"
Final Depth (ft.) 59.65
Casing Diam. (in.) 4"
Casing Length (ft.) 49.50-59.65
Screen Setting (ft.) 10 Slot PVC
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 9.1 | 1 | 0.8' | 0-2' | 1,2,6,12 | SP | | Light dark brown, fine to coarse SAND, little fine to coarse Gravel, trace organic materials. (fill). |
| 7.8 | 2 | 1.4' | 5-7' | 10,20,18,18 | SP | 5 | Light brown fine(+) to coarse SAND, trace fine gravel. Moist at bottom. |
| 6.2 | 3 | 2.0' | 10-12' | 6,12,13,14 | SP | 10 | Gray fine to coarse SAND, some fine Gravel, coarsening downwards. Wet. |
| -- | 4 | 1.35 | 15-17' | 10,12,12,15 | SP<br>SW<br>SP | 15 | 0.-0.2' Brown fine to coarse SAND, trace fine Gravel.<br>0.2-1.2' Gray-brown fine SAND, laminated orange & black<br>1.2-1.35' Gray-brown to orange fine Gravel. |
| 12.2 | 5 | 1.3' | 20-22' | 4,6,7,9 | SW | 20 | Light brown fine to medium SAND; several orange laminae. |
| 3.1 | 6 | 1.5 | 25-27' | 5,10,12,21 | SW | 25 | Light brown fine(+) to medium SAND. |
| 3.6 | 7 | 1.7 | 30-32' | 8,11,12,15 | SW | 30 | Light brown fine to medium, trace silt; micacous sand. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 4/30/90
Project Industri plex PDI
Client Golder Associates
Page 2 of 3
Logged By L. McTiernan
Well No. OW-24b
Loc. Woburn, M.A.
M.P. Elevation 57.26
Drilling Started 4/25/90 Ended 4/27/90
Driller D.L. Maher Company
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 10"
Final Depth (ft.) 59.65
Casing Diam. (in.) 4"
Casing Length (ft.) 49.50
Screen Setting (ft.) 49.50-59.65
Screen Slot & Type 10 Slot PVC
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 3.1 | | 1.4 | 35-37' | 3,5,7,10 | SW | 35 | Light brown fine SAND, very tight seam of silt and clay at 35.9'. |
| 3.2 | | 1.7 | 40-42' | 5,6,8,14 | SW | 40 | Top 1.3': Brown fine to medium SAND, coarsening doenward. Bottom 0.4': Brown to grey medium to coarse SAND and fine to coarse gravel; coarsening downward. |
| 2.3 | | 0.7 | 45-47' | 7,19,13,10 | GP | 45 | Grey-brown fine to coarse angular GRAVEL, some fine to coarse sand, trace silt. |
| 2.4 | | 1.6 | 50-52' | 8,10,12,12 | SM$^{d}_{u}$ MH | 50 | Top 0.7': Brown fine SAND, some silt. Bottom: Grey SILT, little fine sand; tight. |
| 2.2 | | 1.3 | 55-57' | 7,9,10,8 | SM$^{d}_{u}$ | 55 | Grey fine SAND and silt, trace black clay; tight. |
| 2.0 | | 2.0 | 60-62' | 7,6,10,11 | SM$^{d}_{u}$ | 60 | Grey fine SAND, little silt. fining downward; moderately tight. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101 Date 4/30/90
Project Industri-Plex PDI
Client Golder Associates
Page 3 Of 3
Logged By L. McTiernan
Well No. OW-24b
Loc. Woburn, M.A.
M.P. Elevation 57.26
Drilling Started 4/25/90 Ended 4/27/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 10"
Final Depth (ft.) 59.65
Casing Diam. (in.) 4"
Casing Length (ft.) 49.50
Screen Setting (ft.) 49.50-59.65
Screen Slot & Type 10 Slot PVC
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | | 0.6 | 64-65.5 | 14,40,35 | SW | 65 | Grey fine SAND, auger refusal @ 65.5'. (Bedrock). |
| - | | 3.5 | 69.5-73' | 100%recovery | | 70 | Green-grey coarse grain grano-diorite low quartz. Moderately fractured both vertical and oblique fractures, some sand in rock. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101 Date 5/24/90
Project Industri-Plex Site
Client Golder Associate
Page 1 Of 1
Logged By B. Thomas
Well No. OW-25a
Loc. Woburn, Mass
M.P. Elevation 66.00
Drilling Started 5/22/90 Ended 5/22/90
Driller D.L. Maher
Type Of Rig Dual Reverse Rotary

## WELL DATA

Hole Diam. (in.) 8"
Final Depth (ft.) 23.0
Casing Diam. (in.) 4"
Casing Length (ft.) 13.15
Screen Setting (ft.) 13.15-23.3
Screen Slot & Type .010" PVC
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type Split spoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| SAMPLE No. | SAMPLE Rec. | SAMPLE Depth (ft.) | SAMPLE Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|
| | | | | | | See log of OW-25b |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS

**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101 Date 5/19/90
Project Industri-Plex Site
Client Golder Associate
Page 1 Of 2
Logged By B. Thomas
Well No. OW-25b
Loc. Woburn, Mass
M.P. Elevation 65.34
Drilling Started 5/17/90 Ended 5/20/90
Driller D.L. Maher
Type Of Rig Dual Reverse Rotary

**WELL DATA**

Hole Diam. (in.) 8"
Final Depth (ft.) 40.3
Casing Diam. (in.) 4"
Casing Length (ft.) 29.8'
Screen Setting (ft.) 29.8-40.3
Screen Slot & Type .010"PVC
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**

Type Split spoon
Hammer 140 lb.
Fall 10 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | | 0.8 | 0-2' | 3,18,60/3" | SP | 0 | Brown fine to coarse SAND some fine to coarse gravel(fill). |
| | | | | | | | Cuttings 0-10': Brown coarse sand and cobbles(fill). |
| | | | | | | 5 | |
| | | NR | 10-12' | 7,11,11,12 | | 10 | No recovery. |
| 0.0 | | 0.7 | 13-15' | 4,6,4,8 | SW | | Light brown fine to medium(+) SAND; iron stained lamination. |
| | | | | | | 15 | |
| | | | | | | 20 | |
| 0.0 | | 1.1 | 23-25' | 3,10,2,5 | SW | 25 | Grey-brown fine to coarse SAND, some fine gravel, trace silt; coarsening downward, wet. |
| | | | | | | 30 | |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101 Date 5/19/90
Project Industri-Plex Site
Client Golder Associates
Page 2 Of 2
Logged By B. Thomas
Well No. OW-25b
Loc. Woburn, Mass
M.P. Elevation 65.34
Drilling Started 5/17/90 Ended 5/20/90
Driller D.L. Maher
Type Of Rig Dual Reverse Rotary Rig

## WELL DATA

Hole Diam. (in.) 8"
Final Depth (ft.) 40.3
Casing Diam. (in.) 4"
Casing Length (ft.) 29.8
Screen Setting (ft.) 29.8-40.3
Screen Slot & Type 010" PVC
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type Split spoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | | 1.0 | 33-35' | 10,10,11,7 | SW | 35 | Brown medium to coarse(+) SAND, little fine gravel; coarsening downward; well sorted. |
| | | | | | | 40 | |
| 0.0 | | 0.4 | 43-45' | 2,5,9,12 | SP | 45 | Brown coarse SAND and fine gravel. |
| | | 2.8 | 47.5-50.5 | 93% recovery | | 50 | Bedrock @ 47.4' Green-grey medium grain Granodiorite some oblique and horizontal fractures. Sand Seam @ 49.' |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date -
Project Industri plex PDI
Client Golder Associates
Page 1 Of 1
Logged By B. Thomas
Well No. OW-26a
Loc. Woburn, M.A.
M.P. Elevation 64.15
Drilling Started 5/11/90 Ended 5/11/90
Driller D.L. Maher Company
Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.) 12"
Final Depth (ft.) 23.20
Casing Diam. (in.) 4
Casing Length (ft.) 14.95'
Screen Setting (ft.) 13.05-23.20
Screen Slot & Type 10 Slot PVC
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|

## SAMPLER

Type
Hammer lb.
Fall in.

## DEVELOPMENT

| SAMPLE No. | SAMPLE Rec. | SAMPLE Depth (ft.) | SAMPLE Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|
| | | | | | | See log of ATB-3 |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 5/30/90
Project Industri Plex PDI
Client Golder Associates
Page 1 Of 1
Logged By B. Thomas
Well No. OW-26b
Loc. Woburn, M.A.
M.P. Elevation 63.8
Drilling Started 5/24/90 Ended 5/24/90
Driller D.L. Maher Company
Type Of Rig Dual Reverse Rotary

## WELL DATA

Hole Diam. (in.) 8"
Final Depth (ft.) 41.46'
Casing Diam. (in.) 4"
Casing Length (ft.) 33.61
Screen Setting (ft.) 31.31-41.46
Screen Slot & Type 10 Slot PVC
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type
Hammer lb.
Fall in.

## DEVELOPMENT

| SAMPLE No. | SAMPLE Rec. | SAMPLE Depth (ft.) | SAMPLE Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|
| | | | | | | See log of ATB-3. |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101 Date 5/8/90
Project Industri-Plex Site
Client Golder Associate
Page 1 Of 1
Logged By B. Thomas
Well No. OW-27a
Loc. Woburn, Mass
M.P. Elevation 70.84
Drilling Started 5/3/90 Ended
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.) 12"
Final Depth (ft.) 39.6
Casing Diam. (in.) 4"
Casing Length (ft.) 32.0
Screen Setting (ft.) 29.6-39.6
Screen Slot & Type .010" PVC
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type
Hammer lb.
Fall in.

## DEVELOPMENT

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | | | | | | See log of OW-27b. |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS

**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101 Date 5/8/90
Project Industri-Plex Site
Client Golder Associates
Page 1 of 4
Logged By L. McTiernan
Well No. OW-27b
Loc. Woburn, Mass
M.P. Elevation 70.52
Drilling Started 5/90 Ended
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.) 8"
Final Depth (ft.) 94.57
Casing Diam. (in.) 4"
Casing Length (ft.) 85.85
Screen Setting (ft.) 84.42-94.57
Screen Slot & Type .010" PVC
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type Split spoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | | 0.9 | 0-2.0 | 13,17,50/3" | SP | 0 | Grey to brown fine to coarse SAND, some fine to coarse gravel(fill |
| 2.6 | | 1.0 | 5-7' | 8,5,6,32 | SP | 5 | Grey to brown fine to coarse SAND and fine to coarse gravel, some brick and cement fragments. (fill). |
| 3.4 | | 0.6 | 10-12' | 1,2,1,2 | SP | 10 | Grey to brown fine to coarse SAND, some fine to coarse gravel; moist(fill). |
| 0.3 | | 1.45 | 15-17' | 3,6,6,5 | SW | 15 | Light brown fine to medium SAND, trace silt, trace fine gravel, wet. |
| 0.7 | | 1.65 | 20-22' | 4,4,4,4 | SW | 20 | Grey fine SAND, trace silt; red and orange laminae, moderatly stiff. |
| 0.9 | | 1.4 | 25-24' | 4,4,6,7 | SW | 25 | Brown fine to medium SAND trace silt, trace fine gravel; fining downward. |
| 1.0 | | 1.3 | 30-32' | 2,3,7,10 | SW | 30 | Brown fine to medium SAND fine sand seam @ 30.6-30.8' Iron stained throughout. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101 Date 5/8/90
Project Industri plex Site PDI
Client Golder Associates
Page 2 of 4
Logged By L. McTiernan
Well No. OW-27b
Loc. Woburn MA
M.P. Elevation 70.52
Drilling Started 5/3/90 Ended
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.) 8"
Final Depth (ft.) 94.57
Casing Diam. (in.) 4"
Casing Length (ft.) 85.85
Screen Setting (ft.) 84.42-94.57
Screen Slot & Type .010" PVC
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type Split spoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | N.R | 35-37' | 13,20,40/3" | | 35 | No recovery. |
| 0.5 | | 1.25 | 40-42' | 7,2,5,11 | SW | 40 | Light brown fine to medium (+) SAND, trace silt; iron stained, laminae. |
| | | 1.35 | 45-47' | 5,5,9,11 | SW | 45 | Gray-brown fine to medium (+) SAND. trace silt; fining downward. |
| 1.3 | | 1.4 | 50-52' | 4,9,10,15 | SW | 50 | Brown fine to medium (+) SAND, moderately tight. |
| 0.0 | | 1.0 | 55-57' | 3,6,4,2 | SW | 55 | Brown fine-medium SAND, little silt, little gray clay; well sorted; tight. Auger refusal @57.0' Note: Dual reverse rotary rig used from 57' to bottom of boring. |
| 0.0 | | 1.5 | 59-61' | 4,2,3,6 | SW | 60 | Brown to gray fine-medium SAND, little silt; well sorted. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 5/8/90
Project Industri-Plex Site
Client Golder Associates
Page 3 of 4
Logged By L. McTiernan
Well No. OW-27B
Loc. Woburn, Mass
M.P. Elevation 70.52
Drilling Started 5/3/90 Ended
Driller D.L. Maher
Type Of Rig Dual Reverse Rotary Rig

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 94.57
Casing Diam. (in.) 4"
Casing Length (ft.) 85.85
Screen Setting (ft.) 84.42-94.57
Screen Slot & Type .010"PVC
Well Status

**SAMPLER**
Type split spoon
Hammer 140 lb.
Fall 30 in.

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | | | | | 65 | |
| 0.0 | | 1.6 | 69-71' | | MH | 70 | Gray SILT, some fine (+) sand trace clay. |
| | | | | | | 75 | |
| 0.0 | | 0.5 | 79-81' | 1,1,2,2 | MH | 80 | Gray SILT, some fine (+) sand trace clay. |
| | | | | | | 85 | |
| 0.0 | | 1.8 | 89-91' | 1,2,2,3 | ML | 90 | Gray SILT and fine sand. |
| | | | | | | 95 | |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 1610IY Date 5/8/90
Project Industri-Plex Site
Client Golder Associates
Page 4 of 4
Logged By L. McTiernan
Well No. OW-27B
Loc. Woburn, Mass
M.P. Elevation 70.52
Drilling Started 5/3/90 Ended
Driller D.L. Maher
Type Of Rig Dual Reverse Rotary

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 94.57
Casing Diam. (in.) 4"
Casing Length (ft.) 85.85'
Screen Setting (ft.) 84.42-94.57
Screen Slot & Type .010"PVC
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | | 1.5 | 99-100' | 1,1,1,2 | ML | 100 | Gray SILT, fine sand. |
| | | | | | | 105 | |
| | | | | | | 110 | Difficult drilling @ 110' (Bedrock) |
| | | 1.3 | 115-118' | 43%recovery | | 115 | Gray-green fine grain Gabbro trace pyrite, plagioclase vein @116'. Oblique and horizontal fractures throughout core, some sandseams; weathered. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 5/30/90
Project Industri-Plex PDI
Client Golder Associates
Page 1 of 1
Logged By H. Hollister
Well No. OW-29
Loc. Woburn, M.A.
M.P. Elevation 62.0
Drilling Started 5/1/90 Ended 5/2/90
Driller D.L. Maher Company
Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.) 10"
Final Depth (ft.) 25.7'
Casing Diam. (in.) 4"
Casing Length (ft.) 13.55
Screen Setting (ft.) 15.55-25.7
Screen Slot & Type 10 Slot PVC
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev.W.T. |
|---|---|---|
| | | |

## SAMPLER

Type
Hammer lb.
Fall in.

## DEVELOPMENT

| Well | SAMPLE No. | SAMPLE Rec. | SAMPLE Depth (ft.) | SAMPLE Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | | | | | | See Log of ATB-10 |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101 Date 5/8/90
Project Industri-Plex Site PDI
Client Golder Associates
Page 1 of 3
Logged By H. Hollister
Well No. OW-30b
Loc. Woburn, Mass
M.P. Elevation 65.60
Drilling Started 5/3/90 Ended
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 10"
Final Depth (ft.) 60.33
Casing Diam. (in.) 4"
Casing Length (ft.) 52.13
Screen Setting (ft.) 50.13-60.33
Screen Slot & Type .010 PVC
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | | 1.6 | 0-2.0 | 2,4,8,8 | SW | 0 | Brown medium SAND, trace fine gravel, trace organic material. |
| 0.0 | | 1.9 | 5-7' | 4,8,11,12 | SW | 5 | Tan medium(+) to Coarse SAND, coarsening downward. |
| 0.0 | | 1.4 | 10-12' | 7,10,12,14 | SW | 10 | Light brown medium(+) to coarse SAND, Trace(-) fine gravel; wet. |
| 1.2 | | 1.15 | 15-17' | 8,14,16,27 | SW | 15 | Dark grey medium SAND, Black medium sand from 15.2 to 15.4 and 15.9-16.1 |
| 13.6 | | 0.4 | 17.5-18 | 90/6" | | | Dark grey medium(+) to coarse SAND, some fine gravel. |
| 8.6 | | 0.7 | 20-22' | 36,60,20,12 | GM d V SW | 20 | Grey medium to coarse sand and fine to coarse gravel Bottom 0.2': grye fine to medium sand. |
| 0.0 | | 1.4 | 25-27' | 8,12,21,33 | SW | 25 | Grey-brown fine(+) to medium SAND, well sorted. Black Laminated sands. |
| 0.0 | | 2.0 | 30-32' | 6,10,18,24 | SW | 30 | Grey-brown fine(+) to medium SAND; well sorted; black laminated sand. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101 Date 5/8/90
Project Industri-Plex Site PDI
Client Golder Associates
Page 2 Of 3
Logged By H. Hollister
Well No. OW-30
Loc. Woburn, Mass
M.P. Elevation 65.60
Drilling Started 5/3/90 Ended
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.) 10"
Final Depth (ft.) 60.37
Casing Diam. (in.) 4"
Casing Length (ft.) 52.13
Screen Setting (ft.) 50.13-60.33
Screen Slot & Type .010" PVC
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type Split spoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 1.6 | | 1.4 | 35-37' | 14,16,26,33 | SW | 35 | Grey to light brown fine(+) to medium SAND, trace silt stiff; folded. |
| 0.0 | | 2.0 | 40-42' | 14,40,65,7 | SW | 40 | Light brown fine(+) to medium SAND, fining downward, iron staining. |
| 0.0 | | 1.0 | 45-47' | 17,20,26,44 | SM$^{d}_{u}$ | 45 | Light brown fine SAND, trace silt, grey silt @ 45.5 folded. |
| 0.0 | | 1.6 | 50-52' | 29,50,60,80 | SW | 50 | Light brown fine SAND trace fine gravel; stiff. |
| 0.0 | | 1.6 | 55-57' | 14,22,35,45 | SW | 55 | Light brown fine(+) to medium SAND, trace fine gravel, laminated grey sands iron stained. |
| 1.4 | | N.R | 60-61' | 20,24,28, 100/6 | | 60 | No recovery, heaving Sands. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101 Date 5/8/90
Project Industri-Plex Site PDI
Client Golder Associates
Page 3 Of 3
Logged By H. Hollister
Well No. OW-30b
Loc. Woburn, Mass
M.P. Elevation 65.60
Drilling Started 5/3/90 Ended
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 10"
Final Depth (ft.) 58'
Casing Diam. (in.) 4"
Casing Length (ft.) 52.13
Screen Setting (ft.) 50.13-60.33
Screen Slot & Type .010" PVC
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 3.0 | | 1.0 | 65-67 | 38,27,37,55 | $SM_u^d$ | 65 | Light brown fine SAND, some silt. |
| | | | | | | | Difficult drilling @ 68' |
| | | | | | Bedrock | | |
| | | 1.0 | 70.8-74.8 | 25%recovery | | 70 | Grey green Granodiorite weathered, badly fractured with sand and silt seams. |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 5/30/90
Project Industri plex PDI
Client Golder Associates
Page 1 Of 1
Logged By B. Thomas
Well No. OW-33a
Loc. Woburn, M.A.
M.P. Elevation
Drilling Started 4/23/90 Ended 4/23/90
Driller D.L. Maher Company
Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.) 10"
Final Depth (ft.) 44.4'
Casing Diam. (in.) 4"
Casing Length (ft.) 36.64
Screen Setting (ft.) 34.29-44.40
Screen Slot & Type 10 Slot PVC
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type
Hammer lb.
Fall in.

## DEVELOPMENT

| # | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | | | | | | See log of ATB-15 |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101 Date 5/9/90
Project Industri-Plex Site PDI
Client Golder Associates
Page 1 Of 1
Logged By H. Hollister
Well No. OW-33b
Loc. Woburn, Mass
M.P. Elevation 56.66
Drilling Started 5/9/90 Ended Same
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.) 12"
Final Depth (ft.) 83.81
Casing Diam. (in.) 4"
Casing Length (ft.) 76.4
Screen Setting (ft.) 73.4-83.8
Screen Slot & Type 10 Slot PVC
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type
Hammer lb.
Fall in.

## DEVELOPMENT

| SAMPLE No. | SAMPLE Rec. | SAMPLE Depth (ft.) | SAMPLE Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|
| | | | | | | See log of ATB-15 |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 4/23/90
Project Industri-Plex PDI
Client Golder Associates
Page 1 Of 1
Logged By L. McTiernan
Well No. RB-1
Loc. Woburn, MA
M.P. Elevation 67.6'
Drilling Started 4/18/90 Ended 4/18/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 10"
Final Depth (ft.) 28'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| Hnu | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 2.8 | | 2.0' | 0-2' | 4,10,11,9 | SW | 0 | Brown to black, fine to medium SAND, trace fin gravel, trace organic material. |
| 1.7 | | 1.3' | 5-7' | 1,2,3,5 | SM$^{d}_{u}$ | 5 | Black fine SAND and Silt, trace clay, trace organic materials, hides. |
| 2.8 | | 1.4' | 10-12' | 5,16,19,21 | SW | 10 | Dark brown fine SAND, little medium Sand. |
| 3.5 | | 1.9' | 15-17' | 7,8,9,12 | SW | 15 | Grey fine to medium(+) SAND, trace organic, moderately stiff. Laminated. |
| 1.3 | | 1.5' | 20-22' | 3,5,5,8 | SW | 20 | Grey fine to medium SAND, trace silt. |
| 0.5 | | 1.25' | 25-27' | 7,8,8,17 | SW | 25 | Dark grey to black fine SAND, some medium sand, in layers. Well sorted moderately stiff. Auger refusal @ 28' |
| | | | | | | 30 | |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 4/23/90
Project Industri-Plex PDI
Client Golder Associates
Page 1 Of 1
Logged By L. McTiernan
Well No. RB-2
Loc. Woburn, MA
M.P. Elevation 68.1
Drilling Started 4/19/90 Ended 4/19/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**

Hole Diam. (in.) 10"
Final Depth (ft.) 10.5'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**

Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| Hnu | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0 | | 1.3' | 0-2' | 9,7,13,17 | SP | 0 | Tan to dark brown fine- medium(+) to coarse SAND, trace fine gravel, trace organic material. |
| 0 | | 1.1' | 5-7' | 1,1,1,1 | SM$^{d}_{u}$ | 5 | Dark brown to black fine SAND and silt, little yellow clay @ 5.6' mottled reddish-purple staining throughout sample. |
| 0 | | N.R. | 10-10.5' | 100/5" | | 10 | No recovery, loose debris, wet. Auger refusal @ 10.5'. |
| | | | | | | 15 | |
| | | | | | | 20 | |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 4/23/90
Project Industri-Plex PDI
Client Golder Associates
Page 1 of 1
Logged By L. McTiernan
Well No. RB-3
Loc. Woburn, MA
M.P. Elevation 66.9'
Drilling Started 4/19/90 Ended 4/19/90
Driller D.L. Maher
Type Of Rig Hollw Stem Auger

**WELL DATA**
Hole Diam. (in.) 10"
Final Depth (ft.) 18'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW | MP(2) | Elev. W.T. |
|---|---|---|---|

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| Hnu | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0 | | 0.6' | 0-2' | 6,15,23 | SP | 0 | Red to Brown fine to coarse SAND, some fine gravel, little organic mateial. |
| 0 | | 1.0' | 5-7' | 5,4,4,4 | SM | 5 | Red brown to black fine to medium SAND, some fine to coarse gravel, some silt; wet @ 5.3'. |
| 0.0 | | 1.5' | 10-12' | 4,8,9,12 | SW | 10 | Black fine(+) to medium SAND, trace coarse sand, trace fine to coase gravel; Well sorted. |
| 0.0 | | 2.0' | 15-17' | 4/9/35/100/5" | SW | 15 | Black fine SAND, trace fine to coarse gravel, well sorted, fining downward. Auger refusal @ 18'. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 1610IY Date 4/23/90
Project Industri-Plex PDI
Client Golder Associates
Page 1 Of 1
Logged By L. McTiernan
Well No. RB-4
Loc. Woburn, MA
M.P. Elevation 67.5'
Drilling Started 4/19/90 Ended 4/19/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.) 10"
Final Depth (ft.) 11.5'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type Split spoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| Hnu | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0 | | 0.4' | 0-2' | 6,35,50,57 | SMd | 0 | Brown fine Sand and Silt, little organic material, trace fine to coarse gravel. Cuttings: reddish-purple sand and silt. |
| 0 | | 0.25' | 5-7' | 25,39,14,7 | SMd | 5 | Dark brown fine to medium SAND, some white and grey clay, lainated sand; stiff; wet. Cuttings: grey silt and clay, trace of fine to medium sand. |
| 0 | | 1.1' | 10-12' | 20,44,31,56 | SP | 10 | Light to dark brown fine to coarse SAND, little silt, little fine to coarse gravel; wet. Auger refusal @ 11.5'. |
| | | | | | | 15 | |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS

**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 6/8/90
Project Industri-Plex PDI
Client Golder Associates
Page 1 of 1
Logged By L. McTiernan
Well No. RB-5
Loc. Woburn, MA
M.P. Elevation 73.6'
Drilling Started 4/20/90 Ended 4/20/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.) 8"
Final Depth (ft.) 3.5'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type Split spoon
Hammer 140 lb.
Fall 30 in.

## DEVELOPMENT

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 7.9 Back-ground =1.9 | 1 | 0.9 | 0-1.5' | 8,45,50/1" | SP | | Brown fine to medium SAND, trace fine to coarse Gravel, trace organic material. Auger refusal @ 2.5'. |
| 2.9 | 2 | 0.5 | 2.5-3.5' | 42,74 | SP | 5 | Brown fine SAND, little silt, little fine to coarse Gravel. (angular fragments of gray rock). |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 6/8/90
Project Industri-Plex PDI
Client Golder Associates
Page 1 of 1
Logged By L. McTiernan
Well No. RB-6
Loc. Woburn, MA
M.P. Elevation 72.3'
Drilling Started 4/20/90 Ended 4/20/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 12'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 3.7 | 1 | 0.6' | 0-2' | 14,35,38,21 | SP | | Brown medium to coarse SAND, and fine to coarse Gravel, trace organic material. Cuttings 0-5': Brown medium sands and Gravel, some large cobbles. |
| 2.2 | 2 | 0.8' | 5-7 | 1,1,1,1 | SP | 5 | Brown fine to medium SAND, trace fine to coarse Gravel; Wet at bottom 0.2'. |
| 2.3 | 3 | 1.0' | 10-12' | 12,29,30,51 | SP | 10 | Brown fine to coarse SAND, some fine to coarse Gravel, trace Silt (Gravel is crushed sialic rock). Auger refusal @ 12'. |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 4/23/90
Project Industri-Plex PDI
Client Golder Associates
Page 1 of 1
Logged By L. McTiernan
Well No. RB-7
Loc. Woburn, MA
M.P. Elevation 68.1'
Drilling Started 4/20/90 Ended 4/20/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 10"
Final Depth (ft.) 16'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| Hnu | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.2 | | 1,3' | 0-2' | 4,4,1,5 | $SM_u^d$ | 0 | Orange-brown fine to medium SAND, some silt. Cuttings: Orange-brown sand and silt. |
| 1.1 | | 1.0' | 5-7' | 30,51,72 | $GM_u^d$ | 5 | Grey fine to coarse gravel and fine Sand and silt; wet. |
| 0.0 | | 0.9' | 10-12' | 12,32,27,35 | SP | 10 | Grey-brown fine to coarse sand and fine to coarse gravel, little silt, very tight. |
| 0.0 | | 0.85' | 15-16' | 38, 90/4" | GW | 15 | Grey and pink fine to coarse GRAVEL (bedrock). Auger refusal @ 16'. |
| | | | | | | 20 | |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 1610IY Date 4/23/90
Project Industri-Plex PDI
Client Golder Associates
Page 1 Of 1
Logged By L. McTiernan
Well No. RB-8
Loc. Woburn, MA
M.P. Elevation 69.5
Drilling Started 4/20/90 Ended 4/20/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 10"
Final Depth (ft.) 2'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID Hnu | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0 | | 1.5' | 0-2' | 2,3,4,8 | SW | 0 | Orange-brown fine to medium SAND. Auger refusal @ 2'. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 4/23/90
Project Industri-Plex PDT
Client Golder Associates
Page 1 Of 1
Logged By L. McTiernan
Well No. RB-9
Loc. Woburn, MA
M.P. Elevation 66.0'
Drilling Started 4/20/90 Ended 4/20/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 10"
Final Depth (ft.) 26'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| Hnu | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0 | | 1.6' | 0-2' | 2,5,9,9 | SW | 0 | Orange to brown fine to medium(+) SAND, laminated at top |
| 0 | | 1.8' | 5-7' | 6,8,8,7 | SW | 5 | Tan fine-medium to coarse SAND; wet. Cuttings: Orange and tan clean medium sand. |
| 0 | | 1.9' | 10-12' | 33,34,62,35 | SW<br>SP | 10 | Top 0.7':Grey fine-medium(+) to coarse SAND, little fine gravel. 0.7-1.2': Grey fine SAND, trace silt and clay. Bottom: Grey fine(+) to medium SAND and fine to coarse gravel |
| 0 | | 0.65' | 15-16.5' | 20,50,70 | SP | 15 | Grey fine to coarse SAND, and fine to coarse gravel, trace silt. |
| | | N.R. | 20-22' | | | 20 | No recovery, Soft weathered bedrock. |
| | | | 25-26 | | | 25 | Fractured, weathered mafic rock (gabbro). |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y  Date
Project Industri-Plex Site
Client Golder Assoiates
Page 1 Of
Logged By H. Hollister
Well No. RB-10
Loc. Woburn, Mass.
M.P. Elevation
Drilling Started 5/18/90 Ended 5/18/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 11
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 4.6 | | 1.7 | 0-2' | 7,7,8,7 | SW | 0 | Top 0.2': Dark brown fine to medium SAND with organic material. Bottom: Light brown fine to medium(+) SAND. |
| 1.3 | | 1.4 | 5-7' | 8,16,10,10 | SW | 5 | Brown fine to medium(+) SAND; Wet. |
| 0 | | 0.7 | 10-11' | 24,28 | SP | 10 | Grey medium to coarse SAND and fine gravel, little coarse gravel; till.(Auger refusal). |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS

**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101 Date

Project Industri-Plex Site

Client Golder Associates

Page 1 Of 1

Logged By H. Hollister

Well No. RB-11

Loc. Woburn, Mass.

M.P. Elevation

Drilling Started 5/18/90 Ended 5/18/90

Driller D.L. Maher

Type Of Rig Hollow Stem Auger

## WELL DATA

Hole Diam. (in.) 8"

Final Depth (ft.) 15

Casing Diam. (in.)

Casing Length (ft.)

Screen Setting (ft.)

Screen Slot & Type

Well Status

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type Split Spoon

Hammer 140 lb.

Fall 30 in.

## DEVELOPMENT

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.3 | | 1.7 | 0-2 | 5,8,11,14 | SW | 0 | Brown to red medium SAND; laminated dark brown and Iron Stained Sands. |
| 0 | | 1.4 | 5-7' | 5,10,14,8 | SW | 5 | Light brown fine to medium(+) SAND; moist. |
| 0 | | 0.9 | 10-11 | 26,50/1" | SP | 10 | Grey fine to medium SAND some fine to coarse gravel(till); wet. |
| | | N.R. | 15-15.3 | 50/3" | | 15 | No recovery, auger refusal. |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 5/23/90
Project Industri-Plex PDI
Client Golder Associates
Page 1 of 1
Logged By L. McTiernan
Well No. RB-12
Loc. Woburn, MA
M.P. Elevation 73.82
Drilling Started 5/21/90 Ended 5/21/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 13"
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | Sample No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | 1 | 1.6' | 0-2' | 4,6,7,10 | SW | | Light brown medium SAND, trace fine Gravel. |
| 0.0 | 2 | 1.5' | 5-7' | 7,10,15,27 | SM | 5 | Tan fine to medium SAND, little silt (silt in lense at 1.2-1.3'); fining downwards. |
| 0.0 | 3 | 0.9" | 10-12' | 6,15,46/5" | SP | 10 | Brown to grey, fine to coarse SAND, and fine to coarse Gravel, trace(-) silt. Wet. Auger refusal @ 13' |
| | | | | | | 15 | |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 5/23/90
Project Industri-Plex PDT
Client Golder Associates
Page 1 of 1
Logged By L. McTiernan
Well No. RB-13
Loc. Woburn, mA
M.P. Elevation 73.02
Drilling Started 5/21/90 Ended 5/21/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 14"
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | 1 | 1.6 | 0-2' | 2,7,5,6 | SP | | Light to dark brown, fine to medium (+) SAND, trace silt, trace organic material. |
| 0.4 | 2 | 1.3 | 5-7' | 4,6,9,10 | SP | 5 | Light brown to grey fine to medium SAND, trace(-) fine Gravel. Moist. |
| 3.5 Background PID= 3.0 | 3 | 2.0 | 10-12' | 10,22,22, 50/5' | SP | 10 | Light brown medium to coarse SAND, and fine(+) to coarse Gravel. |
| | | | | | | | Auger refsal @ 14'. |
| | | | | | | 15 | |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 5/23/90
Project Industri-Plex PDI
Client Golder Associates
Page 1 Of 1
Logged By L. McTiernan
Well No. RB-14
Loc. Woburn, MA
M.P. Elevation 73.32
Drilling Started 5/21/90 Ended 5/21/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 12.5'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 5.8 | 1 | 1.3' | 0-2' | 3,3,2,3 | SP | | Dark brown to black fine to medium SAND, trace yellow clay, trace organic material. (Yellow clay in layers at 0.1', 1.0', & 1.2') |
| 4.0 | 2 | 1.4' | 5-7' | 3,6,6,10 | SW | 5 | Brown medium SAND, well-sorted, Moist. |
| 3.3 | 3 | 2.0' | 10-12' | 8,18,22, 50/4" | SW<br>SW | 10 | 0-1.0' Brown medium SAND<br>1.0-2.0' Gray fine(+) to medium SAND<br>Auger refusal @ 12.5' |
| | | | | | | 15 | |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 5/23/90
Project Industri-Plex PDI
Client Golder Associates
Page 1 Of 1
Logged By L. McTiernan
Well No. RB-15
Loc. Woburn, MA
M.P. Elevation 70.94
Drilling Started 5/21/90 Ended 5/21/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 12'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 4.5 | 1 | 1.5' | 0-2' | 3,5,6,7 | SM[d]u<br>SW | | 0-1.0' Dark brown fine organic SAND trace silt and clay. Moist.<br>1.0-1.5' Tan medium SAND, well-sorted. |
| 4.0 | 2 | 1.9' | 5-7' | 7,13,17,25 | SW | 5 | Brown to gray fine to medium SAND, trace(organic horizon at 0.6', separates browner, slightly coarser sands from grayer, slightly finer sands below). |
| 3.6 | 3 | 1.4' | 10-12' | 1,4,8,50 | SW<br>SP | 10 | Brown to gray medium SAND, little fine to coarse Gravel (well-rounded and restricted to gray sand zone). |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 5/23/90
Project Industri-Plex PDI
Client Golder Associates
Page 1 Of 1
Logged By L. McTiernan
Well No. RB-16
Loc. Woburn, Mass
M.P. Elevation 71.74
Drilling Started 5/22/90 Ended 5/22/90
Driller D.L. Maher Company
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 10.5'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0 | 1 | 1.3' | 0-2' | 4,4,8,8 | SP | | Dark brown to orange-brown fine to medium SAND, trace fine Gravel, trace organic material; moist. |
| — | 2 | NR | 5-5.5' | 50/5" | — | 5 | Angular fragments of gray rock. |
| 0 | 3 | 0.3' | 10-10.25 | 50/3" | $SM^{d}_{u}$ | 10 | Brown to black fine to medium SAND, little Silt, little fine Gravel. (Black Silt and Gravel together at base - very tight). Auger refusal at 10.5'. |
| | | | | | | 15 | |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 1610LY Date 5/23/90
Project Industri-Plex PDI
Client Golder Associates
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Logged By L. McTiernan
Well No. RB-17
Loc. Woburn, Mass
M.P. Elevation 73.64
Drilling Started 5/22/90 Ended 5/22/90
Driller D.L. maher Company
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 10.5'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | 1 | 1.6' | 0-2' | 1,6,8,10 | SM | | Light to dark brown (with red blotches) fine to medium SAND, little Silt, trace fine to coarse Gravel, trace organic materials. |
| 0.0 | 2 | 1.7' | 5-7' | 3,4,5,8 | SW | 5 | Brown to Black fine to medium SAND (finer, black sands in layers at 0.6- 0.7' and 1.55-1.7'); Wet. |
| 0.0 | 3 | 1.1' | 10-10.5' | 6.50/0" | SW | 10 | Black fine (+) to medium, micaceous SAND: fining downwards. Auger refusal at 10.5'. |
| | | | | | | 15 | |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS

**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 5/23/90
Project Industri-Plex PDI
Client Golder Associates
Page 1 of 1
Logged By L. McTiernan
Well No. RB-18
Loc. Woburn, MA
M.P. Elevation 65.39
Drilling Started 5/22/90 Ended 5/22/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**

Hole Diam. (in.) 8"
Final Depth (ft.) 33'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**

Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0.0 | 1 | 0.4' | 0-2' | 2,6,50/4" | GP | | Gray fine to coarse GRAVEL, some fine to coarse sand, some silt (Till). |
| 0.0 | 2 | 1.4' | 5-7' | 1,6,9,19 | SP | 5 | Gray-brown to orange-brown fine to medium(+) SAND, little fine to coarse Gravel (Till); Fining downwards; Wet. |
| 0.0 | 3 | 0.8' | 10-11.5' | 16,45,50/4" | SP | 10 | Gray brown fine to coarse SAND, some fine(+) to coarse Gravel (Till) |
| 0.0 | 4 | 1.6' | 15-17' | 3,3,12,13 | GW | 15 | Orange-gray fine(+) to coarse GRAVEL, some medium to coarse Sand. (Sand in layer at 0.2- 0.5'). |
| 0.0 | 5 | 1.0' | 20-22' | 11,13,15,22 | SP | 20 | Orange-gray fine to coarse SAND, and fine(+) to coarse Gravel Till); Coarsening downward. |
| 0.0 | 6 | 1.5' | 26-28' | 15,44,33,38 | SM[d] | 25 | Gray-brown fine to coarse SAND and fine to coarse Gravel, little Silt; very tight (Till). |
| 0.0 | 7 | 1.2' | 31-33' | 19,50,60, 100/5" | SM[d] | 30 | Auger refusal at 33'. Gray-brown fine to coarse Gravel little Silt. Very tight (Till). |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 1610IY Date 5/23/90
Project Industri-Plex PDI
Client Golder Associates
Page 1 Of 1
Logged By L. McTiernan
Well No. RB-19
Loc. Woburn, MA
M.P. Elevation 70.34
Drilling Started 5/23/90 Ended 5/23/90
Driller D.L. Maher
Type Of Rig Hollow stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 4.5'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| — | 1 | — | 0-2' | 12,12,8,20 | SP | 5 | Dark brown medium to coarse SAND and fine to coarse Gravel, trace organic material (Till). Cuttings 0-4.5': Brown medium to coarse SAND and Gravel, some small cobbles. Auger refusal @ 4.5'. |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 1610IY Date 5/23/90
Project Industri-Plex PDI
Client Golder Associates
Page 1 Of 1
Logged By L. McTiernan
Well No. RB-20
Loc. Woburn, MA
M.P. Elevation 67.34
Drilling Started 5/23/90 Ended 5/23/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 7'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | | | | SP | | Cuttings 0-5' Brown sand, gravel, and small cobbles, mostly well-rounded. |
| 0.0 | 1 | 0.4 | 5-7' | 15,21,28,46 | SM$^{d}_{u}$ | 5 | Auger refusal at 7'. Gray fine to coarse SAND, and fine to coarse Gravel, little silt (Till) Tight; wet. |

**REMARKS:** (1) in feet relative to a common datum
(2) from top of PVC casing

CONSULTING GROUND WATER GEOLOGISTS
**ROUX ASSOCIATES INC**

# GEOLOGIC LOG

Study No. 16101Y Date 5/23/90
Project Industri-Plex PDI
Client Golder Associates
Page 1 Of 1
Logged By L. McTiernan
Well No. RB-21
Loc. Woburn, MA
M.P. Elevation 70.44
Drilling Started 5/23/90 Ended 5/23/90
Driller D.L. Maher
Type Of Rig Hollow Stem Auger

**WELL DATA**
Hole Diam. (in.) 8"
Final Depth (ft.) 21.5'
Casing Diam. (in.)
Casing Length (ft.)
Screen Setting (ft.)
Screen Slot & Type
Well Status

**G W READINGS(1)**

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

**SAMPLER**
Type Split spoon
Hammer 140 lb.
Fall 30 in.

**DEVELOPMENT**

| PID | Sample No. | Sample Rec. | Sample Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| 0 | 1 | 1.8' | 5-7' | 2,3,8,8 | SW | 5 | Brown fine to medium SAND, coarsening downwards. Moist |
| 0 | 2 | 2.0' | 10-12' | 10,30,21,47 | SP | 10 | Gray to brown, fine to medium (+) SAND, little fine to Gravel. Fining downwards (Ground occurs as crushed rock in bottom half). |
| 0 | 3 | 1.6' | 15-17' | 36,70,60,60 | SMu[d] | 15 | Gray-brown fine to coarse Sand, and fine to coarse Gravel, some Silt |
| 0 | 4 | 0.8' | 20-21.5' | 21,44,100/5' | SMu[d] | 20 | Gray-brown fine to coarse Sand, and fine to coarse Gravel, little Silt. Tight. Auger refusal at 21 feet. |
| | | | | | | 25 | |

REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

# APPENDIX C

Grain Size Data

**Golder Associates Inc.**
CONSULTING ENGINEERS

May 25, 1990 Project No.: 893-6125.10

Roux Associates
775 Park Avenue
Suite 255
Huntington, NY 11743

Attn: Brian Thomas

Gentlemen:

As requested, we have performed geotechnical testing on the soil samples you shipped to us. The samples were taken by others and received in our Mt. Laurel testing facility on May 2, 1990 via overnight courier and were contained within glass sampling jars, inside a cooler.

Testing for particle size distribution began on May 4, 1990 and was completed on May 19, 1990. Analysis for coarse fragments (sands and gravels) was performed in accordance with ASTM methods D-421 and D-422 (Mechanical Sieving), with percentage determination of silts and clays using the same ASTM methods (Hydrometer Analysis). As all the samples were retrieved using a split spoon sampler, some contained oversized particles in relation to the total sample size, and these particles were removed from the tested portion. These are samples ATB #2 (20-22), ATB #15 (30-32) and (85-87), each of which contained one or more +3/4" fragments.

The results of these analysis were transmitted to you via facsimile machine on May 21, 1990 and are presented graphically on the attached pages. Your cooler and the remaining samples will be returned to you and if you have any questions, or require additional tests, please feel free to call.

Very truly yours,

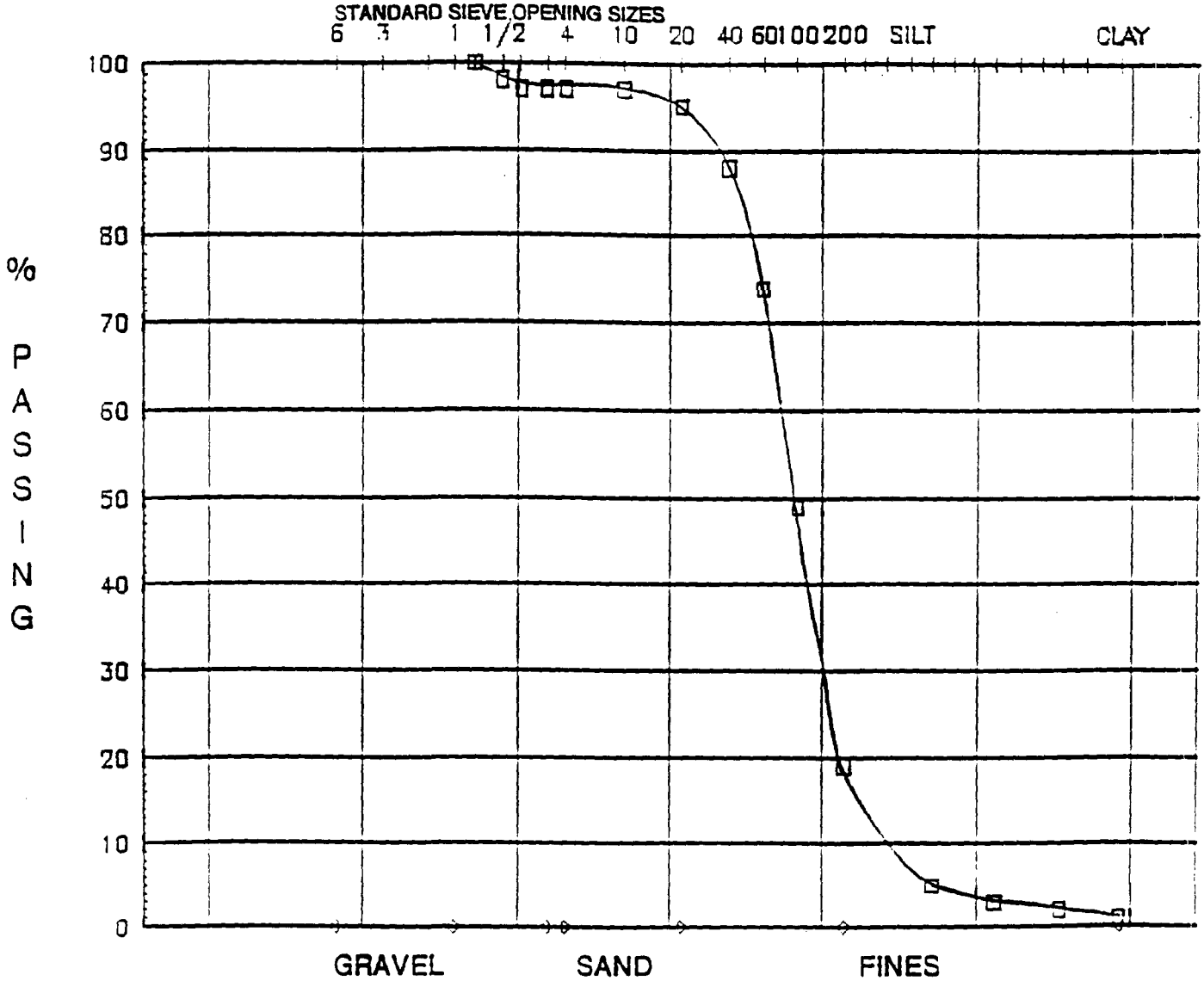
GOLDER ASSOCIATES INC.

Thomas M. Stoops
Laboratory Manager

Pedro C. Repetto
Senior Project Manager

TMS/PCR/drs
D:BT052590
Attachments

# PARTICLE SIZE DISTRIBUTION
# MECHANICAL AND HYDROMETER ANALYSIS
# ASTM D-421 AND 422



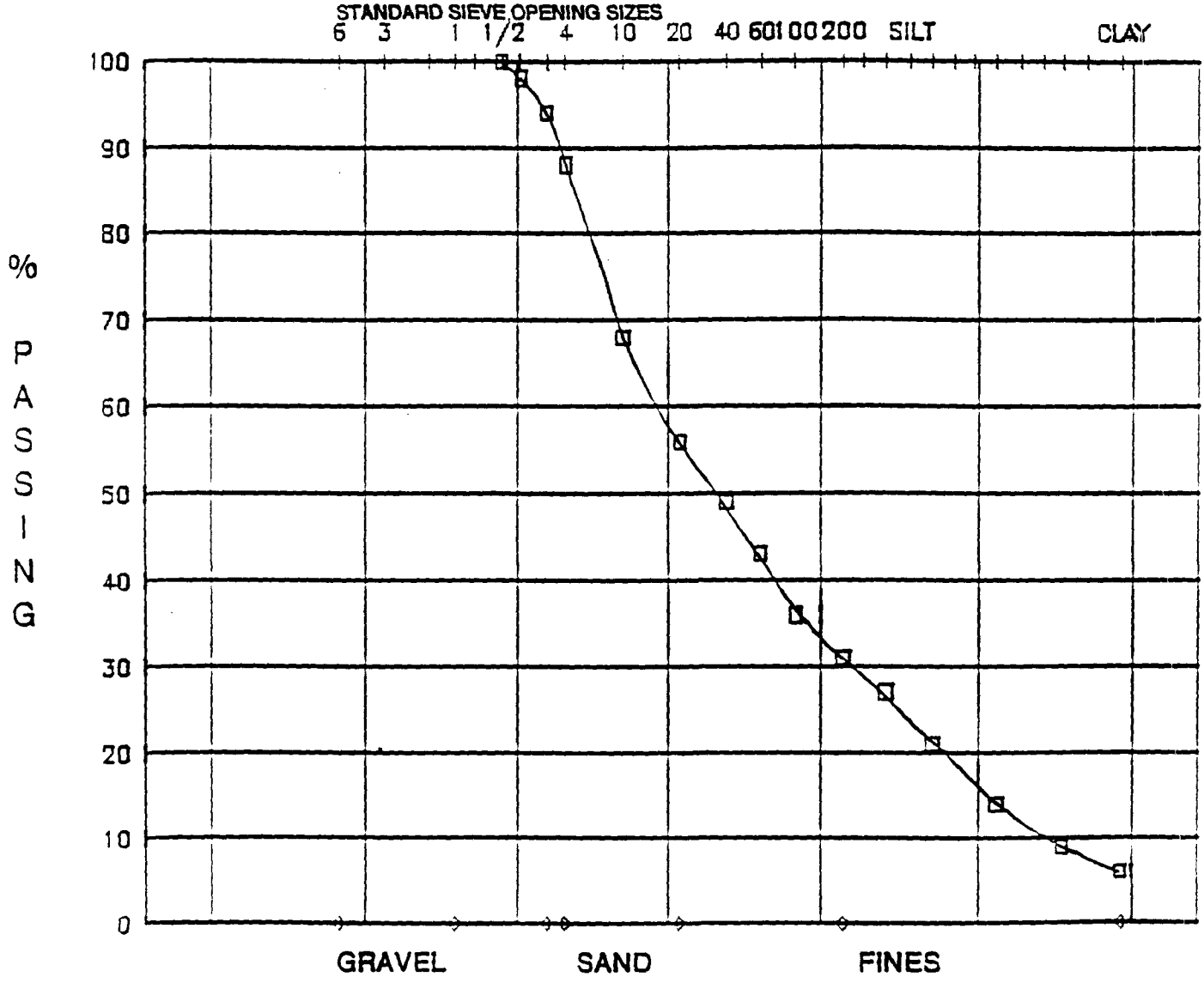

| SAMPLE IDENTITY | Wn% | WL | WP | IP | DESCRIPTION |
|---|---|---|---|---|---|
| ATB-2 | 19.7 | NR | NR | NR | Greenish grey,dark yellowish orange f SAND.some fines. trace f gravel |

ROUX/ISRT/MA

893-6125.10

GOLDER ASSOCIATES
Consulting Engineers

# PARTICLE SIZE DISTRIBUTION
## MECHANICAL AND HYDROMETER ANALYSIS
## ASTM D-421 AND 422



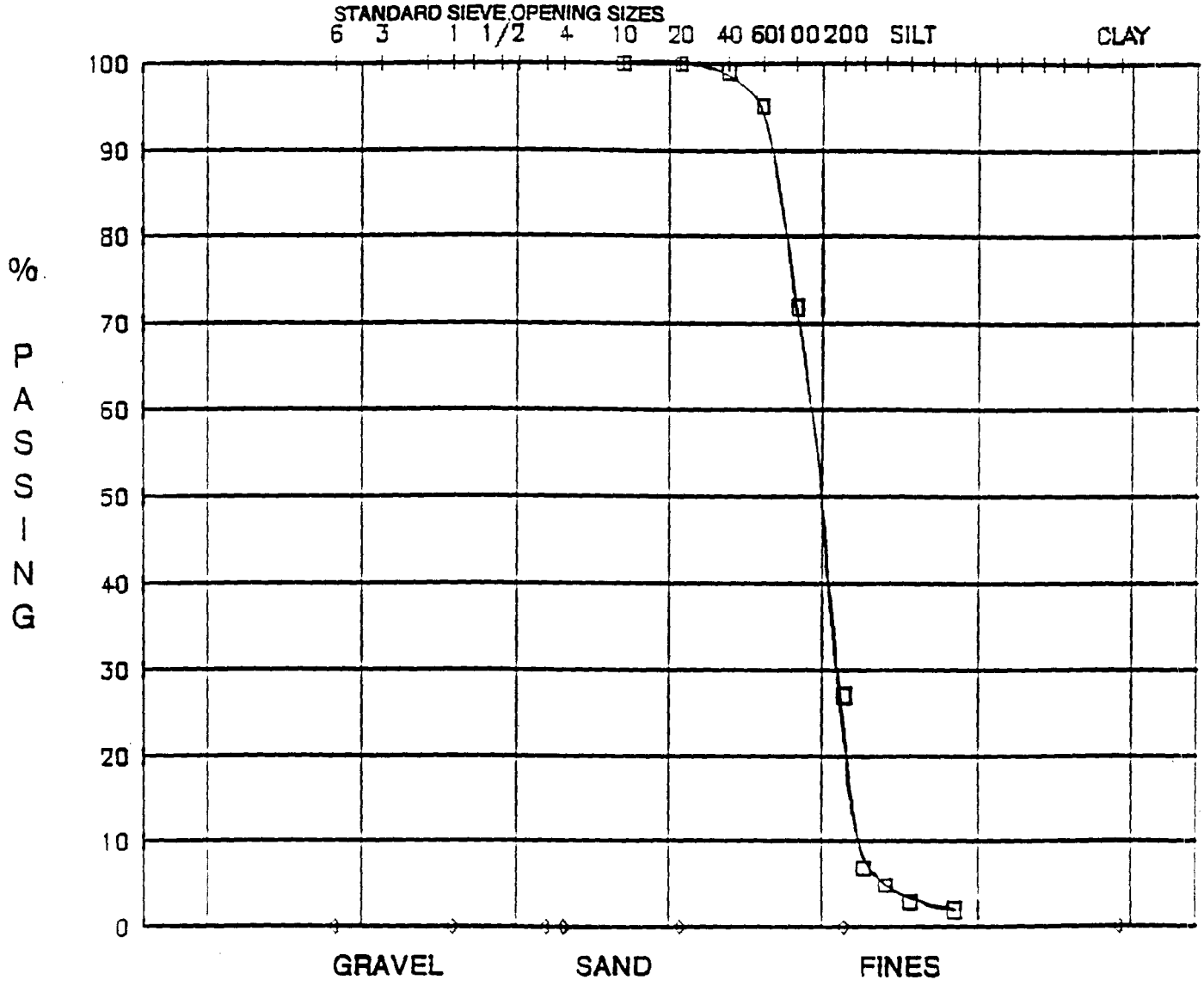

| SAMPLE IDENTITY | Wn% | WL | WP | IP | DESCRIPTION |
|---|---|---|---|---|---|
| ATB-3 (40'-42') | 11.9 | NR | NR | NR | Dark greenish grey c-f SAND and FINES, little f gravel |

ROUX/ISRT/MA

893-6125.10

GOLDER ASSOCIATES
Consulting Engineers

# PARTICLE SIZE DISTRIBUTION
# MECHANICAL AND HYDROMETER ANALYSIS
# ASTM D-421 AND 422




| SAMPLE IDENTITY | Wn% | WL | WP | IP | DESCRIPTION |
|---|---|---|---|---|---|
| ATB-4 (10'-12') | 23.6 | NR | NR | NR | Pale yellowish brown f SAND, some fines |

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893-6125.10

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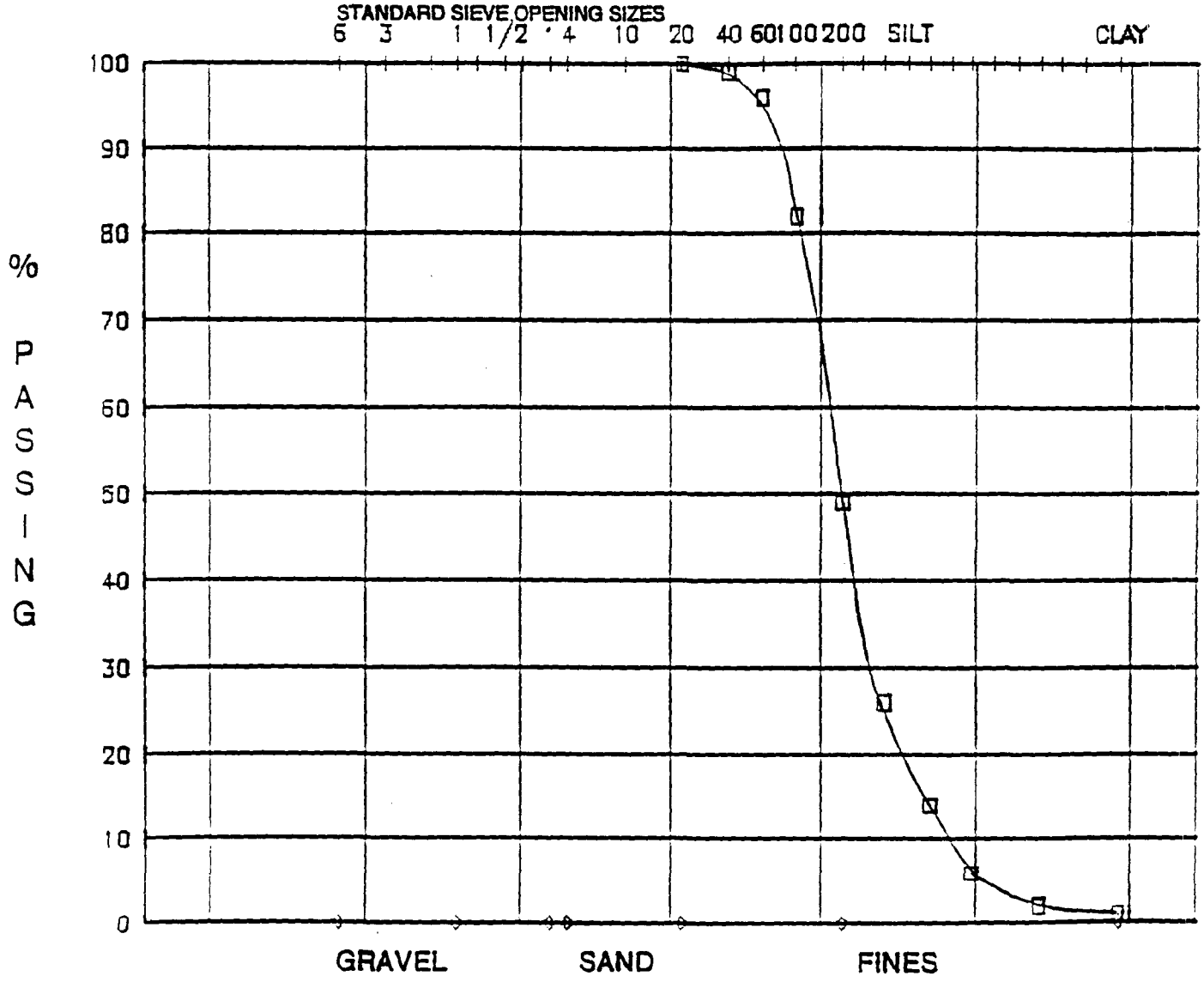
# PARTICLE SIZE DISTRIBUTION
# MECHANICAL AND HYDROMETER ANALYSIS
# ASTM D-421 AND 422




| SAMPLE IDENTITY | Wn% | WL | WP | IP | DESCRIPTION |
|---|---|---|---|---|---|
| ATB-4 (40'-42') | 26.2 | NR | NR | NR | Greenish grey FINES and f SAND |

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893-6125.10

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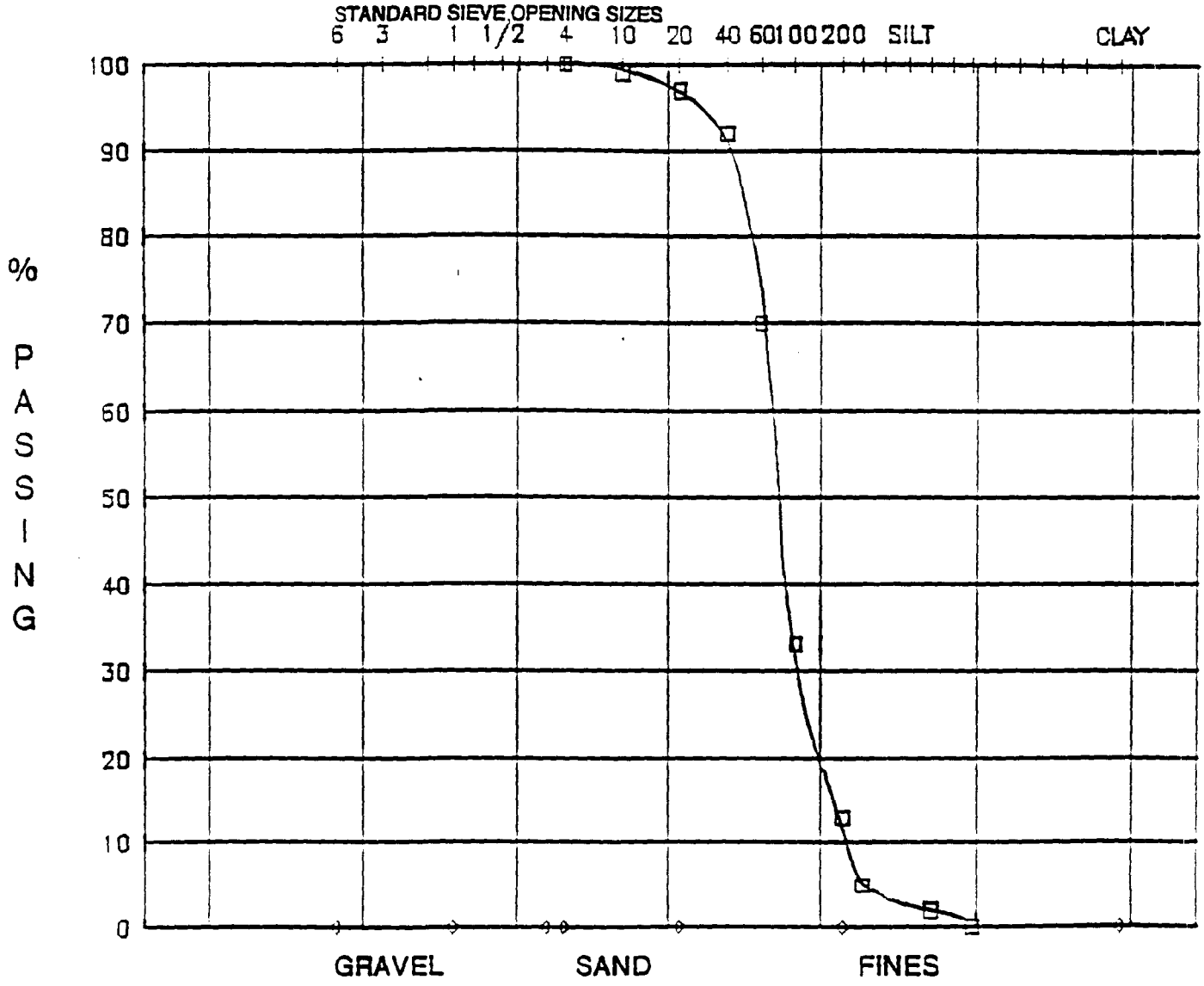
Consulting Engineers

# PARTICLE SIZE DISTRIBUTION
## MECHANICAL AND HYDROMETER ANALYSIS
## ASTM D-421 AND 422




| SAMPLE IDENTITY | Wn% | WL | WP | IP | DESCRIPTION |
|---|---|---|---|---|---|
| ATB-6 (15'-17') | 20 | NR | NR | NR | Light yellowish brown f SAND, some fines |

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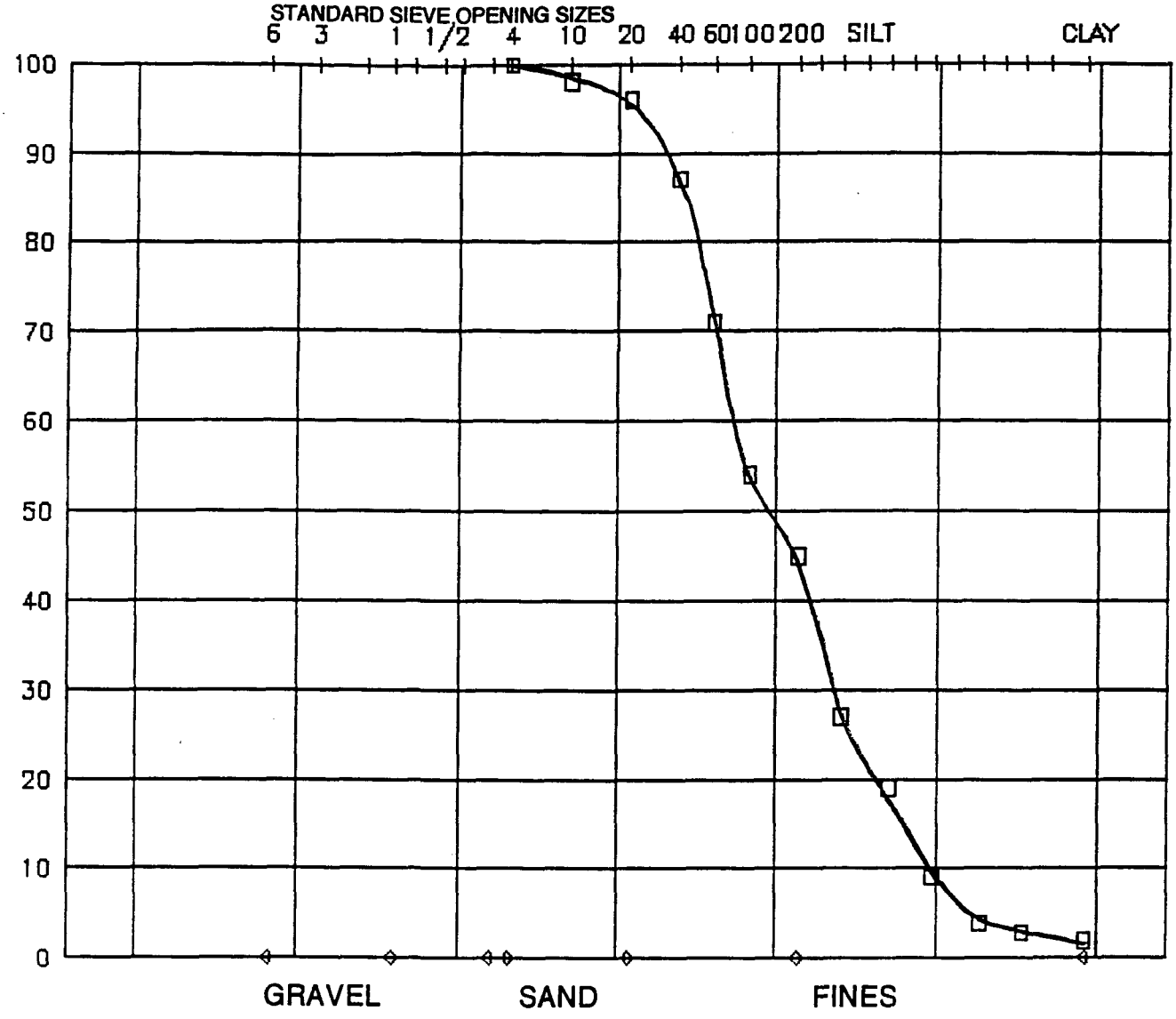
Consulting Engineers

# PARTICLE SIZE DISTRIBUTION
# MECHANICAL AND HYDROMETER ANALYSIS
# ASTM D-421 AND 422




| SAMPLE IDENTITY | Wn% | WL | WP | IP | DESCRIPTION |
|---|---|---|---|---|---|
| ATB-10 (15'-17') | 73 | NR | NR | NR | Dark brown m-f SAND and FINES |

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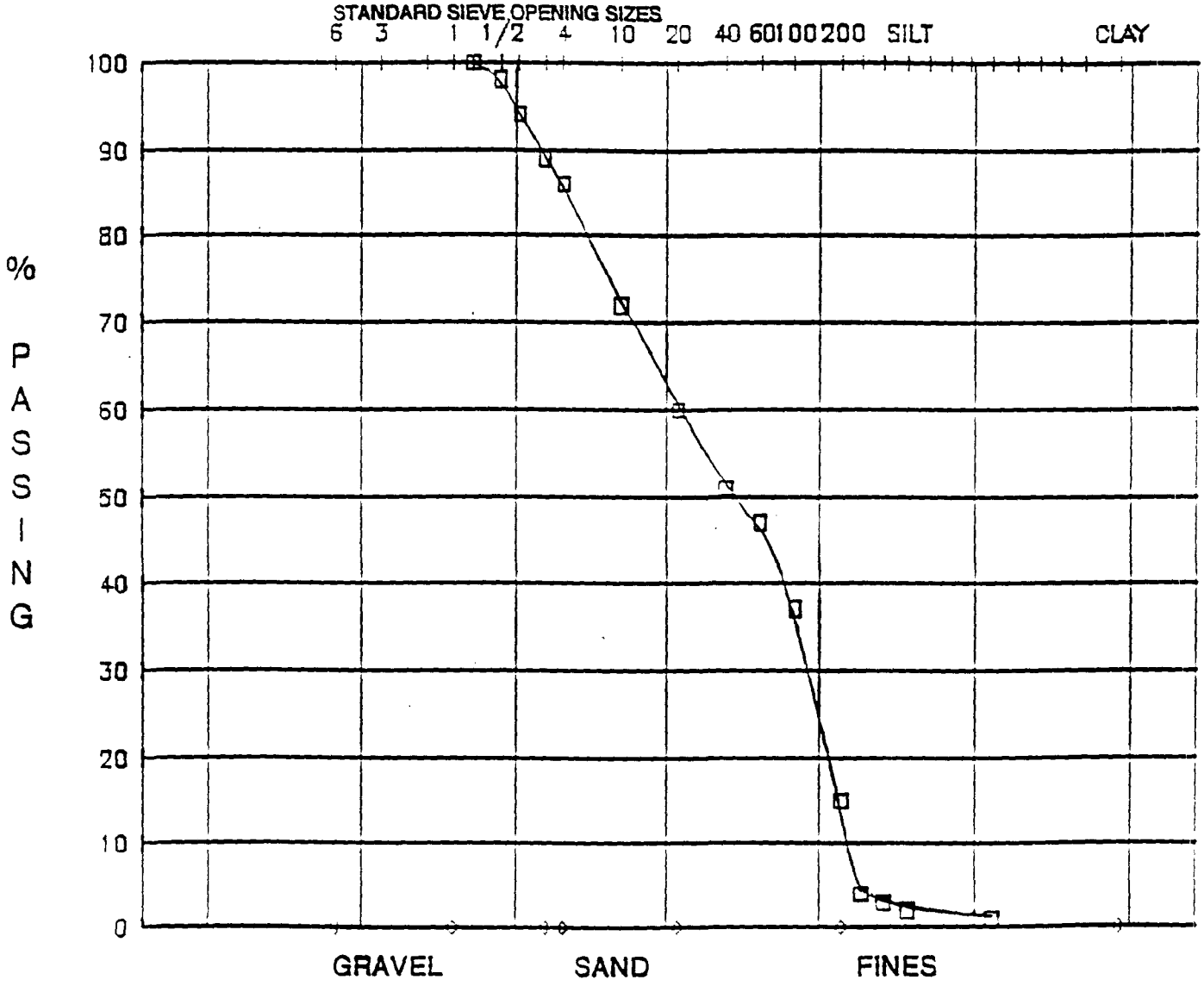
Consulting Engineers

# PARTICLE SIZE DISTRIBUTION
# MECHANICAL AND HYDROMETER ANALYSIS
# ASTM D-421 AND 422




| SAMPLE IDENTITY | Wn% | WL | WP | IP | DESCRIPTION |
|---|---|---|---|---|---|
| ATB-14 (15'-17') | 14.2 | NR | NR | NR | Pale yellowish brown c-f SAND.some f gravel.some fines |

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893-6125.10

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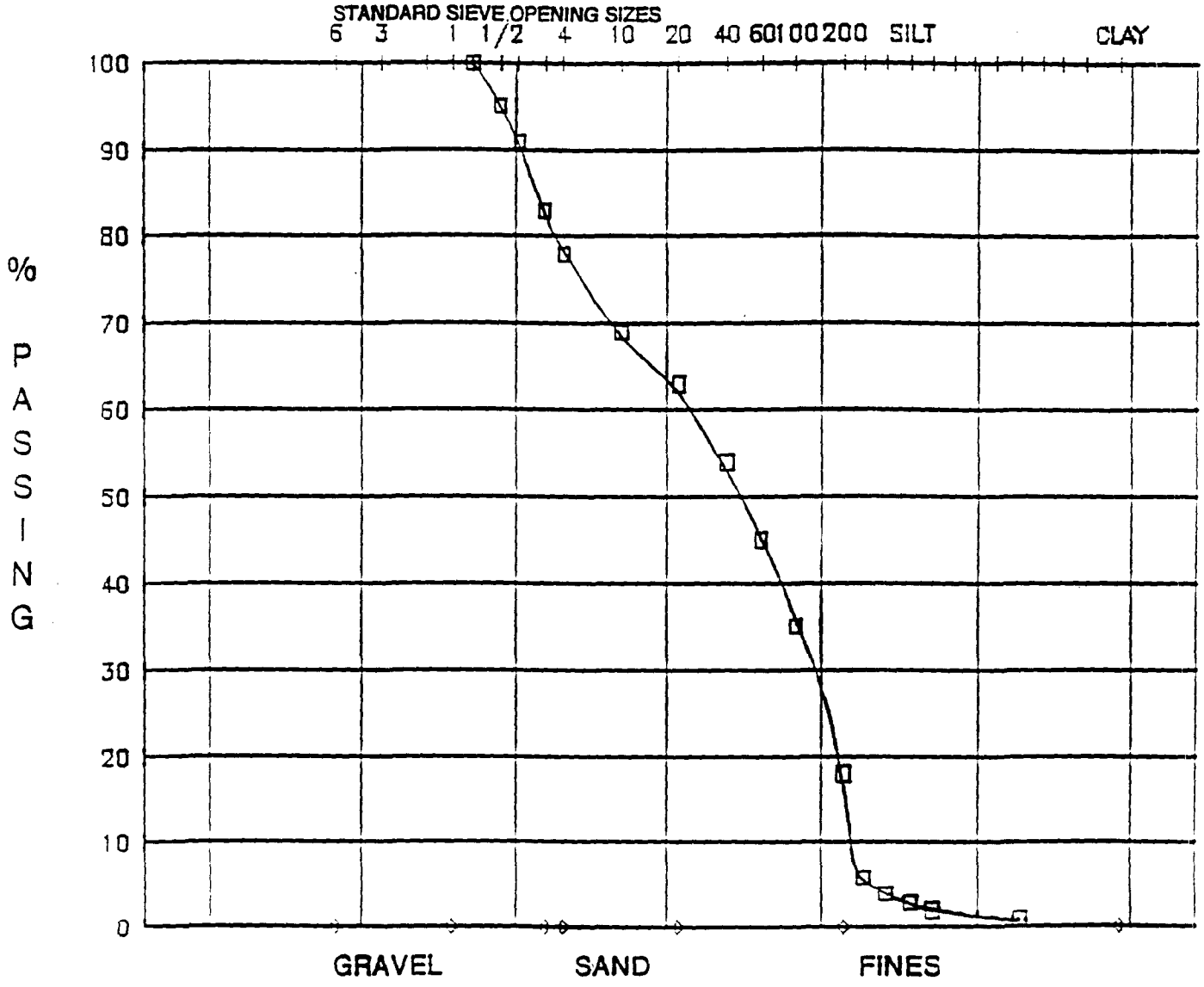
# PARTICLE SIZE DISTRIBUTION
# MECHANICAL AND HYDROMETER ANALYSIS
# ASTM D-421 AND 422




| SAMPLE IDENTITY | Wn% | WL | WP | IP | DESCRIPTION |
|---|---|---|---|---|---|
| ATB-15 (30'-32') | 15.3 | NR | NR | NR | Pale yellowish brown m-f SAND,some f gravel.some fines |

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893-6125.10

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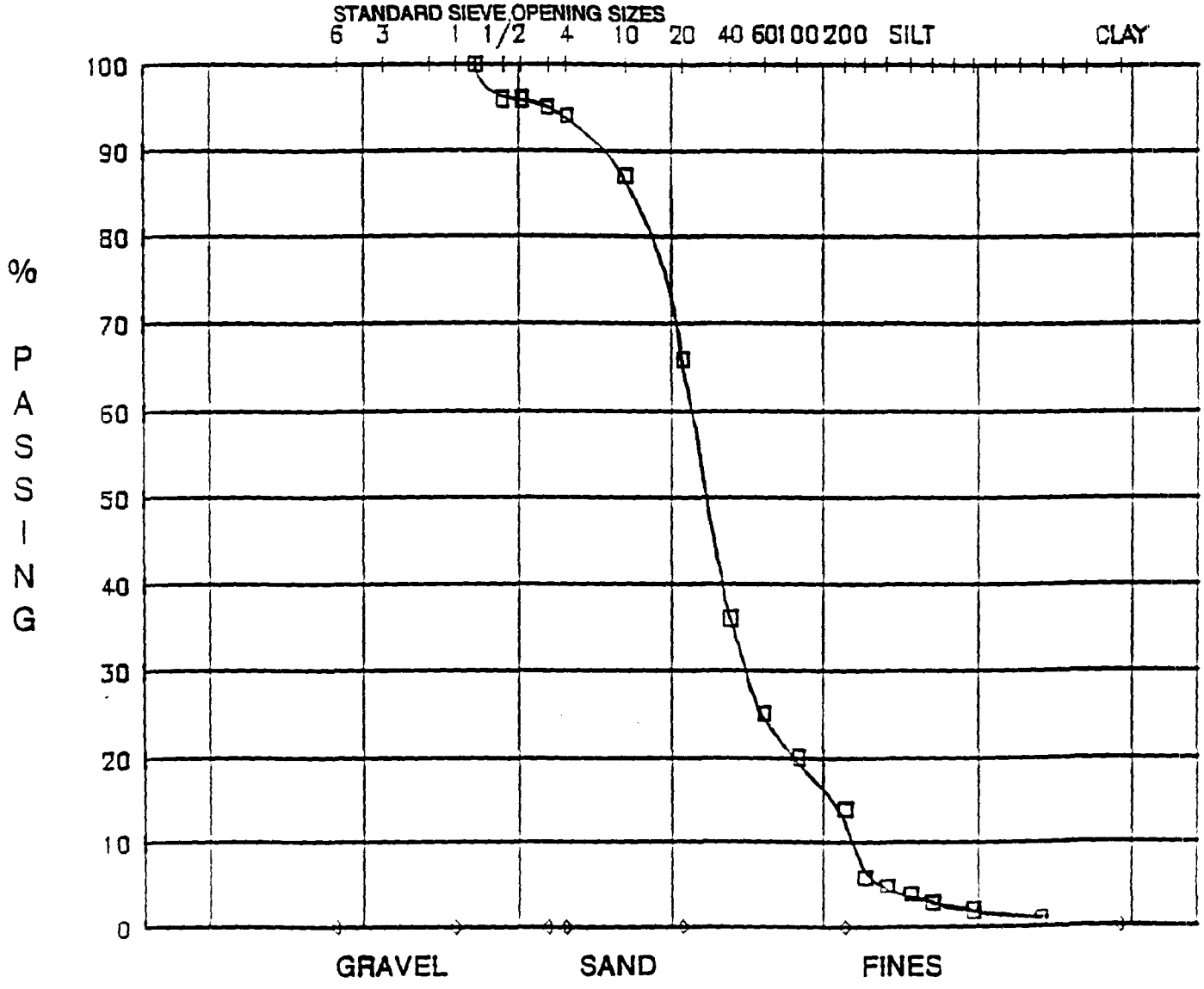
Consulting Engineers

# PARTICLE SIZE DISTRIBUTION
## MECHANICAL AND HYDROMETER ANALYSIS
## ASTM D-421 AND 422




| SAMPLE IDENTITY | Wn% | WL | WP | IP | DESCRIPTION |
|---|---|---|---|---|---|
| ATB-15 (85'-87') | 18.3 | NR | NR | NR | Pale yellowish brown m-f SAND,some fines, little f gravel |

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893-6125.10

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Consulting Engineers

# ESTIMATING TRANSMISSIBILITY FROM EFFECTIVE GRAIN SIZE

This method is based on the Rose & Smith method as modified by Bruin using the curve of Layne Research data and further modified by Sheahan to give minimum values of permeabilities.

Procedure

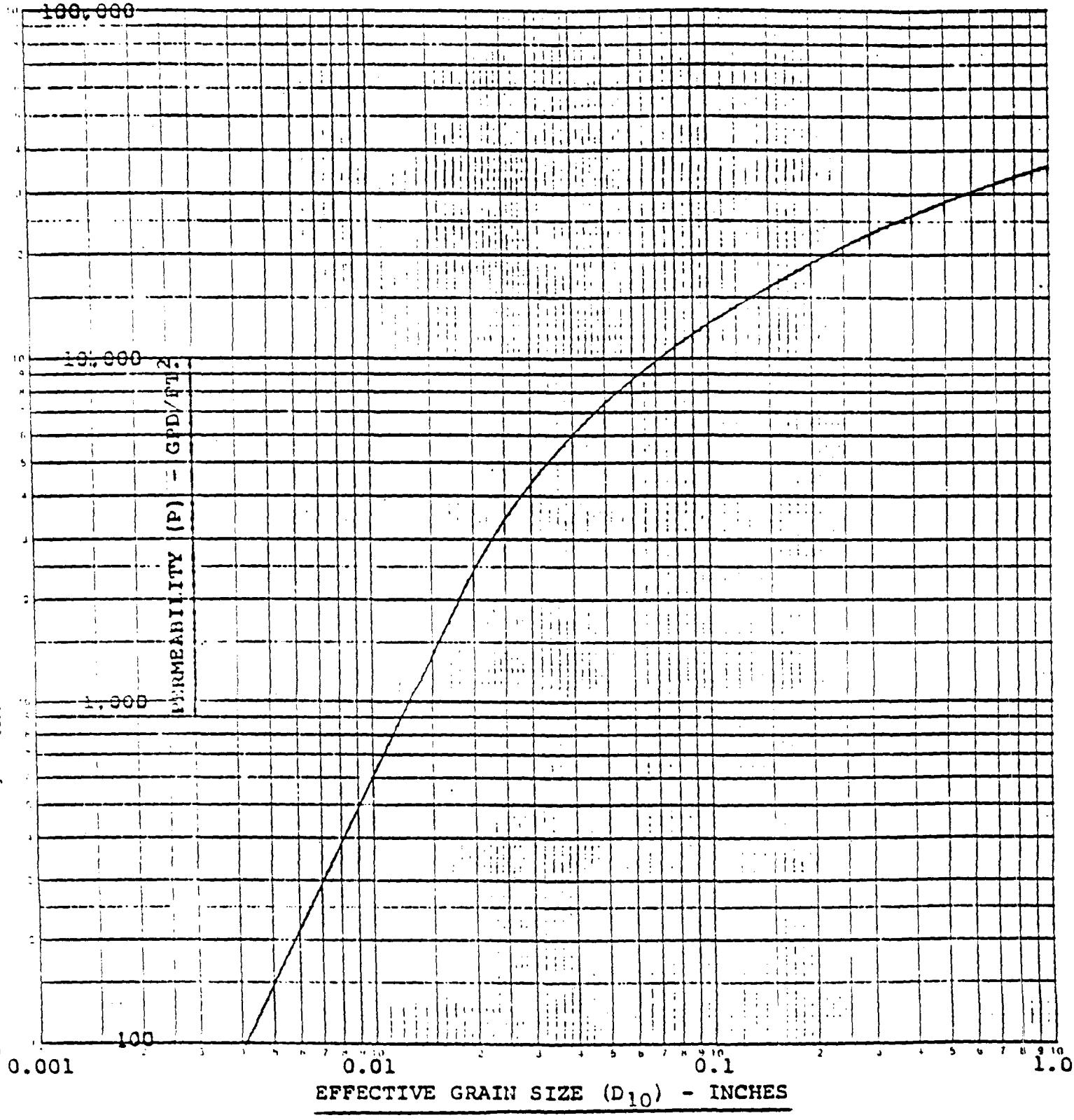
1. Obtain samples of each different section of the water bearing formation using a split-spoon sampler or other accurate sampling devices. Accurate sampling is necessary in order to obtain reliable results by this method.

2. Determine by sieving the effective grain size of each sample which is the grain size in inches at which 10% of the grains are smaller and 90% of the grains are larger. The effective grain size of each section of the aquifer is recorded.

3. The permeability (GPD/Ft.$^2$) for each section of the water bearing formation is determined by plotting the effective grain sizes on the graph on page 15 and reading the corresponding permeabilities.

4. The transmissibility for each section of the aquifer is then determined by multiplying the thickness of each section times the permeability of that section.

5. The transmissibility for all sections of the water bearing formation are totaled giving the transmissibility of the total formation.


100,000
10,000
1,000
100
PERMEABILITY (P) = GPD/FT.²
0.001
0.01
0.1
1.0
EFFECTIVE GRAIN SIZE ($D_{10}$) - INCHES

# APPENDIX D

Well Construction Diagrams

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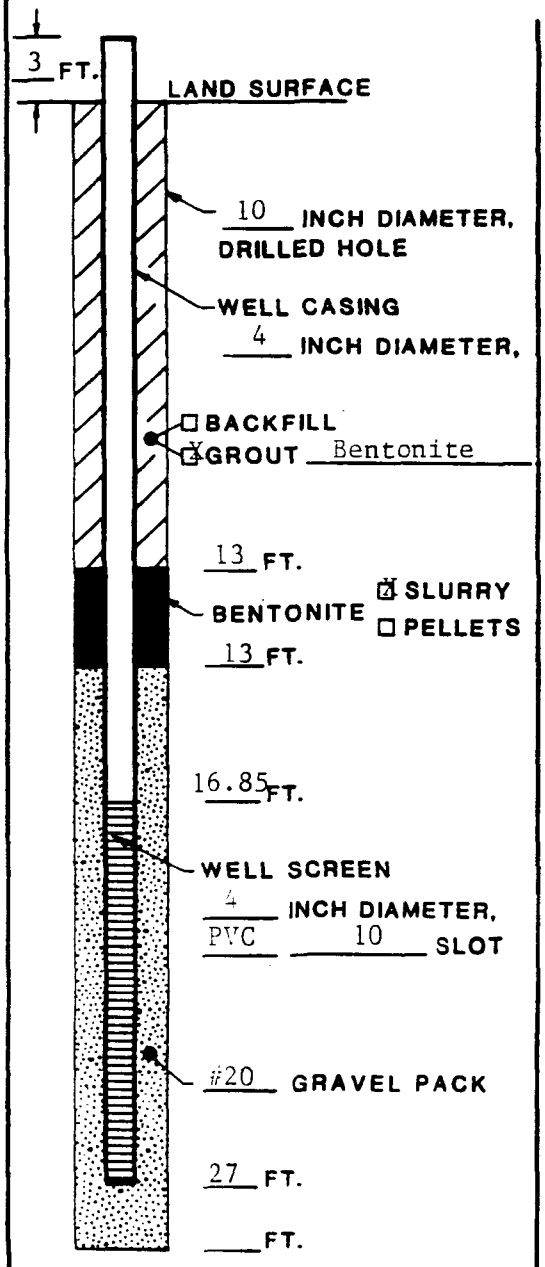
# MONITORING WELL CONSTRUCTION LOG




NOTE:
ALL DEPTHS IN FEET
BELOW LAND SURFACE

PROJECT NAME Industri-Plex PDI NUMBER 16101
WELL NO. OW-23 PERMIT NO. _____
TOWN/CITY Woburn
COUNTY Middlesex STATE M.A.
LAND-SURFACE ELEVATION
AND DATUM _____ FEET ☒ SURVEYED
M.P. datum= 68.54 ☐ ESTIMATED
INSTALLATION DATE(S) 5/16-5/17/90
DRILLING METHOD Hollow Stem Auger
DRILLING CONTRACTOR D.L Maher Company
DRILLING FLUID None

DEVELOPMENT TECHNIQUE(S) AND DATE(S)
Centrifugal pump

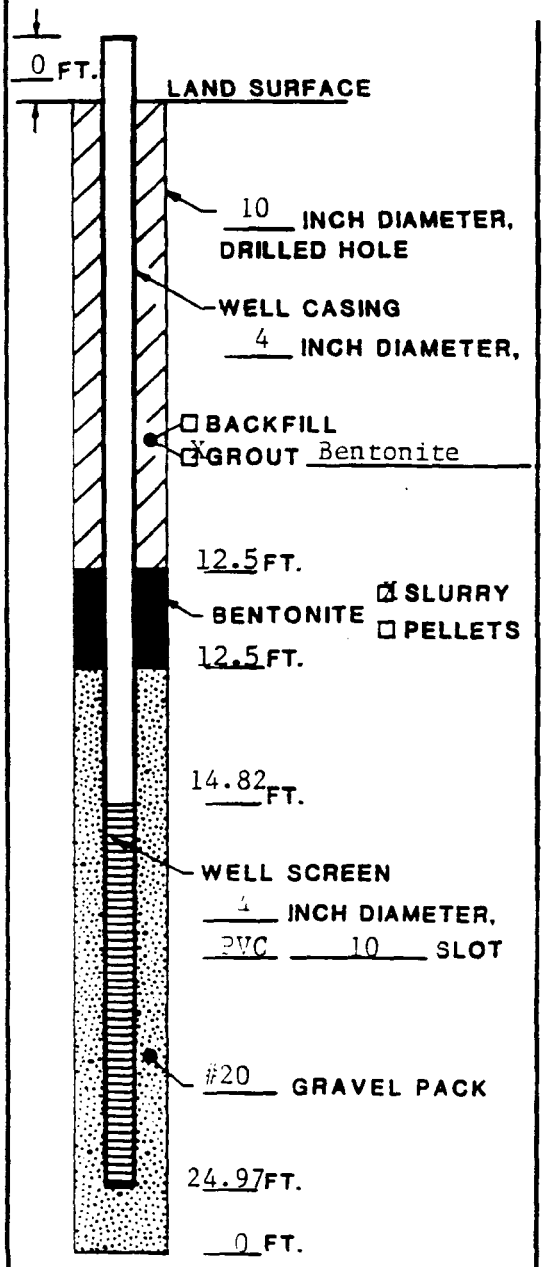
FLUID LOSS DURING DRILLING 250 GALLONS
WATER REMOVED DURING DEVELOPMENT 250 GALLONS
STATIC DEPTH TO WATER 13.73 FEET BELOW M.P.
PUMPING DEPTH TO WATER 28.0 FEET BELOW M.P.
PUMPING DURATION _____ HOURS
YIELD _____ GPM _____ DATE _____
SPECIFIC CAPACITY _____ GPM/FT.
WELL PURPOSE Monitoring Well

REMARKS Poor yielding well pumped dry four times before steady flow rate was achieved.
Waterproof cap and locking lid installed.

HYDROGEOLOGIST Brian Thomas

ROUX
Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# MONITORING WELL CONSTRUCTION LOG




NOTE:
ALL DEPTHS IN FEET
BELOW LAND SURFACE

PROJECT NAME Industri-Plex PDI NUMBER 16101
WELL NO. OW-24a PERMIT NO. _____
TOWN/CITY Woburn
COUNTY Middlesex STATE M.A.
LAND-SURFACE ELEVATION
AND DATUM _____ FEET ☒ SURVEYED
M.P. datum 57.47' ☐ ESTIMATED
INSTALLATION DATE(S) 4/30/90-5/1/90
DRILLING METHOD Hollow Stem Auger
DRILLING CONTRACTOR D.L. Maher
DRILLING FLUID None

DEVELOPMENT TECHNIQUE(S) AND DATE(S)
Centrifugal pump 5/8/90

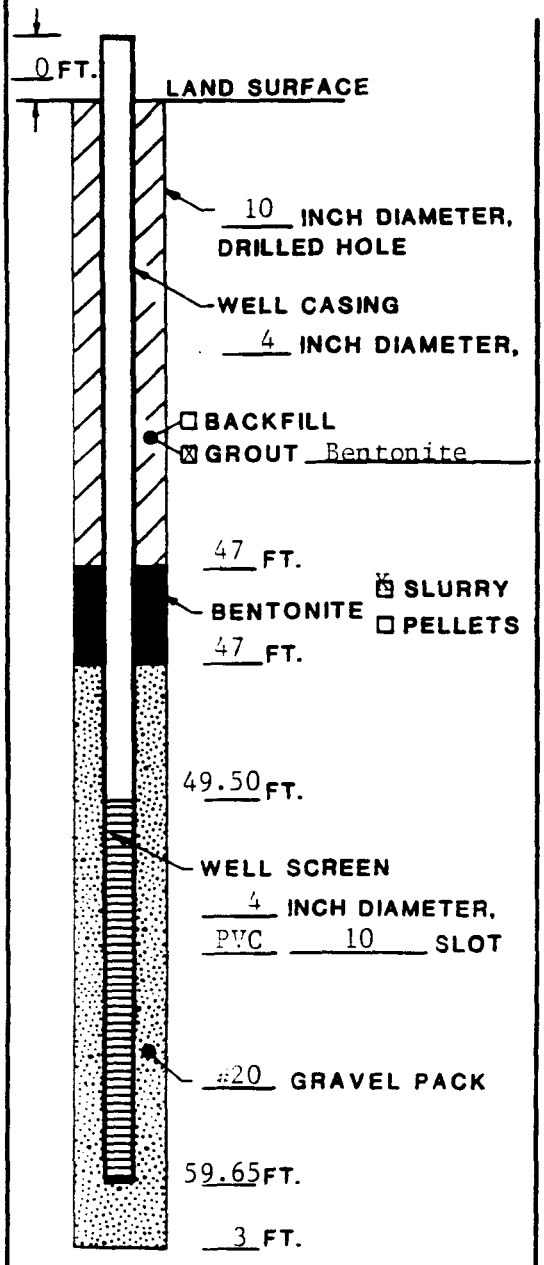
FLUID LOSS DURING DRILLING _____ GALLONS
WATER REMOVED DURING DEVELOPMENT 329 GALLONS
STATIC DEPTH TO WATER 4.24 FEET BELOW M.P.
PUMPING DEPTH TO WATER 7.1 FEET BELOW M.P.
PUMPING DURATION _____ HOURS
YIELD _____ GPM _____ DATE _____
SPECIFIC CAPACITY _____ GPM/FT.
WELL PURPOSE Monitoring Well

REMARKS Waterproof cap and locking lid installed.

HYDROGEOLOGIST Brian Thorne

ROUX
Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# MONITORING WELL CONSTRUCTION LOG




NOTE:
ALL DEPTHS IN FEET
BELOW LAND SURFACE

PROJECT NAME Industri-Plex NUMBER
WELL NO. OW-24b PERMIT NO.
TOWN/CITY Woburn
COUNTY Middlesex STATE M.A.
LAND-SURFACE ELEVATION
AND DATUM FEET ☒ SURVEYED
M.P. datum = 57.26' ☐ ESTIMATED
INSTALLATION DATE(S) 4/26-4/27/90
DRILLING METHOD Hollow Stem Auger
DRILLING CONTRACTOR D.L. Maher
DRILLING FLUID None

DEVELOPMENT TECHNIQUE(S) AND DATE(S)
Submersible pump 5/8/90

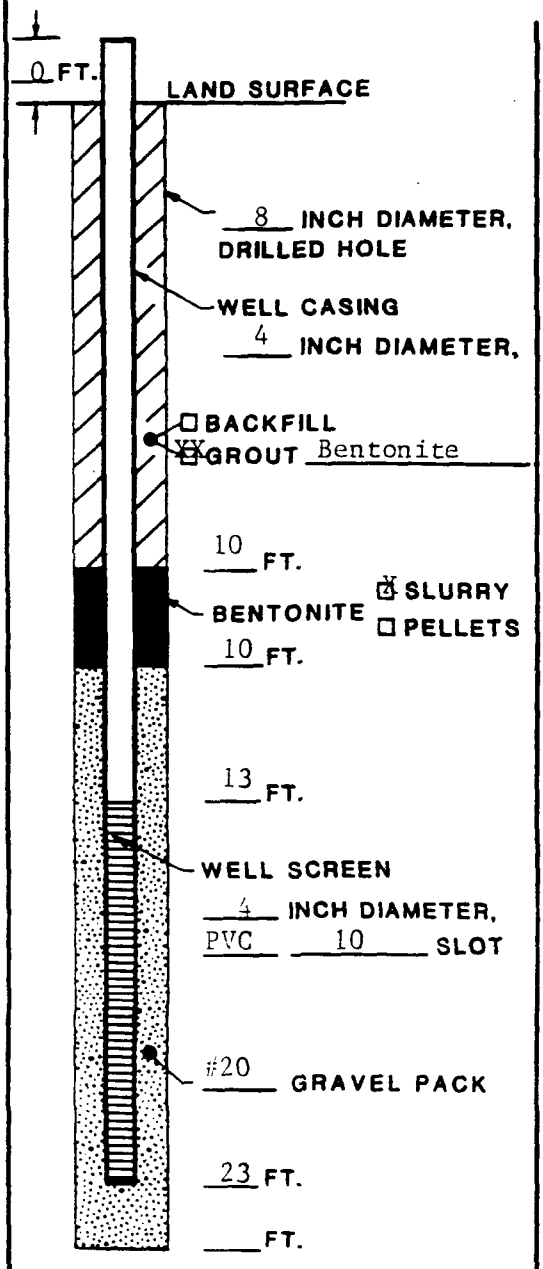
FLUID LOSS DURING DRILLING GALLONS
WATER REMOVED DURING DEVELOPMENT 500 GALLONS
STATIC DEPTH TO WATER 4.12 FEET BELOW M.P.
PUMPING DEPTH TO WATER 20.0' FEET BELOW M.P.
PUMPING DURATION HOURS
YIELD GPM DATE
SPECIFIC CAPACITY GPM/FT.
WELL PURPOSE Monitoring Well

REMARKS Waterproof cap and locking lid installed.

HYDROGEOLOGIST

ROUX
Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# MONITORING WELL CONSTRUCTION LOG




NOTE:
ALL DEPTHS IN FEET
BELOW LAND SURFACE

PROJECT NAME Indsutri-Plex NUMBER
WELL NO. OW-25a PERMIT NO.
TOWN/CITY Woburn
COUNTY Middlesex STATE M.A.
LAND-SURFACE ELEVATION
AND DATUM FEET ☒ SURVEYED
M.P. datum = 66.00' ☐ ESTIMATED
INSTALLATION DATE(S) 5/23/90
DRILLING METHOD Dual Reverse Rotary
DRILLING CONTRACTOR D.L. Maher
DRILLING FLUID Water

DEVELOPMENT TECHNIQUE(S) AND DATE(S)
Centrifugal pump 5/24/90

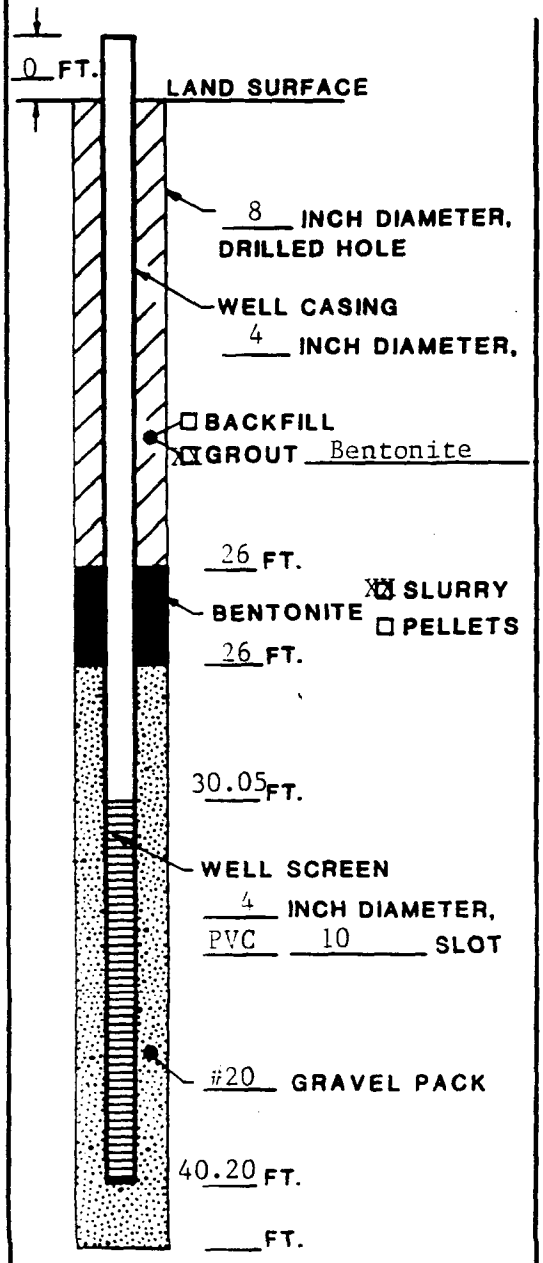
FLUID LOSS DURING DRILLING GALLONS
WATER REMOVED DURING DEVELOPMENT 100 GALLONS
STATIC DEPTH TO WATER 14.18' FEET BELOW M.P.
PUMPING DEPTH TO WATER 14.35 FEET BELOW M.P.
PUMPING DURATION HOURS
YIELD GPM DATE
SPECIFIC CAPACITY GPM/FT.
WELL PURPOSE Monitoring Well

REMARKS Waterproof cap and locking lid instaled.

HYDROGEOLOGIST Brian Thomas

ROUX
Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# MONITORING WELL CONSTRUCTION LOG




NOTE:
ALL DEPTHS IN FEET
BELOW LAND SURFACE

PROJECT NAME Industri-Plex NUMBER
WELL NO. OW-25b PERMIT NO.
TOWN/CITY Woburn
COUNTY Middlesex STATE M.A.
LAND-SURFACE ELEVATION
AND DATUM FEET ☒ SURVEYED
M.P. datum = 65.34' ☐ ESTIMATED
INSTALLATION DATE(S) 5/21/90
DRILLING METHOD Dual Reverse Rotary
DRILLING CONTRACTOR D.L. Maher
DRILLING FLUID Water

DEVELOPMENT TECHNIQUE(S) AND DATE(S)
Centrifugal pump 5/24/90

FLUID LOSS DURING DRILLING GALLONS
WATER REMOVED DURING DEVELOPMENT 120 GALLONS
STATIC DEPTH TO WATER 13.66 FEET BELOW M.P.
PUMPING DEPTH TO WATER 13.53 FEET BELOW M.P.
PUMPING DURATION HOURS
YIELD GPM DATE
SPECIFIC CAPACITY GPM/FT.
WELL PURPOSE Monitoring Well

REMARKS Waterproof cap and locking lid installed.

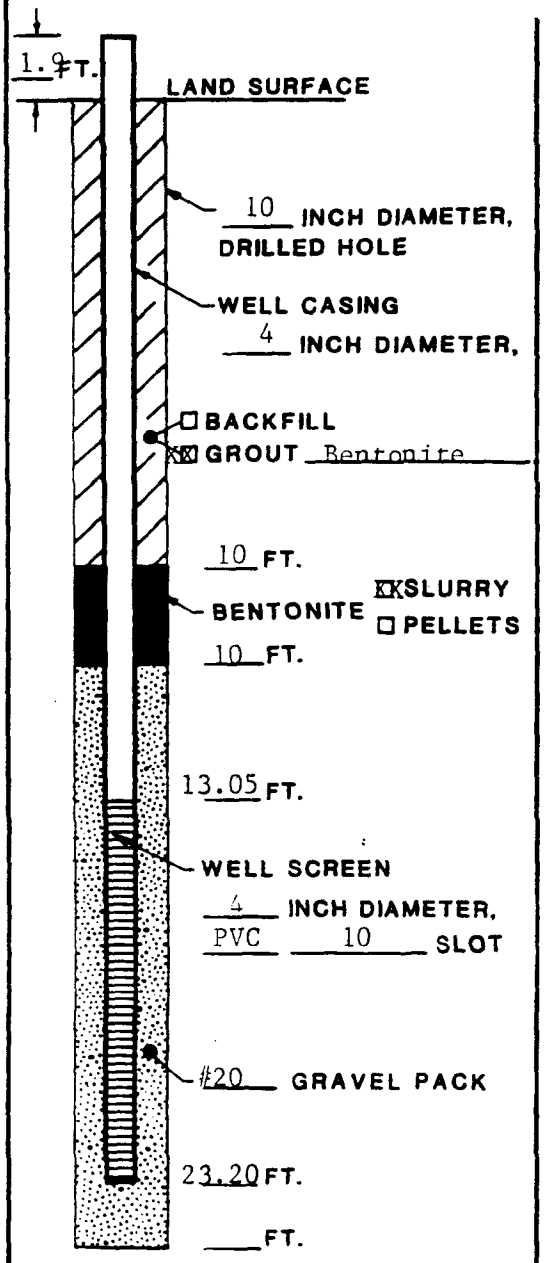
HYDROGEOLOGIST Brian Thorn

1/89

ROUX

Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# MONITORING WELL CONSTRUCTION LOG




NOTE:
ALL DEPTHS IN FEET
BELOW LAND SURFACE

PROJECT NAME Industri-Plex PDI NUMBER _____

WELL NO. OW-26a PERMIT NO. _____

TOWN/CITY Woburn

COUNTY Middlesex STATE M.A.

LAND-SURFACE ELEVATION
AND DATUM _____ FEET ☒ SURVEYED
M.P. datum = 64.15 ☐ ESTIMATED

INSTALLATION DATE(S) 5/11/90

DRILLING METHOD Hollow Stem Auger

DRILLING CONTRACTOR D.L. Maher

DRILLING FLUID None

DEVELOPMENT TECHNIQUE(S) AND DATE(S)
Centrifugal pump

FLUID LOSS DURING DRILLING _____ GALLONS

WATER REMOVED DURING DEVELOPMENT 250 GALLONS

STATIC DEPTH TO WATER 8.37 FEET BELOW M.P.

PUMPING DEPTH TO WATER 8.00 FEET BELOW M.P.

PUMPING DURATION _____ HOURS

YIELD _____ GPM _____ DATE _____

SPECIFIC CAPACITY _____ GPM/FT.

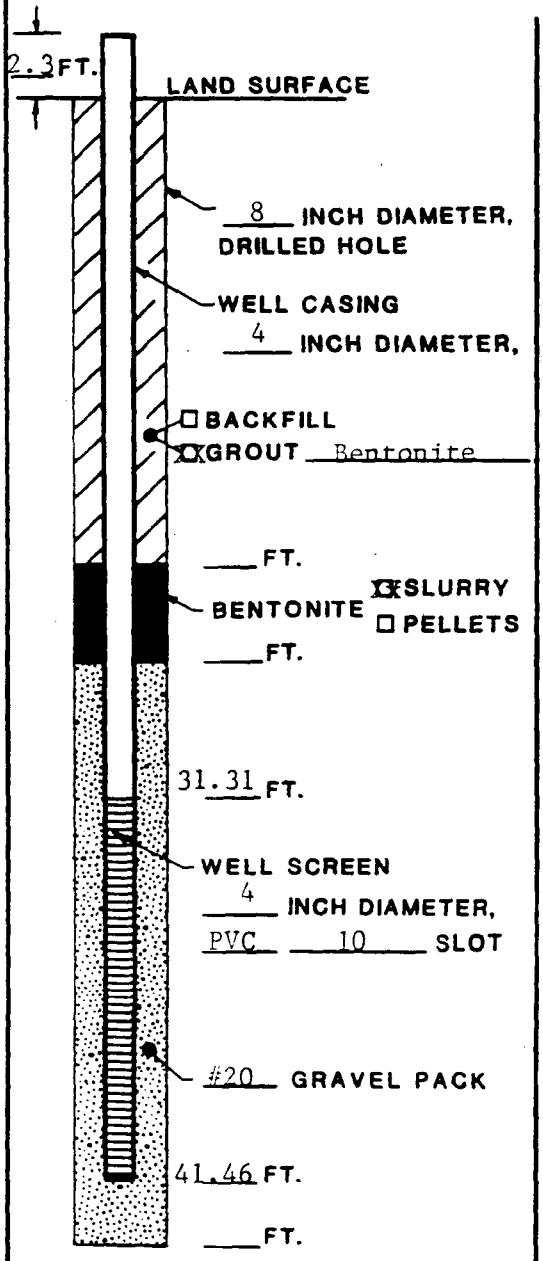
WELL PURPOSE Monitoring Well

REMARKS Waterproof cap and locking lid installed.

HYDROGEOLOGIST Brian Jones

ROUX
Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# MONITORING WELL CONSTRUCTION LOG




NOTE:
ALL DEPTHS IN FEET
BELOW LAND SURFACE

PROJECT NAME Industri-Plex NUMBER ____

WELL NO. OW-26b PERMIT NO. ____

TOWN/CITY Woburn

COUNTY Middlesex STATE M.A.

LAND-SURFACE ELEVATION
AND DATUM ____ FEET ☒ SURVEYED
M.P. datum = 63.80 ☐ ESTIMATED

INSTALLATION DATE(S) 5/24/90

DRILLING METHOD Dual Reverse Rotary

DRILLING CONTRACTOR D.L. Maher

DRILLING FLUID Water

DEVELOPMENT TECHNIQUE(S) AND DATE(S)
Centrifugal pump 5/25/90-5/26/90

FLUID LOSS DURING DRILLING 1500 GALLONS

WATER REMOVED DURING DEVELOPMENT 1500 GALLONS

STATIC DEPTH TO WATER 8.19 FEET BELOW M.P.

PUMPING DEPTH TO WATER 27.9' FEET BELOW M.P.

PUMPING DURATION ____ HOURS

YIELD ____ GPM ____ DATE ____

SPECIFIC CAPACITY ____ GPM/FT.

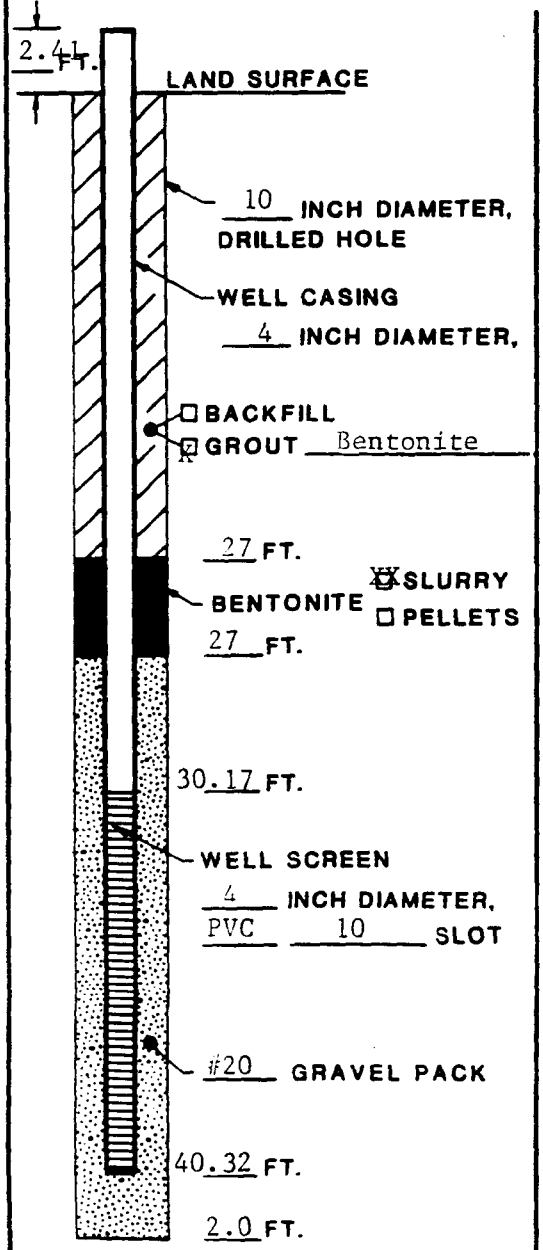
WELL PURPOSE Monitoring Well

REMARKS Waterproof cap and locking lid installed.

HYDROGEOLOGIST Brian T. Moore

ROUX
Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# MONITORING WELL CONSTRUCTION LOG




NOTE:
ALL DEPTHS IN FEET
BELOW LAND SURFACE

PROJECT NAME Industri-Plex NUMBER
WELL NO. OW-27a PERMIT NO.
TOWN/CITY Woburn
COUNTY Middlesex STATE M.A.
LAND-SURFACE ELEVATION
AND DATUM FEET ☒ SURVEYED
M.P. datum 70.84 ☐ ESTIMATED
INSTALLATION DATE(S) 5/3/90
DRILLING METHOD Hollow Stem Auger
DRILLING CONTRACTOR D.L. Maher
DRILLING FLUID

DEVELOPMENT TECHNIQUE(S) AND DATE(S)
Centrifugal pump 5/9/90 and 5/25/90

FLUID LOSS DURING DRILLING GALLONS
WATER REMOVED DURING DEVELOPMENT 300 GALLONS
STATIC DEPTH TO WATER 17.17 FEET BELOW M.P.
PUMPING DEPTH TO WATER 19.79' FEET BELOW M.P.
PUMPING DURATION HOURS
YIELD GPM DATE
SPECIFIC CAPACITY GPM/FT.
WELL PURPOSE Monitoring Well

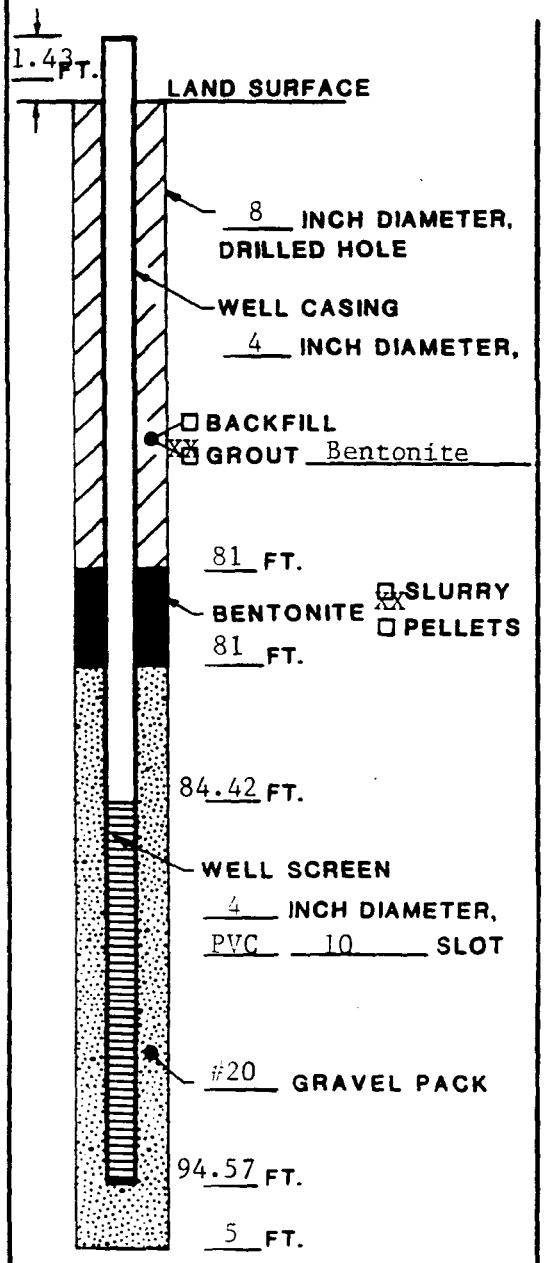
REMARKS Waterproof cap and locking lid instslled.

HYDROGEOLOGIST

1/89

ROUX
Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# MONITORING WELL CONSTRUCTION LOG




NOTE:
ALL DEPTHS IN FEET
BELOW LAND SURFACE

PROJECT NAME Industri-Plex NUMBER
WELL NO. OW-27b PERMIT NO.
TOWN/CITY Woburn
COUNTY Middlesex STATE M.A.
LAND-SURFACE ELEVATION
AND DATUM FEET ☒ SURVEYED
M.P. datum = 70.52 ☐ ESTIMATED
INSTALLATION DATE(S) 5/16/90
DRILLING METHOD Dual Rerverse Rotary
DRILLING CONTRACTOR D.L. Maher
DRILLING FLUID Water

DEVELOPMENT TECHNIQUE(S) AND DATE(S)
Submersible pump 5/22/90 5/25/90

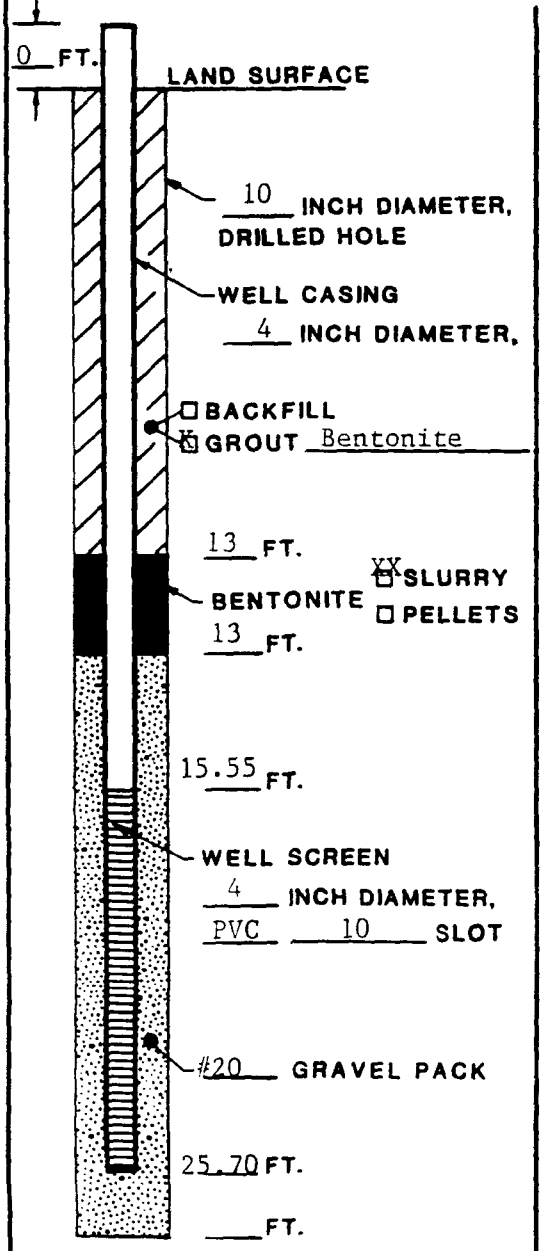
FLUID LOSS DURING DRILLING 1500 GALLONS
WATER REMOVED DURING DEVELOPMENT 1500 GALLONS
STATIC DEPTH TO WATER 18.56 FEET BELOW M.P.
PUMPING DEPTH TO WATER FEET BELOW M.P.
PUMPING DURATION HOURS
YIELD GPM DATE
SPECIFIC CAPACITY GPM/FT.
WELL PURPOSE Monitoring Well

REMARKS Waterproof cap and locking lid installed.

HYDROGEOLOGIST Brian Thomas

ROUX
Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# MONITORING WELL CONSTRUCTION LOG




NOTE:
ALL DEPTHS IN FEET
BELOW LAND SURFACE

PROJECT NAME Indusrti-Plex PDI NUMBER _____
WELL NO. OW-29 PERMIT NO. _____
TOWN/CITY Woburn
COUNTY Middlesex STATE M.A.
LAND-SURFACE ELEVATION
AND DATUM _____ FEET ☒ SURVEYED
M.P. datum = 61.17 ☐ ESTIMATED
INSTALLATION DATE(S) 5/1/90-5/2/90
DRILLING METHOD Hollow Stem Auger
DRILLING CONTRACTOR D.L. Maher Company
DRILLING FLUID _____

DEVELOPMENT TECHNIQUE(S) AND DATE(S)
Centrifugal pump 5/8/90 and 5/24/90

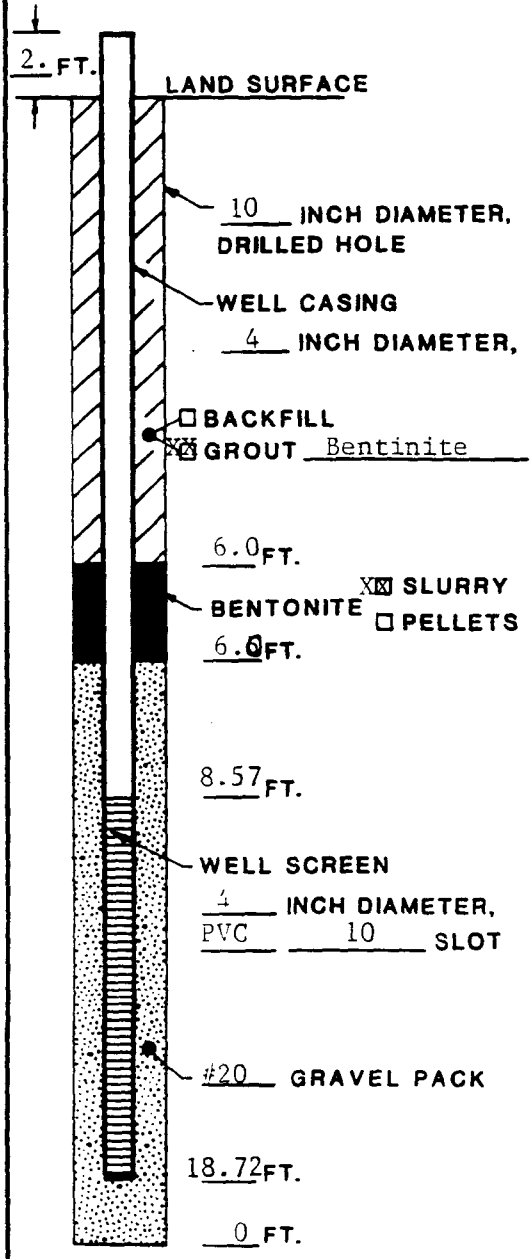
FLUID LOSS DURING DRILLING _____ GALLONS
WATER REMOVED DURING DEVELOPMENT 320 GALLONS
STATIC DEPTH TO WATER 5.31 FEET BELOW M.P.
PUMPING DEPTH TO WATER 6.37 FEET BELOW M.P.
PUMPING DURATION _____ HOURS
YIELD _____ GPM _____ DATE _____
SPECIFIC CAPACITY _____ GPM/FT.
WELL PURPOSE Monitoring Well

REMARKS Waterproof cap and locking lid installed.

HYDROGEOLOGIST _____

ROUX
Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# MONITORING WELL
# CONSTRUCTION LOG




NOTE:
ALL DEPTHS IN FEET
BELOW LAND SURFACE

PROJECT NAME Industri-Plex PDI NUMBER _____

WELL NO. OW-30a PERMIT NO. _____

TOWN/CITY Woburn

COUNTY Middlesex STATE M.A.

LAND-SURFACE ELEVATION
AND DATUM _____ FEET ☒ SURVEYED
M.P. datum 65.90 ☐ ESTIMATED

INSTALLATION DATE(S) 5/11/90

DRILLING METHOD Hollow Stem Auger

DRILLING CONTRACTOR D.L. Maher

DRILLING FLUID None

DEVELOPMENT TECHNIQUE(S) AND DATE(S)
Centrifugal pump 5/31/90

FLUID LOSS DURING DRILLING _____ GALLONS

WATER REMOVED DURING DEVELOPMENT 500 GALLONS

STATIC DEPTH TO WATER 11.61 FEET BELOW M.P.

PUMPING DEPTH TO WATER _____ FEET BELOW M.P.

PUMPING DURATION _____ HOURS

YIELD _____ GPM _____ DATE _____

SPECIFIC CAPACITY _____ GPM/FT.

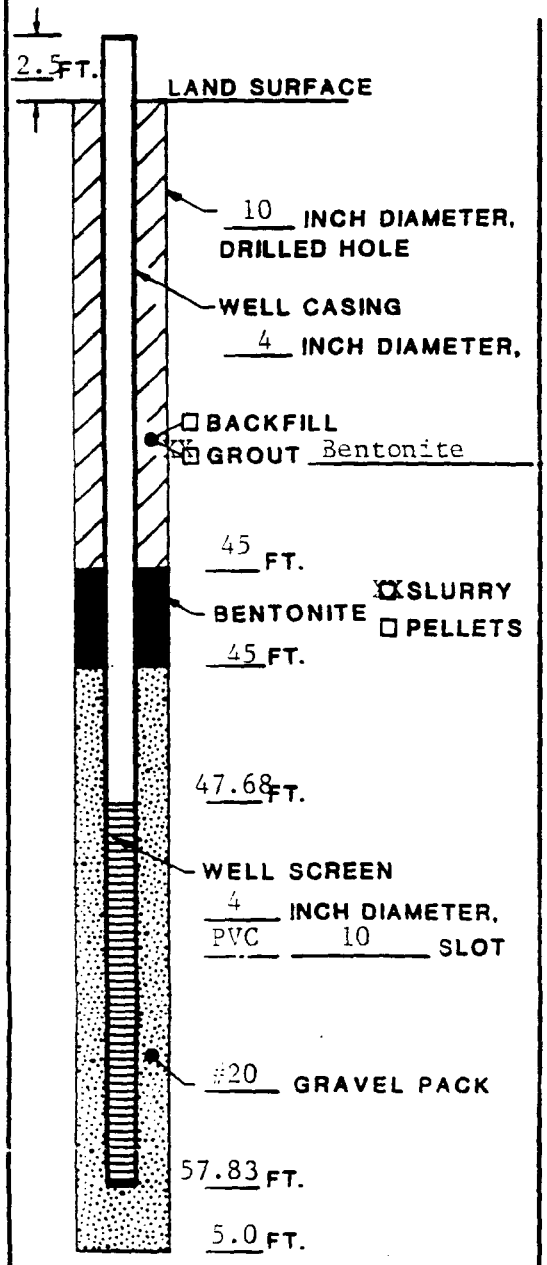
WELL PURPOSE Monitoring Well

REMARKS Waterproof cap and locking lid installed.

HYDROGEOLOGIST Brian Stone

ROUX
Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# MONITORING WELL
# CONSTRUCTION LOG




NOTE:
ALL DEPTHS IN FEET
BELOW LAND SURFACE

PROJECT NAME Industri-Plex PDI NUMBER _____

WELL NO. OW-30b PERMIT NO. _____

TOWN/CITY Woburn

COUNTY Middlesex STATE M.A.

LAND-SURFACE ELEVATION
AND DATUM _____ FEET ☒ SURVEYED
M.P. datum 65.60 ☐ ESTIMATED

INSTALLATION DATE(S) 5/10/90-5/11/90

DRILLING METHOD Hollow Stem Auger

DRILLING CONTRACTOR D.L. Maher

DRILLING FLUID None

DEVELOPMENT TECHNIQUE(S) AND DATE(S)
Centrifugal pump 5/30/90

FLUID LOSS DURING DRILLING _____ GALLONS

WATER REMOVED DURING DEVELOPMENT 500 GALLONS

STATIC DEPTH TO WATER 11.44 FEET BELOW M.P.

PUMPING DEPTH TO WATER 28.50 FEET BELOW M.P.

PUMPING DURATION _____ HOURS

YIELD _____ GPM _____ DATE _____

SPECIFIC CAPACITY _____ GPM/FT.

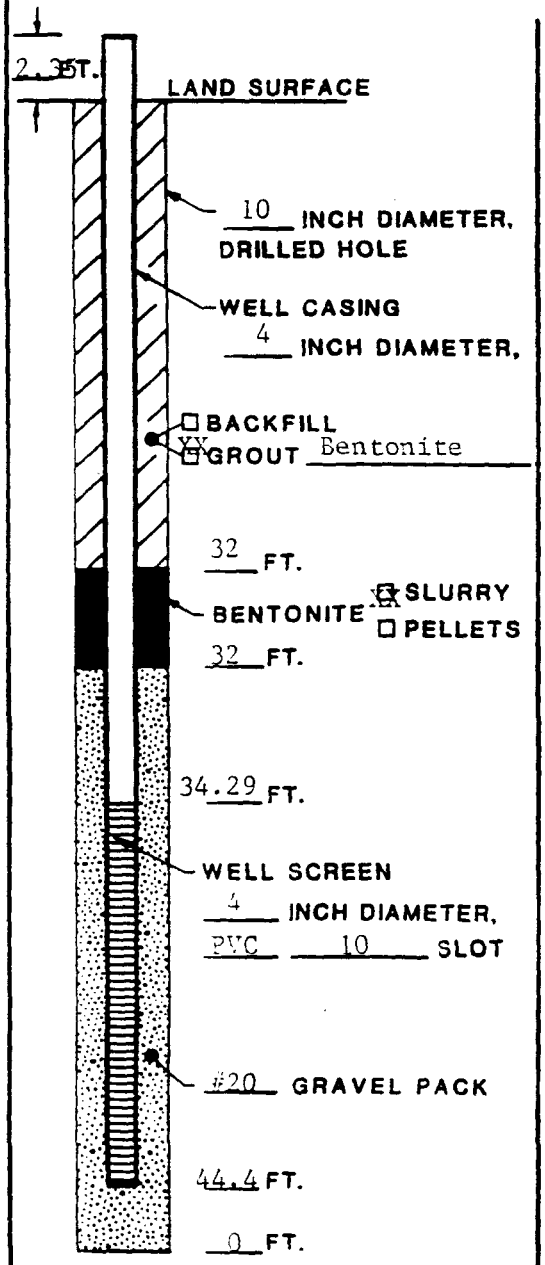
WELL PURPOSE Monitoring Well

REMARKS Well moved up 0.6' while setting
Waterproof cap and locking lid installed.

HYDROGEOLOGIST Brian Howard

ROUX
Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# MONITORING WELL CONSTRUCTION LOG




NOTE:
ALL DEPTHS IN FEET
BELOW LAND SURFACE

PROJECT NAME Industri-Plex Site NUMBER _____

WELL NO. OW-33a PERMIT NO. _____

TOWN/CITY Woburn

COUNTY Middlesex STATE M.A.

LAND-SURFACE ELEVATION

AND DATUM _____ FEET ☒ SURVEYED

M.P. datum = 56.83 ☐ ESTIMATED

INSTALLATION DATE(S) 4/23/90

DRILLING METHOD Hollow Stem Auger

DRILLING CONTRACTOR D.L. Maher

DRILLING FLUID None

DEVELOPMENT TECHNIQUE(S) AND DATE(S)

Centrifugal pump 5/7/90 5/25/90

FLUID LOSS DURING DRILLING _____ GALLONS

WATER REMOVED DURING DEVELOPMENT 367 GALLONS

STATIC DEPTH TO WATER 5.35 FEET BELOW M.P.

PUMPING DEPTH TO WATER 6.12 FEET BELOW M.P.

PUMPING DURATION _____ HOURS

YIELD _____ GPM _____ DATE _____

SPECIFIC CAPACITY _____ GPM/FT.

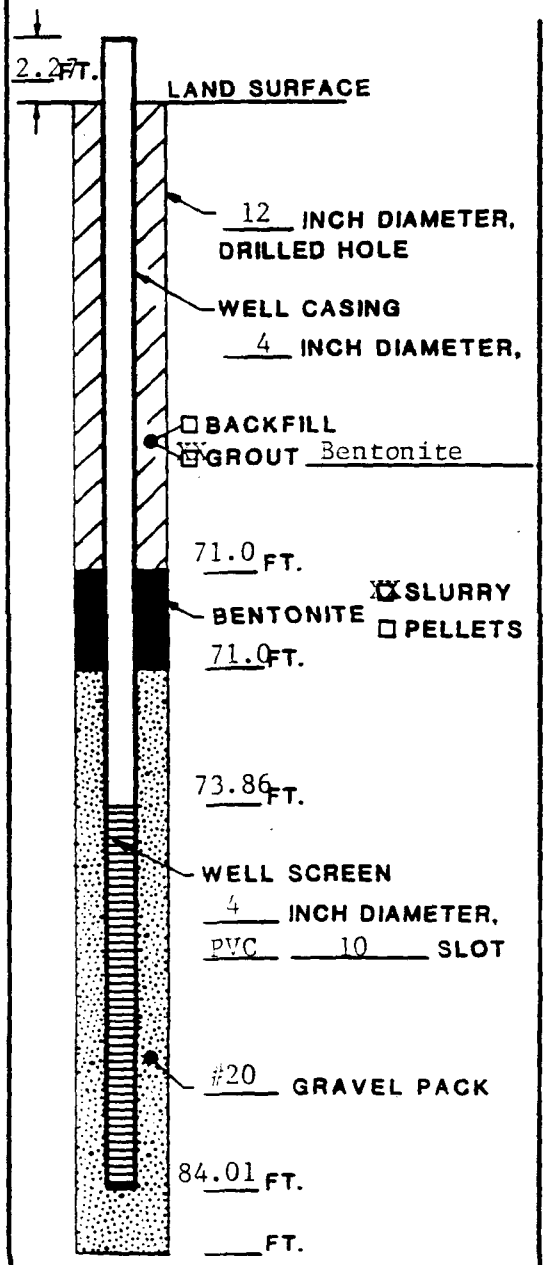
WELL PURPOSE Monitoring Well

REMARKS Waterproof cap and locking lid installed.

HYDROGEOLOGIST [signature]

ROUX
Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# MONITORING WELL CONSTRUCTION LOG




NOTE:
ALL DEPTHS IN FEET
BELOW LAND SURFACE

PROJECT NAME Industri-Plex NUMBER
WELL NO. OW-33b PERMIT NO.
TOWN/CITY Woburn
COUNTY Middlesex STATE M.A.
LAND-SURFACE ELEVATION
AND DATUM FEET ☒ SURVEYED
M.P. datum 56.66 ☐ ESTIMATED
INSTALLATION DATE(S) 5/8/90-5/9/90
DRILLING METHOD Hollow Stem Auger
DRILLING CONTRACTOR D.L. Maher
DRILLING FLUID

DEVELOPMENT TECHNIQUE(S) AND DATE(S)
Submersible pump 5/30/90 5/24/90-5/25/90

FLUID LOSS DURING DRILLING GALLONS
WATER REMOVED DURING DEVELOPMENT 1250 GALLONS
STATIC DEPTH TO WATER 4.74 FEET BELOW M.P.
PUMPING DEPTH TO WATER 50.03 FEET BELOW M.P.
PUMPING DURATION HOURS
YIELD GPM DATE
SPECIFIC CAPACITY GPM/FT.
WELL PURPOSE Monitoring Well

REMARKS Waterproof cap and locking lid installed.

HYDROGEOLOGIST Brian Thorne

1/89

## APPENDIX E

Well Sampling Forms

ROUX Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# WELL SAMPLING DATA FORM

CLIENT Golder Associates
PROJECT NO. 161014
LOCATION Industri-Plex Woburn Mass.

WELL NUMBER OW-24A
DATE 6/4/90
WEATHER Partly Sunny, Windy
SAMPLED BY B. Thomas

TYPE OF WELL Monitoring well
STORAGE TANK
TIME OF START
TIME OF FINISH

| | | |
|---|---|---|
| DEPTH TO BOTTOM OF WELL | 24.39 | FT. |
| DEPTH TO WATER | 4.24 | FT. |
| WATER COLUMN | 20.15 | FT. |
| VOLUME OF WATER IN WELL | 13.10 | GAL. |
| VOLUME OF WATER TO REMOVE | 39.30 | GAL. |
| VOLUME REMOVED | 48 | GAL. |

RATE OF PURGE 12 gpm (4 min)
METHOD OF PURGE Centrifugal Pump

PHYSICAL APPEARANCE/COMMENTS
Split with MW5 and GZA
pH meter not functioning

FIELD MEASUREMENTS

| TIME | pH | COND | TEMP | TURB | Eh | $O_2$ |
|---|---|---|---|---|---|---|
| 12:15 | | 440 umho | 14 °C | NA | NA | NA |

NA - not applicable

TYPES OF SAMPLES COLLECTED
TCL - CLP

LABORATORY NAME AND LOCATION
Erco laboratory Cambridge Massachusetts

ROUX Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# WELL SAMPLING DATA FORM

CLIENT Golder Associates
PROJECT NO. 161014
LOCATION Industri-Plex, Woburn, Mass.

WELL NUMBER OW-24B
DATE 6/4/90
WEATHER Partly Sunny, Windy
SAMPLED BY B. Thomas

TYPE OF WELL
STORAGE TANK
TIME OF START
TIME OF FINISH

| | | |
|---|---|---|
| DEPTH TO BOTTOM OF WELL | Silt to 57.76 | FT. |
| DEPTH TO WATER | 4.12 | FT. |
| WATER COLUMN | 53.64 | FT. |
| VOLUME OF WATER IN WELL | 34.87 | GAL. |
| VOLUME OF WATER TO REMOVE | 104.61 | GAL. |
| VOLUME REMOVED | 106 | GAL. |

RATE OF PURGE ~~Centrifu~~ 5 gpm (3 min); 1 gpm (6 min); 2 gpm (20 min); 3 gpm (15 min)
METHOD OF PURGE Centrifugal Pump

PHYSICAL APPEARANCE/COMMENTS

~~Turbid~~ Split with NUS + GZA
pH meter not functioning

FIELD MEASUREMENTS

| TIME | pH | COND | TEMP | TURB | Eh | $O^2$ |
|---|---|---|---|---|---|---|
| 11:25 | | 400 umho | 13°C | NM | NM | NM |

NM- Not measured

TYPES OF SAMPLES COLLECTED

TCL - CLP

LABORATORY NAME AND LOCATION

Erco lab Cambridge, MA

ROUX Consulting Ground-Water Geologists
ROUX ASSOCIATES INC.

# WELL SAMPLING DATA FORM

CLIENT Golder Associates
PROJECT NO. 161014
LOCATION Industri-Plex, Woburn, Mass

WELL NUMBER OW-25A
DATE 6/5/90
WEATHER Partly Sunny
SAMPLED BY B. Thomas

TYPE OF WELL
STORAGE TANK
TIME OF START
TIME OF FINISH

| | | |
|---|---|---|
| DEPTH TO BOTTOM OF WELL | 23.00 | FT. |
| DEPTH TO WATER | 13.53 | FT. |
| WATER COLUMN | 9.47 | FT. |
| VOLUME OF WATER IN WELL | 6.16 | GAL. |
| VOLUME OF WATER TO REMOVE | 18.48 | GAL. |
| VOLUME REMOVED | 22.5 | GAL. |

RATE OF PURGE 7 1/2 gpm (3 min)
METHOD OF PURGE Centrifugal Pump

PHYSICAL APPEARANCE/COMMENTS

FIELD MEASUREMENTS

| TIME | pH | COND | TEMP | TURB | Eh | $O^2$ |
|---|---|---|---|---|---|---|
| 12:10 | 5.51 | 50.9 umho | 12°C | NM | NM | NM |

Not measured

TYPES OF SAMPLES COLLECTED

TCL-CLP

LABORATORY NAME AND LOCATION

Erco lab Cambridge, MA

ROUX Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# WELL SAMPLING DATA FORM

CLIENT Golder Associates
PROJECT NO. 161014
LOCATION Industri-Plex Site Woburn, Mass.

WELL NUMBER OW-25B
DATE 6/5/90
WEATHER Partly Sunny
SAMPLED BY B. Thomas

TYPE OF WELL
STORAGE TANK
TIME OF START
TIME OF FINISH

| | | |
|---|---|---|
| DEPTH TO BOTTOM OF WELL | 39.42 | FT. |
| DEPTH TO WATER | 12.94 | FT. |
| WATER COLUMN | 26.48 | FT. |
| VOLUME OF WATER IN WELL | 17.21 | GAL. |
| VOLUME OF WATER TO REMOVE | 51.63 | GAL. |
| VOLUME REMOVED | 55 | GAL. |

RATE OF PURGE 10 gpm (5½ min)
METHOD OF PURGE Centrifugal Pump

PHYSICAL APPEARANCE/COMMENTS

FIELD MEASUREMENTS

| TIME | pH | COND | TEMP | TURB | Eh | $O_2$ |
|---|---|---|---|---|---|---|
| 12:25 | 6.07 | 279 umho | 13°C | NM | NM | NM |

NM - Not Measured

TYPES OF SAMPLES COLLECTED

TCL - CLP

LABORATORY NAME AND LOCATION

Erco lab Cambridge, MA

ROUX Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# WELL SAMPLING DATA FORM

CLIENT Golder Associates
PROJECT NO. 161014
LOCATION Industri-Plex Site, Woburn, Mass

WELL NUMBER OW-26A
DATE 6/5/90
WEATHER Partly Sunny
SAMPLED BY B. Thomas

TYPE OF WELL
STORAGE TANK
TIME OF START
TIME OF FINISH

| | | |
|---|---|---|
| DEPTH TO BOTTOM OF WELL | 25.10 | FT. |
| DEPTH TO WATER | 8.37 | FT. |
| WATER COLUMN | 16.73 | FT. |
| VOLUME OF WATER IN WELL | 10.87 | GAL. |
| VOLUME OF WATER TO REMOVE | 32.61 | GAL. |
| VOLUME REMOVED | 35 | GAL. |

RATE OF PURGE 10 gpm (3½ min)
METHOD OF PURGE Centrifugal Pump

PHYSICAL APPEARANCE/COMMENTS

FIELD MEASUREMENTS

| TIME | pH | COND | TEMP | TURB | Eh | $O^2$ |
|---|---|---|---|---|---|---|
| 15:30 | 6.87 | 301 umhos | 12°C | NM | NM | NM |

NM- not measured

TYPES OF SAMPLES COLLECTED

TCL-CLP

LABORATORY NAME AND LOCATION

Erco lab, Cambridge, MA

ROUX Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# WELL SAMPLING DATA FORM

CLIENT Gelber Associates
PROJECT NO. 161014
LOCATION Industri-Plex Site; Woburn, Mass

WELL NUMBER OW-26B
DATE 6/5/90
WEATHER Partly Sunny
SAMPLED BY B. Thomas

TYPE OF WELL
STORAGE TANK
TIME OF START
TIME OF FINISH

| | | |
|---|---|---|
| DEPTH TO BOTTOM OF WELL | 43.76 | FT. |
| DEPTH TO WATER | 8.19 | FT. |
| WATER COLUMN | 35.57 | FT. |
| VOLUME OF WATER IN WELL | 23.12 | GAL. |
| VOLUME OF WATER TO REMOVE | 69.36 | GAL. |
| VOLUME REMOVED | 72 | GAL. |

RATE OF PURGE 8 gpm (6 min); 6 gpm (4 min)
METHOD OF PURGE Centrifugal Pump

PHYSICAL APPEARANCE/COMMENTS

FIELD MEASUREMENTS

| TIME | pH | COND | TEMP | TURB | Eh | $O^2$ |
|---|---|---|---|---|---|---|
| 15:50 | 6.28 | 401 umh. | 11°C | NM | NM | NM |

Not measured
TYPES OF SAMPLES COLLECTED

TCL - CLP

LABORATORY NAME AND LOCATION

Erco lab, Cambridge MA

ROUX Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# WELL SAMPLING DATA FORM

CLIENT Calder Associates
PROJECT NO. 161014
LOCATION Industri-Plex Site; Woburn, Mass.

WELL NUMBER OW-27A
DATE 6/5/90
WEATHER Partly Sunny
SAMPLED BY B. Thomas

TYPE OF WELL
STORAGE TANK
TIME OF START
TIME OF FINISH

| | | |
|---|---|---|
| DEPTH TO BOTTOM OF WELL | 42.73 | FT. |
| DEPTH TO WATER | 17.17 | FT. |
| WATER COLUMN | 25.56 | FT. |
| VOLUME OF WATER IN WELL | 16.61 | GAL. |
| VOLUME OF WATER TO REMOVE | 49.83 | GAL. |
| VOLUME REMOVED | 60 | GAL. |

RATE OF PURGE 10 gpm (3 min); 5 gpm (6 min)
METHOD OF PURGE Centrifugal Pump

PHYSICAL APPEARANCE/COMMENTS

FIELD MEASUREMENTS

| TIME | pH | COND | TEMP | TURB | Eh | $O^2$ |
|---|---|---|---|---|---|---|
| 11:00 | 6.53 | 1140 umhos | 12°C | NM | NM | NM |

NM - Not Measured

TYPES OF SAMPLES COLLECTED

TCL - CLP

LABORATORY NAME AND LOCATION

Erco lab Cambridge, MA

ROUX Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# WELL SAMPLING DATA FORM

CLIENT Golder Associates
PROJECT NO. 161014
LOCATION Industri-Plex Site: Woburn, Mass

WELL NUMBER OW-27B
DATE 6/5/90
WEATHER Partly Sunny
SAMPLED BY B. Thomas

TYPE OF WELL
STORAGE TANK
TIME OF START
TIME OF FINISH

| | | |
|---|---|---|
| DEPTH TO BOTTOM OF WELL | 96.00 | FT. |
| DEPTH TO WATER | 18.56 | FT. |
| WATER COLUMN | 77.44 | FT. |
| VOLUME OF WATER IN WELL | 50.34 | GAL. |
| VOLUME OF WATER TO REMOVE | 151.02 | GAL. |
| VOLUME REMOVED | 154.5 | GAL. |

RATE OF PURGE 7½ gpm (11 min), 6 gpm (12 min)
METHOD OF PURGE Submersible Pump

PHYSICAL APPEARANCE/COMMENTS

FIELD MEASUREMENTS

| TIME | pH | COND | TEMP | TURB | Eh | $O_2$ |
|---|---|---|---|---|---|---|
| 11:20 | 6.64 | 269 umho | 11 °C | NM | NM | NM |

NM - Not measured

TYPES OF SAMPLES COLLECTED

TCL-CLP

LABORATORY NAME AND LOCATION

Erco lab, Cambridge, MA

ROUX Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# WELL SAMPLING DATA FORM

CLIENT Golder Associates
PROJECT NO. 161014
LOCATION Industri-Plex Site, Woburn, Mass.

WELL NUMBER OW1-29
DATE 6/4/90
WEATHER Partly Sunny, Windy
SAMPLED BY B. Thomas

TYPE OF WELL
STORAGE TANK
TIME OF START
TIME OF FINISH

| | | |
|---|---|---|
| DEPTH TO BOTTOM OF WELL | 25.07 | FT. |
| DEPTH TO WATER | 5.11 | FT. |
| WATER COLUMN | 19.96 | FT. |
| VOLUME OF WATER IN WELL | 12.97 | GAL. |
| VOLUME OF WATER TO REMOVE | 38.91 | GAL. |
| VOLUME REMOVED | 45 | GAL. |

RATE OF PURGE 15 gpm (3 min)
METHOD OF PURGE Centrifugal Pump

PHYSICAL APPEARANCE/COMMENTS

FIELD MEASUREMENTS

| TIME | pH | COND | TEMP | TURB | Eh | $O^2$ |
|---|---|---|---|---|---|---|
| 17:25 | | 1200 umh. | 14°C | NM | NM | NM |

NM - Not Measured

TYPES OF SAMPLES COLLECTED

TCL-CLP

LABORATORY NAME AND LOCATION

Erco lab, Cambridge, MA

ROUX Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# WELL SAMPLING DATA FORM

CLIENT Golder Associates
PROJECT NO. 161014
LOCATION Industri-Plex Site, Woburn, Mass.

WELL NUMBER 04-30A
DATE 6/5/90
WEATHER Partly Sunny
SAMPLED BY B. Thomas

TYPE OF WELL
STORAGE TANK
TIME OF START
TIME OF FINISH

| | | |
|---|---|---|
| DEPTH TO BOTTOM OF WELL | 20.72 | FT. |
| DEPTH TO WATER | 11.61 | FT. |
| WATER COLUMN | 9.11 | FT. |
| VOLUME OF WATER IN WELL | 5.92 | GAL. |
| VOLUME OF WATER TO REMOVE | 17.76 | GAL. |
| VOLUME REMOVED | 20 | GAL. |

RATE OF PURGE 5 gpm (4 min)
METHOD OF PURGE Centrifugal Pump

PHYSICAL APPEARANCE/COMMENTS

FIELD MEASUREMENTS

| TIME | pH | COND | TEMP | TURB | Eh | $O^2$ |
|---|---|---|---|---|---|---|
| 15:30 | 6.61 | 505 umd. | 13°C | NM | NM | NM |

NM - Not Measured

TYPES OF SAMPLES COLLECTED

TCL - CLP

LABORATORY NAME AND LOCATION

Erco lab, Cambridge, MA

ROUX Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# WELL SAMPLING DATA FORM

CLIENT Golder Associates
PROJECT NO. 161017
LOCATION Industriplex Woburn Mass.

WELL NUMBER OW-31
DATE 6/6/90
WEATHER Cloudy, humid
SAMPLED BY B. Thomas

TYPE OF WELL
STORAGE TANK
TIME OF START
TIME OF FINISH

| | | |
|---|---|---|
| DEPTH TO BOTTOM OF WELL | 17.05 | FT. |
| DEPTH TO WATER | 4.06 | FT. |
| WATER COLUMN | 12.99 | FT. |
| VOLUME OF WATER IN WELL | 8.44 | GAL. |
| VOLUME OF WATER TO REMOVE | ~~25~~ 25.32 | GAL. |
| VOLUME REMOVED | 26 | GAL. |

RATE OF PURGE 1 gpm
METHOD OF PURGE Bailer

PHYSICAL APPEARANCE/COMMENTS

- Water blackish-greenish, strong odor, effervescent
- Split with NUS

FIELD MEASUREMENTS

| TIME | pH | COND | TEMP | TURB | Eh | $O^2$ |
|---|---|---|---|---|---|---|
| 1230 | 7.67 | 1560 umho | 11°C | NM | NM | NM |

NM-Not Measured

TYPES OF SAMPLES COLLECTED

TCL-CLP

LABORATORY NAME AND LOCATION

Erco lab, Cambridge, MA

ROUX Consulting Ground-Water Geologists
ROUX ASSOCIATES INC.

# WELL SAMPLING DATA FORM

CLIENT Golder Associates
PROJECT NO. 161017
LOCATION Industri-Plex Site, Woburn Mass.

WELL NUMBER OW-32
DATE 6/6/90
WEATHER Cloudy, humid
SAMPLED BY B. Thomas

TYPE OF WELL
STORAGE TANK
TIME OF START
TIME OF FINISH

| | | |
|---|---|---|
| DEPTH TO BOTTOM OF WELL | 11.25 | FT. |
| DEPTH TO WATER | 4.61 | FT. |
| WATER COLUMN | 6.64 | FT. |
| VOLUME OF WATER IN WELL | 4.32 | GAL. |
| VOLUME OF WATER TO REMOVE | 12.96 | GAL. |
| VOLUME REMOVED | 13 ~~36~~ | GAL. |

RATE OF PURGE 1 gpm
METHOD OF PURGE Bailer

PHYSICAL APPEARANCE/COMMENTS

~~Water black, effervescent, strong odor~~
turbid, brown, odorous

FIELD MEASUREMENTS

| TIME | pH | COND | TEMP | TURB | Eh | $O_2$ |
|---|---|---|---|---|---|---|
| 10:25 | 7.51 | 1770 umho | 12°C | NM | NM | NM |

NM - Not Measured

TYPES OF SAMPLES COLLECTED

TCL-CLP

LABORATORY NAME AND LOCATION

Ercolab, Cambridge, MA

ROUX Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# WELL SAMPLING DATA FORM

CLIENT Golder Associates
PROJECT NO. 161014
LOCATION Industri-Plex Site - Woburn, Mass

WELL NUMBER OW-33A
DATE 6/4/90
WEATHER Partly Sunny, Windy
SAMPLED BY B. Thomas

TYPE OF WELL
STORAGE TANK
TIME OF START
TIME OF FINISH

| | | |
|---|---|---|
| DEPTH TO BOTTOM OF WELL | 46.79 | FT. |
| DEPTH TO WATER | 4.76 | FT. |
| WATER COLUMN | 42.03 | FT. |
| VOLUME OF WATER IN WELL | 27.32 | GAL. |
| VOLUME OF WATER TO REMOVE | 81.96 | GAL. |
| VOLUME REMOVED | 100 | GAL. |

RATE OF PURGE 10 gpm (10 min)
METHOD OF PURGE Centrifugal

PHYSICAL APPEARANCE/COMMENTS

Split with NUS and GZA

FIELD MEASUREMENTS

| TIME | pH | COND | TEMP | TURB | Eh | $O^2$ |
|---|---|---|---|---|---|---|
| 14:00 | | Formula | 12°C | NM | NM | NM |

NM - Not Measured

TYPES OF SAMPLES COLLECTED

TCL - CLP

LABORATORY NAME AND LOCATION

Erco lab, Cambridge, MA

ROUX Consulting Ground-Water Geologists
ROUX ASSOCIATES INC.

# WELL SAMPLING DATA FORM

CLIENT Golder Associates
PROJECT NO. 161014
LOCATION Industri-Plex Site, Woburn, Mass

WELL NUMBER GW-33B
DATE 6/4/90
WEATHER Partly Sunny, Windy
SAMPLED BY B. Thomas

TYPE OF WELL
STORAGE TANK
TIME OF START
TIME OF FINISH

| | | |
|---|---|---|
| DEPTH TO BOTTOM OF WELL | 86.13 | FT. |
| DEPTH TO WATER | 4.85 | FT. |
| WATER COLUMN | 81.28 | FT. |
| VOLUME OF WATER IN WELL | 52.83 | GAL. |
| VOLUME OF WATER TO REMOVE | 158.79 | GAL. |
| VOLUME REMOVED | 157.5 | GAL. |

RATE OF PURGE 7½ lpm (15 min); 5 lpm (9 min)
METHOD OF PURGE Submersible Pump

PHYSICAL APPEARANCE/COMMENTS

FIELD MEASUREMENTS

| TIME | pH | COND | TEMP | TURB | Eh | $O^2$ |
|---|---|---|---|---|---|---|
| 15:30 | | 360 umho | 11 °C | NM | NM | NM |

NM - Not Measured

TYPES OF SAMPLES COLLECTED

TCL - CLP

LABORATORY NAME AND LOCATION

Erco lab Cambridge, MA

ROUX Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# WELL SAMPLING DATA FORM

CLIENT Golder Associates
PROJECT NO. 16014
LOCATION Industri-Plex, Woburn Mass.

WELL NUMBER OW-30B
DATE 6/5/90
WEATHER Partly Sunny
SAMPLED BY B. Thomas

TYPE OF WELL
STORAGE TANK
TIME OF START
TIME OF FINISH

| | | |
|---|---|---|
| DEPTH TO BOTTOM OF WELL | 60.33 | FT. |
| DEPTH TO WATER | 11.44 | FT. |
| WATER COLUMN | 48.89 | FT. |
| VOLUME OF WATER IN WELL | 31.78 | GAL. |
| VOLUME OF WATER TO REMOVE | 95.34 | GAL. |
| VOLUME REMOVED | 96.00 | GAL. |

RATE OF PURGE 7½ ppm (4 min); 5 ppm (5 min)
METHOD OF PURGE Centrifugal Pump

PHYSICAL APPEARANCE/COMMENTS

FIELD MEASUREMENTS

| TIME | pH | COND | TEMP | TURB | Eh | $O^2$ |
|---|---|---|---|---|---|---|
| 16:05 | 7.13 | 564 umhos | 12°C | NM | NM | NM |

NM—Not Measured

TYPES OF SAMPLES COLLECTED

TCL analysis volatile organic compounds, Semi volatiles, Pesticide and PCB's, Inorganics, total and dissolved.

LABORATORY NAME AND LOCATION

Erco laboratory Cambridge, Massachusetts

ROUX Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

# WELL SAMPLING DATA FORM

CLIENT Golder Associates
PROJECT NO. 16101Y
LOCATION Industri-Plex, Woburn Mass

WELL NUMBER OW-23
DATE 6/5/90
WEATHER Partly Sunny
SAMPLED BY B. Thomas

TYPE OF WELL Monitoring well
STORAGE TANK
TIME OF START
TIME OF FINISH

| | | |
|---|---|---|
| DEPTH TO BOTTOM OF WELL | 30.10 | FT. |
| DEPTH TO WATER | 13.73 | FT. |
| WATER COLUMN | 16.37 | FT. |
| VOLUME OF WATER IN WELL | 10.64 | GAL. |
| VOLUME OF WATER TO REMOVE | 31.92 | GAL. |
| VOLUME REMOVED | ~~35~~ 34 | GAL. |

RATE OF PURGE 5 gpm (2 min); 2 gpm (12 min.)
METHOD OF PURGE Centrifugal Pump

PHYSICAL APPEARANCE/COMMENTS
Clear, slightly turbid
pH

FIELD MEASUREMENTS

| TIME | pH | COND | TEMP | TURB | Eh | $O^2$ |
|---|---|---|---|---|---|---|
| 10:05 | 5.43 | 1400 umho | 10°C | NM | NM | NM |

NM - Not Measured

TYPES OF SAMPLES COLLECTED
TCL analysis Volatile organic compounds, Semi Volatiles, Pesticide and PCBs, Inorganics ~~filter~~ total and dissolved.

LABORATORY NAME AND LOCATION
Erco laboratory, Cambridge, Massachusetts

## APPENDIX F

Chain-of-Custody Forms

# CHAIN OF CUSTODY

ROUX

Consulting Ground-Water Geologists & Engineers
**ROUX ASSOCIATES INC**

775 PARK AVENUE
SUITE 255
HUNTINGTON, NEW YORK 11743



**Project Name:** PRE-DESIGN INVESTIGATION
**Project Number:** 16101Y
**Project Location:** Industri-Plex Site Woburn Massachusetts
**Sampler(s):** Ben Jones, Brian Thomas, Larry McTiernan

ANALYSES

| Sample Designation/Location | Date Collected | Time Collected | TCL semi-volatiles in 1 liter amber glass bottle. Unpreserved. Chilled. | TCL pesticides and PCBs in 1 liter amber glass bottle. Unpreserved. Chilled. | TAL metals in 1 liter poly bottle. Preserved with nitric acid. Chilled. | TAL dissolved metals in 1 liter poly bottle. Field filtered. Preserved with nitric acid. Chilled. | TCL volatile organic compounds in 40 ml glass vial. Preserved with HCl. Chilled. | TOTAL BOTTLES | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| G1PUB213 | 6-4-90 | 1110 | 1 | | | | | 1 | |
| G1PUB215U | 6-4-90 | 1110 | | | 1 | | | 1 | |
| G1PUB215F | 6-4-90 | 1110 | | | | 1 | | 1 | |
| G1PUB214 | 6-4-90 | 1110 | | 1 | | | | 1 | |
| G1PUB212 | 6-4-90 | 1110 | | | | | 3 | 3 | |
| G124A215F | 6-4-90 | 1125 | | | | 1 | | 1 | |
| G124A214 | 6-4-90 | 1125 | | 1 | | | | 1 | |
| G124A213 | 6-4-90 | 1125 | 1 | | | | | 1 | 18 Total Bottles |
| G124A212 | 6-4-90 | 1125 | | | | | 3 | 3 | |
| G124A215U | 6-4-90 | 1125 | | | 1 | | | 1 | |
| G124B215F | 6-4-90 | 1215 | | | | 1 | | 1 | |
| G124B214 | 6-4-90 | 1215 | | 1 | | | | 1 | |
| G124B215U | 6-4-90 | 1215 | | | 1 | | | 1 | |
| G124B213 | 6-4-90 | 1215 | 1 | | | | | 1 | |

| Relinquished by:(Signature) | For | Date | Time | Received by:(Signature) | For | Date | Time |
|---|---|---|---|---|---|---|---|
| Ben Jones | ROUX | 6/4/90 | 19:19 | Marcia Motta | Enviro | 6/4/90 | 19:21 |
| Relinquished by:(Signature) | For | Date | Time | Received by:(Signature) | For | Date | Time |
| Relinquished by:(Signature) | For | Date | Time | Received by:(Signature) | For | Date | Time |

**Delivery Method:** Hand Delivered

**Comments:**

# CHAIN OF CUSTODY

ROUX

Consulting Ground-Water Geologists & Engineers
ROUX ASSOCIATES INC
775 PARK AVENUE
SUITE 255
HUNTINGTON, NEW YORK 11743



**Project Name:** PRE-DESIGN INVESTIGATION
**Project Number:** 16101Y
**Project Location:** Industri-Plex Site Woburn, Massachusetts
**Sampler(s):** Brian Thomas, Larry McTiernan

ANALYSES

| Sample Designation/Location | Date Collected | Time Collected | TCL volatile organic compounds in 40 ml glass vial. Preserved with HCl. Chilled. | TOTAL BOTTLES | NOTES |
|---|---|---|---|---|---|
| G124B212 | 6-4-90 | 1215 | 3 | 3 | |
| G133A212 MSD | 6-4-90 | 1400 | 3 | 3 | |
| G133A212 MS | 6-4-90 | 1400 | 3 | 3 | |
| G133A212 | 6-4-90 | 1400 | 3 | 3 | |
| G133B212 | 6-4-90 | 1530 | 3 | 3 | 17 total bottles |
| TRIP BLANK 6339 | 6-4-90 | | 2 | 2 | |

| Relinquished by:(Signature) | For | Date | Time | Received by:(Signature) | For | Date | Time |
|---|---|---|---|---|---|---|---|
| Brian Thomas | ROUX | 6/4/90 | 19:19 | Marcia Motta | Enviro | 6/4/90 | 19:19 |
| Relinquished by:(Signature) | For | Date | Time | Received by:(Signature) | For | Date | Time |
| Relinquished by:(Signature) | For | Date | Time | Received by:(Signature) | For | Date | Time |

**Delivery Method:** Hand Delivered

**Comments:**

**Enseco-Erco Laboratory**
205 Alewife Brook Parkway
Cambridge, Massachusetts 02138
617/661-3111 Fax: 617/354-5258

Attn: _____

# CHAIN OF CUSTODY 006406 1 of 6 No. 02460

**SAMPLE SAFE™ CONDITIONS**

1. Packed by _____ Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: _____ °C
9. Condition of Contents: _____

Enseco Client _____
Project Pre-Design Investigation
~~Sampling Co.~~ Project #16101Y
Sampling Site Industri-Plex Site, Woburn, Mass.
Team Leader Brian Thomas
Larry McTiernan

| Date | Time | Sample ID/Description | Sample Type | No. Containers | Analysis Parameters | Remarks |
|---|---|---|---|---|---|---|
| 6-4-90 | 17:25 | G129214 | Water | 1 | TCL Pesticides and PCB's in 1-liter amber glass bottle; Unpreserved; Chilled. | |
| 6-4-90 | 17:25 | G129213 | Water | 1 | TCL Semi-Volatiles in 1-liter amber glass bottle; Unpreserved; Chilled. | |
| 6-4-90 | 17:25 | G129215U | Water | 1 | TAL metals in 1-liter Poly Bottle; Preserved with Nitric acid; Chilled. | |
| 6-4-90 | 17:25 | G129215F | Water | 1 | TAL dissolved metals in 500-mL Poly bottle; Field-filtered; Preserved with Nitric acid; Chilled. | 14 bottles total |
| 6-4-90 | 17:25 | G129 212 | Water | 3 | TCL Volatile organic compounds in 40-mL glass vial; Preserved with HCl; Chilled. | |
| 6-4-90 | 18:25 | G134 214 | Water | 1 | TCL Pesticides and PCB's in 1-liter amber glass bottle; Unpreserved; Chilled. | |
| 6-4-90 | 18:25 | G134 213 | Water | 1 | TCL Semi-Volatiles in 1-liter glass bottle; Unpreserved; Chilled. | |
| 6-4-90 | 18:25 | G134 215U | Water | 1 | TAL metals in 1-liter Poly bottle; Preserved with Nitric Acid; Chilled. | |
| 6-4-90 | 18:25 | G134215F | Water | 1 | TAL dissolved metals in 500mL Poly bottle; Field-filtered; Preserved with Nitric acid; Chilled. | |
| 6-4-90 | 18:25 | G134212 | Water | 3 | TCL Volatile organic compounds in 40-mL glass vial; Preserved with HCl; Chilled. | |

**CUSTODY TRANSFERS PRIOR TO SHIPPING**

| | Relinquished by: (signed) | Received by: (signed) | Date | Time |
|---|---|---|---|---|
| 1 | [signature] | [signature] | 6/5/90 | 8:10 |
| 2 | [signature] | | | |
| 3 | 6/5/90 20:10 | | | |

**SHIPPING DETAILS**

Delivered to Shipper by: _____
Method of Shipment: _____ Airbill # _____
Received for Lab: Enco Signed: [signature] Date/Time 6/6/90 1:00
Enseco Project No. _____

**Enseco-Erco Laboratory**
205 Alewife Brook Parkway
Cambridge, Massachusetts 02138
617/661-3111 Fax: 617/354-5258

Attn: _____

# CHAIN OF CUSTODY 006406 2 of 6 No. 6525

**SAMPLE SAFE™ CONDITIONS**

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2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: _____ °C
9. Condition of Contents: _____

Enseco Client _____
Project Pre-Design Investigation
~~Sampling Co.~~ Project #16101Y
Sampling Site Industri-Plex Site, Woburn, Mass.
Team Leader Brian Thomas
Larry McTiernan

| Date | Time | Sample ID/Description | Sample Type | No. Containers | Analysis Parameters | Remarks |
|---|---|---|---|---|---|---|
| 6-5-90 | 10:05 | G123214 | Water | 1 | TCL Pesticides and PCB's in 1-liter amber glass bottle; Unpreserved; Chilled. | |
| 6-5-90 | 10:05 | G123213 | Water | 1 | TCL Semi-Volatiles in 1-liter amber glass bottle; Unpreserved; Chilled. | |
| 6-5-90 | 10:05 | G123215U | Water | 1 | TAL metals in 1-liter poly bottle; Preserved with Nitric Acid; Chilled. | |
| 6-5-90 | 10:05 | G123215F | Water | 1 | TAL dissolved metals in 500-ml poly bottle; Field-Filtered; Preserved with Nitric Acid; Chilled. | 14 bottles total |
| 6-5-90 | 10:05 | G123212 | Water | 3 | TCL Volatile organic compounds in 40-ml glass vials; Preserved with HCl; Chilled. | |
| 6-5-90 | 11:00 | G127A214 | Water | 1 | TCL Pesticides and PCB's in 1-liter amber glass bottle; Unpreserved; Chilled. | |
| 6-5-90 | 11:00 | G127A213 | Water | 1 | TCL Semi-Volatiles in 1-liter amber glass bottle; Unpreserved; Chilled. | |
| 6-5-90 | 11:00 | G127A215U | Water | 1 | TAL metals in 1-liter poly bottle; Preserved with Nitric Acid; Chilled. | |
| 6-5-90 | 11:00 | G127A215F | Water | 1 | TAL dissolved metals in 500-ml poly bottle; Field-Filtered; Preserved with Nitric Acid; Chilled. | |
| 6-5-90 | 11:00 | G127A212 | Water | 3 | TCL Volatile organic compounds in 40-ml glass vials; Preserved with HCl; Chilled. | |

**CUSTODY TRANSFERS PRIOR TO SHIPPING**

| | Relinquished by: (Signed) | Received by: (signed) | Date | Time |
|---|---|---|---|---|
| 1 | [signature] | Karen Stevens | 6/5/90 | 8.10PM |
| 2 | FedEx | | | |
| 3 | 6/5/90 20:10 | | | |

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SS-001 (CM)

**Enseco-Erco Laboratory**
205 Alewife Brook Parkway
Cambridge, Massachusetts 02138
617/661-3111 Fax: 617/354-5258

# CHAIN OF CUSTODY 006406 3 of 6 No. 6511

Attn: _____

Enseco Client _____
Project Pre-Design Investigation
~~Sampling Co.~~ Project #16101Y
Sampling Site Industri-Plex Site, Woburn, Mass.
Team Leader Brian Thomas
Larry McTiernan

**SAMPLE SAFE™ CONDITIONS**

1. Packed by _____ Seal # _____
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4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: _____ °C
9. Condition of Contents: _____

| Date | Time | Sample ID/Description | Sample Type | No. Containers | Analysis Parameters | Remarks |
|---|---|---|---|---|---|---|
| 6-5-90 | 11:20 | G127B 214 | Water | 1 | TCL Pesticides and PCB's in 1-liter amber glass bottle; Unpreserved; Chilled. | |
| 6-5-90 | 11:20 | G127B 213 | Water | 1 | TCL Semi-Volatiles in 1-liter amber glass bottle; Unpreserved; Chilled. | |
| 6-5-90 | 11:20 | G127B 215Y | Water | 1 | TAL metals in 1-liter poly bottle; Preserved with Nitric Acid; Chilled. | |
| 6-5-90 | 11:20 | G127B215F | Water | 1 | TAL dissolved metals in 500-ml poly bottle; field-filtered; Preserved with nitric acid; Chilled. | 14 bottles listed |
| 6-5-90 | 11:20 | G127B212 | Water | 3 | TCL Volatile organic compounds in 40-ml glass vial; Preserved with HCl; Chilled. | |
| 6-5-90 | 12:10 | G125A 214 | Water | 1 | TCL Pesticides and PCB's in 1-liter amber glass bottle; Unpreserved; Chilled. | |
| 6-5-90 | 12:10 | G125A 213 | Water | 1 | TCL Semi-Volatiles in 1-liter amber glass bottle; Unpreserved; Chilled. | |
| 6-5-90 | 12:10 | G125A215Y | Water | 1 | TAL metals in 1-liter poly bottle; Preserved with nitric acid; Chilled. | |
| 6-5-90 | 12:10 | G125A215F | Water | 1 | TAL dissolved metals in 500-ml poly bottle; field-filtered; Preserved with Nitric Acid; Chilled. | |
| 6-5-90 | 12:10 | G125A212 | Water | 3 | TCL Volatile organic compounds in 40-ml glass vial; Preserved with HCl; Chilled. | |

**CUSTODY TRANSFERS PRIOR TO SHIPPING**

| | Relinquished by: (signed) | Received by: (signed) | Date | Time |
|---|---|---|---|---|
| 1 | [signature] | [signature] | 6/5/90 | 810pm |
| 2 | FedEX | | | |
| 3 | 6/6/90 20:10 | | | |

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# CHAIN OF CUSTODY D064406 4 of 6 No. 6510

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3. Condition of Contents: _____
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6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: _____ °C
9. Condition of Contents: _____

Enseco Client _____
Project Ato - Design Investigation
~~Sampling Co~~ Project #16101Y
Sampling Site Industri-Plex Site
Team Leader Brian Thomas
Larry McTiernan

| Date | Time | Sample ID/Description | Sample Type | No. Containers | Analysis Parameters | Remarks |
|---|---|---|---|---|---|---|
| 6-5-90 | 12:25 | G125B214 | Water | 1 | TCL Pesticides and PCB's in 1-liter amber glass bottle; Unpreserved; Chilled. | |
| 6-5-90 | 12:25 | G125B213 | Water | 1 | TCL Semi-Volatiles in 1-liter amber glass bottle; Unpreserved; Chilled. | |
| 6-5-90 | 12:25 | G125B215U | Water | 1 | TAL Metals in 1-liter poly bottle; Preserved with Nitric Acid; Chilled. | 6-5-90 LV |
| 6-5-90 | 12:25 | G125B215F | Water | 1 | TAL dissolved metals in 500-ml poly bottle; Field-filtered; Preserved with Nitric Acid; Chilled. | 13 bottles total |
| 6-5-90 | 12:25 | G125B212 | Water | 3 | TCL Volatile organic compounds in 40-ml glass vial; Preserved with HCl; Chilled. | |
| 6-5-90 | 09:00 | Field Blank A 214 | Water | 1 | TCL Pesticides and PCB's in 1-liter amber glass bottle; Unpreserved; Chilled | |
| 6-5-90 | 09:00 | Field Blank A 213 | Water | 1 | TCL Semi-Volatiles in 1-liter amber glass bottle; Unpreserved; Chilled. | |
| 6-5-90 | 09:00 | Field Blank A 215U | Water | 1 | TAL Metals in 500 ml poly bottle; Preserved with Nitric acid; Chilled | |
| 6-5-90 | 09:00 | Field Blank A 215F | Water | 1 | TAL dissolved metals in 500-ml poly bottle; field-filtered; Preserved with Nitric Acid; Chilled. | |
| 6-5-90 | 09:00 | Field Blank A 212 | Water | 3 2 6-5-90 LV | TCL Volatile organic compounds in 40-ml glass vial; Preserved with HCl; Chilled. | |

**CUSTODY TRANSFERS PRIOR TO SHIPPING**

| | Relinquished by: (signed) | Received by: (signed) | Date | Time |
|---|---|---|---|---|
| 1 | [signature] | Karen Brown | 6/5/90 | 8:10 p.m. |
| 2 | LOVX | | | |
| 3 | 6/5/90 20:10 | | | |

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Cambridge, Massachusetts 02138
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# CHAIN OF CUSTODY 006406 5 of 6 No. 01269

Attn: _____

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2. Seal Intact Upon Receipt by Sampling Co.: Yes No
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4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab: _____ °C
9. Condition of Contents: _____

Enseco Client _____
Project Pre-Design Investigation
~~Sampling Co.~~ Project #161014
Sampling Site Industri-Plex Site, Wilburn Mass
Team Leader Brian Thomas
Larry McTiernan

| Date | Time | Sample ID/Description | Sample Type | No. Containers | Analysis Parameters | Remarks |
|---|---|---|---|---|---|---|
| 6-5-90 | 15:30 | G130A214 | Water | 1 | TCL Pesticides and PCB's in 1-liter amber glass bottle; Unpreserved; Chilled. | |
| 6-5-90 | 15:30 | G130A213 | Water | 1 | TCL Semi-volatiles in 1-liter amber glass bottle; Unpreserved; Chilled. | |
| 6-5-90 | 15:30 | G130A2154 | Water | 1 | TAL metals in 1-liter poly bottle; Preserved with Nitric Acid; Chilled. | 14 bottles total |
| 6-5-90 | 15:30 | G130A215F | Water | 1 | TAL dissolved metals in 500-ml poly bottle; Field-filtered; Preserved with Nitric Acid; Chilled. | |
| 6-5-90 | 15:30 | G130A212 | Water | 3 | TCL volatile organic compounds in 40-ml glass vial; Preserved with HCl; Chilled. | |
| 6-5-90 | 16:05 | G130B214 | Water | 1 | TCL Pesticides and PCB's in 1-liter amber glass bottle; Unpreserved; Chilled. | |
| 6-5-90 | 16:05 | G130B213 | Water | 1 | TCL Semi-volatiles in 1-liter amber glass bottle; Unpreserved; Chilled. | |
| 6-5-90 | 16:05 | G130B2154 | Water | 1 | TAL metals in 1-liter poly bottle; Preserved with Nitric Acid; Chilled. | |
| 6-5-90 | 16:05 | G130B215F | Water | 1 | TAL dissolved metals in 500-ml poly bottle; Field-filtered; Preserved with Nitric Acid; Chilled. | |
| 6-5-90 | 16:05 | G130B212 | Water | 3 | TCL Volatile organic compounds in 40-ml glass vial; Preserved with HCl; Chilled. | |

**CUSTODY TRANSFERS PRIOR TO SHIPPING**

| | Relinquished by: (signed) | Received by: (signed) | Date | Time |
|---|---|---|---|---|
| 1 | Brian Thomas | Kevin Fleming | 6/7/90 | 8:10pm |
| 2 | FedEx | | | |
| 3 | 6/8/90 20:10 | | | |

**SHIPPING DETAILS**

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Received for Lab: RCW Signed: _____ Date/Time 6/8/90 20:10
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White and Pink Copies to Lab Yellow to Sampler

SS 001 (CM)

**Enseco-Erco Laboratory**
205 Alewife Brook Parkway
Cambridge, Massachusetts 02138
617/661-3111 Fax: 617/354-5258

# CHAIN OF CUSTODY

0064406 6 of 6 No. 6512

Attn: _____

Enseco Client _____
Project Pre-design Investigation
~~Sampling Co.~~ Project #161014
Sampling Site Industri-Plex Site, Woburn, Mass.
Team Leader Brian Thomas
Larry McTiernan

**SAMPLE SAFE™ CONDITIONS**

1. Packed by: _____ Seal # _____
2. Seal Intact Upon Receipt by Sampling Co.: Yes No
3. Condition of Contents: _____
4. Sealed for Shipping by: _____
5. Initial Contents Temp.: _____ °C Seal # _____
6. Sampling Status: Done Continuing Until _____
7. Seal Intact Upon Receipt by Laboratory: Yes No
8. Contents Temperature Upon Receipt by Lab. _____ °C
9. Condition of Contents: _____

| Date | Time | Sample ID/Description | Sample Type | No. Containers | Analysis Parameters | Remarks |
|---|---|---|---|---|---|---|
| 6-5-90 | 16:30 | G135214 | Water | 1 | TCL Pesticides and PCB's in 1-liter amber glass bottle; Unpreserved; Chilled | 11 bottles total |
| 6-5-90 | 16:30 | G135213 | Water | 1 | TCL Semi-Volatiles in 1-liter amber glass bottle; Unpreserved; Chilled. | |
| 6-5-90 | 16:30 | G1352154 | Water | 1 | TAL metals in 1-liter poly bottle; Preserved with Nitric Acid; Chilled. | |
| 6-5-90 | 16:30 | G135215F | Water | 1 | TAL dissolved metals in 500-ml poly bottle; field-filtered; Preserved with Nitric Acid; Chilled. | |
| 6-5-90 | 16:30 | G135212 | Water | 3 | TCL volatile organic compounds in 40-ml glass vial; preserved with HCl; Chilled. | |
| 6-5-90 | 19:00 | Trip blank A | Water | 2 | | |
| 6-5-90 | 19:00 | Trip blank B | Water | 2 | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**CUSTODY TRANSFERS PRIOR TO SHIPPING**

| | Relinquished by: (signed) | Received by: (signed) | Date | Time |
|---|---|---|---|---|
| 1 | Brian Thomas | Karen Stevens | 6/5/90 | 8:10 PM |
| 2 | FedEx | | | |
| 3 | 6/5/90 20:10 | | | |

**SHIPPING DETAILS**

Delivered to Shipper by: _____
Method of Shipment: _____ Airbill # _____
Received for Lab: Enco Signed: A. Kwiatkowski Date/Time 6/6/90 1:00
Enseco Project No. _____

White and Pink Copies to Lab Yellow to Sampler

# APPENDIX G

PDI Work Plan Standard Operating Procedures

ATTACHMENT 2

Roux Associates Standard Operating Procedures

# CONTENTS
## STANDARD OPERATING PROCEDURES

CONTENTS
STANDARD OPERATING PROCEDURES (continued)

## CONTENTS
## STANDARD OPERATING PROCEDURES (continued)



## FIGURES

# STANDARD OPERATING PROCEDURE FOR MEASURING WATER TEMPERATURE

## 1.0 CALIBRATION

1.1 Calibration of thermometers will be performed before entering the field and checked upon return to the office.

1.2 Thermometers will be calibrated against a National Bureau of Standards (NBS) - traceable thermometer.

1.3 The thermometer must read within 1° - 1.5° C of the NBS - traceable thermometer. If the thermometer does not read within this range and the thermometer cannot be calibrated, then it will not be used for temperature measurements and will be disposed of in an appropriate manner. If the thermometer does not read within this range and the thermometer can be calibrated, then the thermometer will be calibrated to the NBS- traceable thermometer.

1.4 The following information is documented in the calibration logbook at the time of calibration:

a. Date
b. Thermometer Identification
c. Initials
d. Calibration Data

## 2.0 PROCEDURE

2.1 The thermometer is immersed in water until the temperature equilibrates. The temperature is read in Celsius (° C).

2.2 Temperature data are recorded in the field notebook. and initialed and dated.

# STANDARD OPERATING PROCEDURE FOR MEASURING THE pH OF WATER SAMPLES

## 1.0 CALIBRATION

1.1 Calibration of the pH meter is to be performed prior to its use each day at the end of the day, and at least every four hours.

1.2 Re-calibration must occur if: (1) the pH of the samples being measured is outside the previous calibration range, or (2) the battery is replaced.

1.3 Two buffer calibrations bracketing the expected pH range of samples are to be performed prior to the meters use each day. Three pH buffers (4.0, 7.0, and 10.0) are read after standardization at pH of 7.0 to evaluate the linearity and electrodes. The samples and buffers are to be measured at the same temperature.

1.4 The following information is documented in the calibration logbook at the time of calibration:

a. Date.
b. pH meter identification.
c. Initials.
d. Calibration results using pH standards.

## 2.0 PROCEDURE

2.1 The pH electrode must be kept moist.

2.2 The electrodes must be carefully rinsed with deionized water before each measurement.

2.3 The electrodes of a Cole-Parmer meter must be immersed half of their length in a water sample and stirred briefly until the pH reading equilibrates. The bulb electrode of a Lakewood meter must be covered with sample water. The pH reading will equilibrate.

2.4 Follow manufacturer's operating instructions.

2.5 The pH readings are documented in the field notebook, and initialed and dated.

2.6 The electrodes are rinsed with deionized/distilled water and the unit stored properly. The electrodes are not to be stored in tap water or deionized/distilled water.

# STANDARD OPERATING PROCEDURE FOR MEASURING WATER LEVELS WITH A STEEL TAPE

## 1.0 PROCEDURE

1.1 The steel tape must be pre-cleaned (decontaminated) using a non-phosphate, laboratory-grade solution and distilled/deionized water.

1.2 If the well is being sounded (depth measured), then lower the tape to the bottom of the well and measure its length.

1.3 If a water-level measurement is to be taken, then apply chalk (e.g., carpenter's chalk) to the bottom few feet of the tape and lower it into the water. Hold the top of the tape at an even foot-increment at the measuring point, roll up the tape, and note the cut (i.e., the mark between the dry and wet chalk).

1.4 Measurements will be taken to the nearest 0.01 foot.

1.5 All pertinent data will be recorded in the field notebook, and initialed and dated.

# STANDARD OPERATING PROCEDURE FOR MEASURING WATER LEVELS USING AN M-SCOPE

## 1.0 PROCEDURE

1.1 The probe of the m-scope must be pre-cleaned (decontaminated) using a non-phosphate, laboratory-grade solution and distilled/deionized water before use. The wire should be rinsed with distilled water.

1.2 The manufacturer's model should be noted because some have switches, lights, beepers, or a combination of the above. If a test switch is available, test the light or beeper prior to use.

1.3 The water-level measurement is taken by lowering the probe into the well until the instrument-specific detection method (e.g., light, beeper, or both) is activated by contacting the water. Avoid lowering the probe below the water surface.

1.4 Measurements will be taken accurately and to the nearest 0.01 foot to the top of the inner casing.

1.5 The depth to water from the measuring point (top of the inner casing), the stickup of the outer protective casing and inner PVC casing, will be documented in the field notebook and initialed and dated.

# STANDARD OPERATING PROCEDURE FOR MEASURING THE CONDUCTIVITY OF WATER SAMPLES

## 1.0 CALIBRATION

1.1 Calibration is in accordance with the manufacturer's specific directions, and the following information is documented in the calibration logbook:

a. Date.
b. Conductivity meter identification.
c. Calibration results.
d. Initials.

1.2 Calibration is performed at the beginning and end of the day, and at least every four hours.

## 2.0 PROCEDURE

2.1 The probe is immersed in a water sample until the meter equilibrates.

2.2 In reading the conductivity meter scale, one or more of the following may have to be considered:

a. The reading may have to be multiplied appropriately (e.g., the reading is expressed in x1, x10, x100 scales).

b. If the conductivity meter is not capable of compensating for temperature differences, then note that the conductance measurements are not temperature compensated and document the temperatures of the standards and samples.

c. If the conductivity meter can be compensated for temperature, then adjust the temperature control before reading the conductance measurement.

2.3 Conductivity measurements and any other relevant information are recorded in the field notebook, and initialed and dated.

# STANDARD OPERATING PROCEDURE FOR DECONTAMINATION OF FIELD EQUIPMENT

## 1.0 PROCEDURE FOR DRILLING EQUIPMENT

The following is a decontamination procedure for drilling equipment. Any variation from this method will be documented on an appropriate field form or notebook.

1.1 The rig and all associated equipment will be thoroughly cleaned with a high pressure hot water wash before and upon arriving at the test site.

1.2 The augers, drilling casings, rods, samplers, tools, rig, and any piece of equipment that can come in contact (directly or indirectly) with the soil, will be high pressure hot water washed on site prior to set up for drilling to ensure proper decontamination.

1.3 The same high pressure hot water wash procedures will be followed between boreholes (at a fixed on-site location if appropriate) and before leaving the site at the end of the study.

1.4 All on-site high pressure hot water washing (decontamination) activities will be monitored by the field hydrogeologist. Washing should be performed at the decontamination pad in order to collect the rinsate.

## 2.0 PROCEDURE FOR SEDIMENT-SAMPLING EQUIPMENT

The following is the decontamination procedure for sediment sampling equipment (e.g., split spoons).

2.1 Wear disposable gloves while cleaning equipment to avoid contamination and change gloves as needed.

2.2 High pressure hot water wash the split-spoon sampler or rinse with potable water.

2.3 Prepare a non-phosphate, laboratory grade detergent solution and distilled or deionized water in a bucket.

2.4 Disassemble the split-spoon sampler and immerse all parts and other sampling equipment in the solution.

2.5 Scrub all equipment in the bucket with a brush to remove any adhering particles.

2.6 Rinse with potable water.

2.7 Rinse all equipment with distilled or deionized water.

2.8 Rinse all equipment with methanol (to remove volatile organic compounds).

2.9 Allow to dry.

2.10 Rinse all equipment with distilled or deionized water.

2.11 Place clean equipment on a clean plastic (e.g., polyethylene) sheet with the outer surface (which do not contact the sample) facing down.

2.12 Reassemble the cleaned split-spoon sampler.

2.13 Transfer the sampler to the driller (or helper) making sure that this individual is also wearing clean gloves, or wrap the equipment with a suitable material (e.g., plastic bag, aluminum foil).

## 3.0 PROCEDURE FOR WATER SAMPLING EQUIPMENT

The following is the decontamination procedure for water sampling equipment (e.g., bailers).

3.1 Wear disposable gloves while cleaning bailer to avoid contamination and change gloves as needed.

3.2 Prepare a non-phosphate, laboratory grade detergent solution and distilled water in a bucket.

3.3 Disassemble bailer (if applicable) and scrub each part with the detergent and water using a brush.

3.4 Rinse with potable water.

3.5 Rinse bailer with distilled or deionized water and reassemble bailer.

3.6 Rinse bailer with 10% nitric acid (to remove metals).

3.7 Rinse bailer with distilled or deionized water.

3.8 Rinse bailer with hexane (to remove pesticides/PCBs).

3.9 Allow to air dry.

3.10 Rinse bailer with distilled or deionized water.

3.11 Rinse bailer with methanol (to remove volatile organic compounds).

3.12 Allow to air dry.

3.13 Rinse with distilled or deionized water.

3.14 Collect all rinsate in a container for disposal of by the Industri-Plex Site Remedial Trust.

# STANDARD OPERATING PROCEDURE FOR GROUND-WATER MONITORING WELL DRILLING, FORMATION SAMPLING, AND CONSTRUCTION DEVELOPMENT

## 1.0 DESCRIPTION OF DRILLING TECHNIQUE

1.1 Roux Associates has chosen to drill the ground-water monitoring wells using the hollow-stem auger. This drilling method is rapid and extremely effective in most cohesive sediments but less so in loose sandy material.

## 2.0 PROCEDURE FOR FORMATION SAMPLING

2.1 Intact formation sampling will be implemented using split-spoon samplers. (Formation samples will be retained in appropriate size (e.g., one-pint or half-pint) jars for physical descriptions and potential physical and chemical analysis. The labeled jars and tubes will be stored in a safe place to avoid breakage, agitation, and freezing. Intact formation samples will be collected at specified intervals (e.g., every 5 foot increment below land surface) and at each major change in subsurface materials. Hydrogeologic information will be recorded on a Geologic Log form (Figure 1).

2.2 Disturbed formation samples (drill cuttings) will be examined continuously throughout the entire depth of the borehole. Borehole cuttings will be described from the circulating auger flights which lift cuttings to land surface.

2.3 The soil cores from the wells drilled at the site will be used for confirmatory lithologic identification.

2.4 Before collecting and retaining soil and/or sediments collected with the split-spoon sampler, the top several inches will be removed from the sampler and discarded to eliminate any sediment that may have caved into the bottom of the borehole.

2.5 Sediment sampling equipment such as split-spoon samples, spatulas, etc. will be decontaminated according to the standard protocols.

## 3.0 DESCRIPTION OF MONITORING WELL CONSTRUCTION

3.1 The installation of each monitoring well will begin immediately after borehole completion. In cases of unscheduled delays, such as personal injury, equipment breakdowns or sudden inclement weather, installation will be resumed as soon as practical. The drill rig will be secured to prevent accidental injuries and the hole will be covered to prevent contamination or injuries.

3.2 The monitoring well will be constructed of 4-inch diameter PVC casing and screen. A generalized well construction diagram will be included (Figure 2).

# ROUX ASSOCIATES INC — GEOLOGIC LOG

Study No. _____ Date _____
Project _____
Client _____
Page _____ Of _____
Logged By _____
Well No. _____
Loc. _____
M.P. Elevation _____
Drilling Started _____ Ended _____
Driller _____
Type Of Rig _____

## WELL DATA

Hole Diam. (in.) _____
Final Depth (ft.) _____
Casing Diam. (in.) _____
Casing Length (ft.) _____
Screen Setting (ft.) _____
Screen Slot & Type _____
Well Status _____

## G W READINGS(1)

| Date | DTW MP(2) | Elev. W.T. |
|---|---|---|
| | | |

## SAMPLER

Type _____
Hammer _____ lb.
Fall _____ in.

## DEVELOPMENT

| Hnu | SAMPLE No. | Rec. | Depth (ft.) | Blows/6" | Strata Change & Gen. Desc. | Depth (ft.) | SAMPLE DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

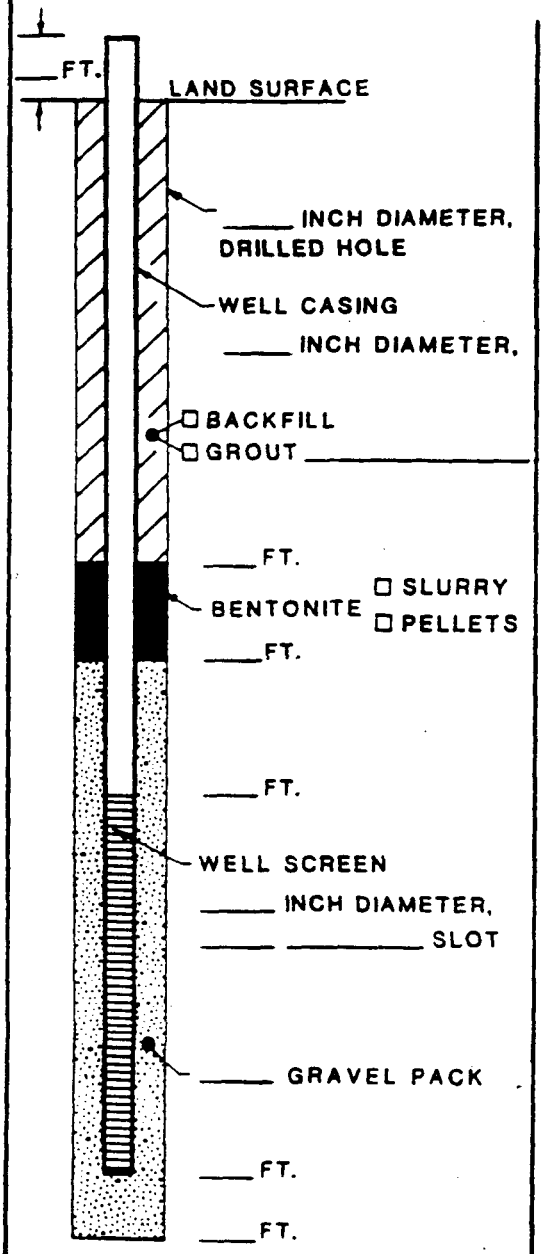
REMARKS: (1) in feet relative to a common datum
(2) from top of PVC casing

ROUX

Consulting Ground-Water Geologists

ROUX ASSOCIATES INC

# MONITORING WELL CONSTRUCTION LOG




NOTE:
ALL DEPTHS IN FEET
BELOW LAND SURFACE

PROJECT NAME _____ NUMBER _____

WELL NO. _____ PERMIT NO. _____

TOWN/CITY _____

COUNTY _____ STATE _____

LAND-SURFACE ELEVATION

AND DATUM _____ FEET ☐ SURVEYED

_____ ☐ ESTIMATED

INSTALLATION DATE(S) _____

DRILLING METHOD _____

DRILLING CONTRACTOR _____

DRILLING FLUID _____

_____

DEVELOPMENT TECHNIQUE(S) AND DATE(S)

_____

_____

_____

FLUID LOSS DURING DRILLING _____ GALLONS

WATER REMOVED DURING DEVELOPMENT _____ GALLONS

STATIC DEPTH TO WATER _____ FEET BELOW M.P.

PUMPING DEPTH TO WATER _____ FEET BELOW M.P.

PUMPING DURATION _____ HOURS

YIELD _____ GPM _____ DATE _____

SPECIFIC CAPACITY _____ GPM/FT.

WELL PURPOSE _____

_____

_____

REMARKS _____

_____

_____

_____

_____

_____

HYDROGEOLOGIST _____

1/89

3.3 Monitoring wells in unconsolidated formations will be set as follows:

a. The screen and casing will be lowered into the borehole to the appropriate depth.

b. A gravel pack (quartz sand) is filled in around the screen at least two feet above the screened interval (to allow for potential settlement during subsequent development).

c. Bentonite grout will be placed on top of the sand to five feet below grade.

d. A locking steel protective casing or curb box is set over the well and cemented in place. The protective case, or curb box is designed to prevent water from ponding at the top of the well or directly entering the well.

3.4 Each well will be properly identified with the appropriate information (e.g., local well number, state and/or permit number, etc. The top of the well casing will serve as the measuring point for ground-water level measurements. The inside PVC casing will be surveyed to the nearest $\pm$ 0.01 foot relative to a datum (e.g., mean sea level) by a professional, state-licensed surveyor. The location and elevation of the top of the inside PVC casing will be surveyed by a state licensed surveyor to an accuracy of $\pm$1.0 and $\pm$0.01 foot, respectively.

3.5 Each well will have a well construction log showing the casing placement and materials used to fill the annular space between the well casing and borehole. The appropriate log will show the depths of each casing material and discuss the geologic variability at the borehole. A description of the surface soils and unsaturated zone materials down to and including the water table is required.

The following information, if applicable, will be included on the well log:

a. Project number.
b. Date and initials of scientist documenting the well information.
c. Date/time of construction.
d. Well location.
e. Well/permit number.
f. Borehole diameter and depth.
g. Well depth.
h. Casing material.
i. Screen material.
j. Screen slot size/length.
k. Gravel pack/type size (depths from _____ to _____).
l. Sand pack (depths from _____ to _____).
m. Bentonite pellets (depths from _____ to _____).
n. Bentonite slurry (depths from _____ to _____).
o. Cement/grout (depths from _____ to _____).
p. Ground-surface elevation.
q. Well height above/depth below land surface.
r. Depth ground water encountered.

## 4.0 DESCRIPTION OF WELL DEVELOPMENT

4.1 Before a newly constructed well can be used for water-quality sampling, it must be developed. Well development refers to the procedure used to clear the well and formation around the screen of fine-grained materials (sands, silts, and clays) produced during drilling or naturally occurring in the formation. Well development continues until the well responds to water-level changes in the formation (i.e., a good hydraulic connection is established between the well and formation and the well produces clear, sediment-free water to the extent practical).

4.2 Well development may include one or more of the following techniques.

a. Bailing.
b. Pumping (centrifugal or submersible).
c. Surging (mechanical).
d. A combination of the above.

4.3 A one-pint sample of the last water removed during development will be obtained and inspected by the field hydrogeologist for relative clarity to determine whether development is complete. Well development procedures will be documented in the field notebook.

4.4 Dispersing agents, acids, disinfectants, or other additives will not be used during development nor will they be introduced into the well at any other time. During development, water will be removed form the entire column of water standing in the well (e.g., by periodically lowering and raising the pump intake). Well development will include the rinsing of the interior well casing above the water column in the well using only water from that well.

# STANDARD OPERATING PROCEDURE FOR ROCK CORING AND FORMATION SAMPLING

## 1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to describe the considerations and procedures, and to establish the guidelines for coring (drilling) and formation sampling activities in consolidated (bedrock) formations.

## 2.0 DRILLING TECHNIQUE

There are several coring (drilling) techniques available which include diamond core bits, carbide core bits, and sawtooth core bits. The objective of the coring are:

a. Collection of a three-foot core characteristic of the upper part of the consolidated formation(s).

b. Identification of the lithology for the development of a detailed geologic log of the formations penetrated to confirm auger refusal.

## 3.0 DECONTAMINATION

The following is a decontamination procedure for coring (drilling) equipment.

3.1 The rig and all associated equipment must be properly decontaminated before arriving at the test site.

3.2 The core barrels, bits, drive pipe, drilling casings, rods, samplers, tools, rig, and any piece of equipment that can come in contact (directly or indirectly) with subsurface materials, will be cleaned with a high pressure hot water wash prior to set up for drilling to ensure proper decontamination.

3.3 Any drilling fluid circulating equipment (e.g., pumps, hoses) will be flushed with a non-phosphate, laboratory-grade detergent and potable water solution, followed by a flush (rinse) with potable water. The exterior of this equipment should also be steam cleaned or washed with the detergent solution and rinsed with potable water. This will ensure proper internal and external decontamination.

3.4 The same hot water wash cleaning, and flushing and rinsing procedures will be followed between boreholes (at a fixed on-site location[s], if appropriate) and before leaving the site at the end of the study.

3.5 All on-site decontamination activities will be monitored and documented by a member(s) of the staff of Roux Associates, Inc. (Roux Associates).

## 4.0 PROCEDURE

4.1 Document all coring-related activities (e.g., starting, stopping, footage, problems, decontamination, etc.) on the Daily Log form (Figure 1) or in the field notebook. Record dates and times of activities, and name of Roux Associates personnel providing oversight.

4.2 Begin coring activities when consolidated materials are evidenced when the soil boring is terminated due to auger refusal.

4.3 Ensure that core borings are made through appropriate size casing (e.g., 4-inch diameter) which has been driven and seated into the top of the consolidated formation to prevent seepage into the borehole from the overburden, and that the core barrel is in efficient operating condition.

4.4 Monitor and record drill fluid mix, speed of rotation, down pressure on the core barrel, pressure on the drill fluid, and length of an individual core run during drilling.

4.5 Pay particular attention to the advancement of the boring in order that the top of the weathered portion of consolidated formation (rock) and the top of the competent portion of rock are carefully indicated in the log.

4.6 Confirm that the drill rods and core barrel are straight, or discontinue drilling.

4.7 Maintain a continuous dialogue with the driller to track and keep informed of all drilling/coring activities (e.g., the speed of the drill and drilling pressure. amount and pressure of water, length of core run) to secure maximum core recovery.

4.8 Pay attention that blockage of the core barrel is not occurring. If blockage occurs, then the barrel must be removed from the boring, the core removed, and the coring stopped until care has been taken to assure that the core barrel and bit are in satisfactory operating condition.

4.9 Make sure that the first core run does not exceed 3 feet (1 meter) and that no grinding of the core occurs.

4.10 Ream the boring with flush joint casing to a point below broken or open formation (rock) if soft or broken formations are encountered that cause pieces of rock to fall into the boring and result in unsatisfactory coring or if voids are encountered that restrict the continued downward progress of the boring.

4.11 Remove the rock core from the core barrel immediately upon recovery and place it in the core box. Core removal and placement should be done with extreme care. Make sure that the driller-supplied core boxes are well-constructed wooden boxes with longitudinal spacers the height of the box to provide separate rows for the cores.

4.12 Place spacer blocks between each core run to separate runs. Additionally, if portions of the core run have not been recovered, then a partition must be placed and permanently secured immediately above the spacer block at the end of a core run showing the length of core lost.

4.13 Label core boxes with an indelible marker on each end and on the inside and outside of the lid. Labeling of the inside must include the project number and name, boring number, and depths from which core was recovered. The exterior of the box must include the project number and name, boring number, box sequence, and depths covered.

4.14 Record geologic information on the Geologic Log form.

4.15 Place only one boring in a core box and do not transfer core samples between boxes (unless a problem develops, e.g., box cracks or breaks, etc.). If transferring is unavoidable, then exercise extreme caution in moving the core and verify that the corebox is labeled properly (as discussed above).

4.16 Photograph all core boxes, with a scale reference, as soon as possible, and especially if the boxes are to be removed from the site. The photographs must clearly show the core, the printed on the inside of the box and taken from a consistent distance.

4.17 Handle and ship core boxes carefully to minimize disturbance of the core.

STANDARD OPERATING PROCEDURE
FOR SAMPLING GROUND-WATER MONITORING WELLS

## 1.0 MATERIALS AND EQUIPMENT

1.1 The following items may be required for monitoring well sampling and data collection:

a. Appropriate bailer(s) for test substances.
b. Non-absorbent cord (e.g., polypropylene).
c. Pre-measured plastic bucket(s).
d. Plastic sheets.
e. m-scope
f. Tape measure (steel - tenth of a foot measurement increments) and chalk.
g. Pen knife.
h. Field forms/Field notebook.
i. Well location map.
j. Cleaning agents (detergent, distilled or deionized water, potable water).
k. Pump (if purging required) and associated materials such as:

   1. Teflon tape.
   2. Appropriate tubing (e.g., polyethylene) if using peristaltic pump.
   3. Portable generator if using submersible pump.

l. Water Well Handbook.
m. Calculator.
n. Hard hat (if required on location).
o. pH meter.
p. Conductivity meter.
q. Thermometer.
r. Paper towels, clean rags.
s. Black pen and pencil.
t. Wet ice and/or blue packs.
u. Sample jars, codes, and labels.
v. Electrical tape.
w. Pipe wrench.
x. Screwdriver, hammer.
y. Cooler(s).
z. Water jugs.
aa. Disposable gloves
bb. Well keys.
cc. Masking and packing tape.
dd. Water-proof marker.
ee. Well sampling form(s).
ff. Non-phosphate, laboratory-grade detergent.
gg. Distilled/deionized water.
hh. Chain-of-custody form(s).
ii. Custody seal(s).
jj. Extra batteries (meters, thermometer).
kk. Buffer/calibration solutions.

## 2.0 PROCEDURE

2.1 Once the wells are in place, and properly developed, ground-water samples will be taken for water-quality analyses.

2.2 Make sure all equipment is decontaminated, cleaned, and calibrated before use and document daily activities in the field notebook.

2.3 Document well identification and pre-sampling information in the field notebook as needed.

2.4 Inspect the protective casing of the well and note any items of concern such as a missing lock or bent casing. Complete the Well Inspection Checklist.

2.5 Place plastic sheeting around the well to protect sampling equipment from potential contamination.

2.6 Remove the well cap or plug and clean the top of the well off with a clean rag. Place the cap or plug on plastic.

2.7 Measure the depth to water using an electronic probe (m-scope) or steel tape and chalk. Document in the field notebook.

2.8 Measure the depth of the well with the steel tape or obtain from construction diagram. Calculate and record the volume of water in the well in the field notebook.

2.9 Prior to sampling, the well should be pumped or bailed to remove a minimum of three casing volumes if the recharge rate is adequate to accomplish this within a reasonable amount of time. The well should not be pumped or bailed dry. If the well produces little water, at least one well volume must be purged. The well will be sampled after the water level has stabilized.

2.10 Record the temperature, pH, conductivity, and physical appearance of the water in the field notebook (e.g., color, turbidity, odor, etc.) as it is pumped or bailed, a minimum of three times.

2.11 If the bailer has not been decontaminated, decontaminate it according to the procedures described previously. If the bailer has been decontaminated, flush it several times with distilled/deionized water, and collect and discard (in an appropriate manner) three bails of well water before collecting the sample.

2.12 Using a non-absorbent cord (e.g., polypropylene), lower the bailer into the well.

2.13 Quality-control samples will be used to monitor sampling and laboratory performance and will include replicates, and blanks, spikes.

a. Replicate analysis is done to check on samples reproducibility. The procedure to be used for taking replicate samples follows. If samples are

collected for volatile organic compound (VOC) analysis, then the water from the bailer will be distributed first to fill one VOC container and then to fill the second VOC container. Adequate water will be available to fill both of the bottles completely before they are capped. A replicate sample will be collected every 20 samples at a minimum.

b. Trip blank analysis is performed to detect if contamination has occurred during field handling, shipment, or in the laboratory. A trip blank is a container that is filled with distilled/deionized water in the laboratory, and travels unopened with the sample bottles. It is opened in the laboratory and analyzed along with the field samples for the constituent of interest.

c. Equipment blank analysis provides a check on sampling procedures. An equipment blank is made with distilled/deionized water by exposing it to the sampling processes (e.g., bailer). The clean water will be poured into the bailer (which has been decontaminated and is ready for sampling) and then into the sampling container. A field blank will be collected every 20 samples at a minimum.

d. A matrix spike, which is performed in the laboratory, is a check on the laboratory's ability to recover the matrix. Spikes of standard compounds may be added to samples in the laboratory to determine if the groundwater constituents are interfering with test substance identification or quantification. Such analyses may also point to systematic errors and lack of sensitivity of analytical equipment. A matrix spike and replicate matrix spike will be collected every 20 samples at a minimum.

2.14 Place samples in the pre-labeled containers and store on ice (wet ice or blue packs).

2.15 After sample collection is complete, measure and record the temperature, conductivity, pH, and physical appearance of the water, and record in the field notebook.

2.16 Wipe the well cap with a clean rag, replace the well cap and protective cover (if present). Lock the protective cap.

2.17 Verify that each sample is placed in an individual "zip-lock" bag, wrapped with "bubble wrap," and placed in its appropriate container (holder) in the cooler, and that the cooler has sufficient ice (wet ice or blue packs) to preserve the samples for transportation to the laboratory.

2.18 Complete the Chain-of-Custody forms. One copy of the Chain-of-Custody form is retained. Secure the cooler with sufficient packing tape and a Custody Seal. Forward the samples via overnight (express) mail or hand deliver to the designated laboratory preferably within 24 hours but no later than 48 hours after sampling. Notify the laboratory that samples have been shipped, and make special arrangements if Saturday delivery is necessary.

2.19 Decontaminate bailers, hoses, and pumps as discussed in the decontamination section. Wrap decontaminated equipment with a suitable material (e.g., aluminum foil). Discard the cord, rags, gloves, etc. in a manner consistent with the Health and Safety Plan.

# STANDARD OPERATING PROCEDURE
# FOR FILTRATION OF WATER SAMPLES FOR DISSOLVED METALS ANALYSES

## 1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to describe the considerations and procedures for the field filtration of water samples for dissolved metals analyses prior to sample preservation. Filtering is implemented when the water sample originates from a medium-grained to fine-grained porous geologic formation that contains suspended fine-grained materials (fines) that cannot be prohibited from entering the water sample by well development or well design. Since fines are not always distinctly visible in a water sample, all water samples will undergo filtration.

It should be noted that filtration of water for metals analyses has been a standard practice with the United States Geological Survey (USGS) for many years. Within this framework, filtration refers to the filtering of water either directly or at the end of a filtration series through a 0.45 micrometer (micron) membrane filter (i.e., the presence of a large quantity of fines may require the prefiltering of the sample with a larger-size[s] membrane filter[s] prior to the 0.45 micron filter to avoid clogging the 0.45 micron filter using an exorbitant amount of time to filter).

Filtration will be done as soon as possible after a water sample is collected, preferably at the same time that the water is produced. The filtering equipment and membrane will be suitable for the intended analysis.

## 2.0 MATERIALS/EQUIPMENT

2.1 In order to field filter water samples, specific equipment and materials will be required. The equipment and materials needed for field filtering will include the following:

a. Non-phosphate, laboratory-grade detergent.
b. Distilled/Deionized water.
c. Potable water.
d. Roux Associates field forms (e.g., Daily Log, Sampling, etc.)/field book.
e. Filtration apparatus (e.g., Gelman apparatus, Buchner funnel, etc.), filters, pre-filters.
f. Plasticware (e.g., pre-measured buckets, beakers, flasks, funnels).
g. Teflon™ tape.
h. Vacuum pump (e.g., manual/hand-operated or electric).
i. Appropriate tubing.
j. Disposable gloves.
k. Sample jars with appropriate preservative (e.g., Nitric acid) and labels.

## 3.0 DECONTAMINATION

3.1 Decontamination procedures for filtering equipment follow:

a. Wear disposable gloves while cleaning filtering equipment to avoid contamination and change gloves as needed.

b. Prepare a non-phosphate, laboratory-grade detergent solution and distilled or deionized water in a bucket.

c. Remove vacuum tubing from flask.

d. Remove filter membrane from funnel.

e. Disassemble filtering apparatus (flask and funnel) and scrub each piece of equipment with a brush and solution.

f. Rinse with potable water.

g. Rinse with copious amounts of distilled or deionized water.

h. Rinse with dilute, trace-metal analysis-grade Nitric Acid triple rinse with distilled water.

i. Air dry.

j. Wrap equipment with a suitable material (e.g., clean plastic bag, aluminum foil).

## 4.0 PROCEDURE

4.1 Ensure that the filtering equipment is properly decontaminated before use.

4.2 Assemble the filtering apparatus (funnel and flask), and connect the vacuum pump.

4.3 Place a clean (new) 0.45-micron pore-size filter in the funnel. Use larger, pore-size filters if prefiltering is required (i.e., if suspended sediment is present that would quickly clog the 0.45-micron filter and prevent continuous filtration).

4.4 Obtain the water sample using an appropriate, decontaminated sample-collection device (e.g., bailer, pump jar).

4.5 Pass the unpreserved water sample through the prefilter, if needed, and the 0.45-micron filter into the flask. Apply a vacuum using the vacuum pump, if needed, to facilitate filtering.

4.6 Transfer the filtered water sample to the appropriate, pre-labeled sample container containing the preservative (e.g., Nitric Acid) being careful not to overfill the container and dilute the preservative.

4.7 Follow standard operating procedures for sample documentation, shipping, and tracking (i.e., record keeping) as defined in the FSP and QAPjP.

4.8 Decontaminate the filtering equipment that came in contact with the water sample.

# STANDARD OPERATING PROCEDURE FOR QUALITY CONTROL

## 1.0 RESPONSIBILITY

1.1 The project hydrogeologist will verify the integrity of the well and ensure that all wells are constructed to specification, are adequately developed, and sampled using the appropriate equipment to properly collect the samples needed to meet study objectives. The project hydrogeologist will verify that all sampling equipment is properly decontaminated according to the standard procedures, that all samples are properly handled and packaged to avoid possible cross contamination or breakage and that the standard shipping procedures (i.e., Chain-of-Custody forms, Custody Seals, etc.) and deadlines are met.

1.2 All field work will be done by or under the direct supervision of an experienced project hydrogeologist from Roux Associates, Inc. The project manager or project hydrogeologist, and Quality Assurance Unit (QAU) officer will be present for critical phases of the study, inspection of site activities, procedural review, and communication with field hydrogeologist and client personnel.

## 2.0 QUALITY CONTROL SAMPLES

2.1 Samples taken for analysis of compounds may require the use of quality control samples to monitor sampling activities and laboratory performance. Types of quality control samples may include replicate, trip blank, field (equipment) blank, and matrix spike. A discussion pertaining to each quality control sample follows:

1. Replicate - Replicate sample analysis is done to check on the reproducibility of results either with respect to the sampler or the laboratory. Replicate samples are aliquots from a sample in a common container. A replicate sample will be collected every 20 samples at a minimum.

   If samples are collected for volatile organic compound (VOC) analysis, then the water from the bailer or pump will be distributed first to fill one VOC container and then to fill the second VOC container. Adequate water should be available to fill the bottles completely before they are capped. If the water is insufficient to fill all the bottles at once, then incrementally fill each bottle with water from two or more bailer volumes or pump cycles.

   In the case of wells that recover slowly and produce insufficient water to fill all the replicate sample containers, the containers should be filled incrementally and kept on ice in the cooler in between filling periods.

2. Trip Blank - A trip blank sample is a sample bottle that is filled with "clean" (e.g., distilled/deionized) water in the laboratory, and travels unopened with the sample bottles. It is opened in the laboratory and analyzed along with the field samples for the constituent(s) of interest (e.g., test substance, etc.). Analysis of trip blanks is performed to detect if contamination has occurred during field handling, shipment, or in the laboratory.

3. Equipment and Field Blanks - An equipment blank sample is collected to check on the sampling procedures implemented in the field. An equipment blank is made with "clean" (e.g., distilled/deionized) water by exposing it to sampling processes (i.e., the clean water must pass through the actual sampling equipment) For example, if samples are being collected with a bailer, the equipment blank would be made by pouring the clean water into a bailer which has been decontaminated and is ready for sampling, and then pouring from the bailer into the sample containers. If a metals equipment blank is to be made, the sample must be filtered. One equipment blank would be incorporated into the sampling program every 20 samples at a minimum and analyzed for the identical suite of constituents as the samples.

   Often an equipment blank is made just before sampling the last well each day to check for accumulated cross contamination. However, it may also be made before sampling a background well or between sampling events during the day. A field blank might be made at a location where ambient air quality is poor, to check for atmospheric interference.

2. Matrix Spike - Spikes of compounds may be added to samples in the laboratory to determine if the ground-water matrix is interfering with constituent identification or quantification. Such analyses may also point to systematic errors and lack of sensitivity of analytical equipment. That is, a matrix spike, which is performed in the laboratory, provides a check of the laboratory's ability to recover the matrix. A spike matrix and replicate spike matrix will be analyzed for every 20 samples by the laboratory at a minimum.

# APPENDIX H

Golder Associates, Inc.
Data Validation Documentation

**Golder Associates Inc.**
CONSULTING ENGINEERS

July 18, 1990 Project No.: 893-6255.6

Roux Associates, Inc.
The Huntington Atrium
775 Park Avenue
Huntington, New York 11743

RE: CASES 6257, 6404, AND 6439
ENSECO-ERCO LABORATORIES
INDUSTRI-PLEX SITE, WOBURN, MASSACHUSETTS

ATT: William Sarni
Vice President

Gentlemen:

Golder Associates, Inc. has performed a validation of the organic and inorganic analytical data from groundwater samples collected June 4 through June 6, 1990 at the Industri-Plex Site in Woburn, Massachusetts. This data will be used in PDI Task GW-1 to delineate the groundwater plume. Twenty-five samples were analyzed for volatile organics, and twenty-two samples were analyzed for semivolatiles, pesticide/PCBs, total metals, and dissolved metals. These analyses were performed by Enseco-Erco of Cambridge, Massachusetts. U.S. EPA Region I Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses (February 1, 1988 and modified November 1, 1988), and Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses (June 13, 1988 and modified February 1989) were followed.

Samples were collected from the following observation wells:

| | | |
|---|---|---|
| G129 | G130A | G133A |
| G123 | G130B | G133B |
| G127A | G126A | G1PUB |
| G127B | G126B | G124A |
| G125A | G131 | G124B |
| G125B | G132 | |

Two field duplicates were collected and labelled G134 (duplicate of G129) and G135 (duplicate of G130A). A matrix spike and a matrix spike duplicate were collected from G133A. Three trip blanks and two field blanks were also analyzed with these samples for quality control (QC)

purposes. The organic data was evaluated based on the following parameters:

* * - data completeness
* * - holding times
* * - GC/MS tuning
  - calibration
  - blanks
  - surrogate recoveries
  - matrix spike/matrix spike duplicate
* * - field duplicates
* * - internal standard performance
* * - pesticide instrument performance
* * - compound identification
* * - compound quantitation

The inorganic data was evaluated based on the following parameters:

* * - data completeness
* * - holding times
  - calibration verification
  - laboratory and field blank analyses
  - ICP interference check sample results
* * - matrix spike recoveries
* * - laboratory and field duplicates
* * - laboratory control sample results
  - furnace atomic absorption results
* * - serial dilution results
* * - detection limit results
* * - sample results

* All criteria were met for this parameter.

## ORGANICS

### Calibration

#### Volatiles

The percent relative standard deviation (% RSD) for 2-Hexanone was greater than 30% (but less than 50%) for the initial calibration verification (ICV) on June 12, 1990. The percent differences (%D) for the following compounds were greater than 25% (but less than 50%) for the continuing calibration verifications (CCV) on the following dates:

| | |
|---|---|
| June 11, 1990 | Carbon disulfide |
| | Bromomethane |
| June 12, 1990 | Bromomethane |
| | Chloroethane |
| | Acetone |

| | |
|---|---|
| June 15, 1990 | Acetone |
| | 2-Butanone |
| | Carbon tetrachloride |
| | 4-Methyl-2-pentanone |
| | 2-Hexanone |
| June 18, 1990 | Chloroethane |
| | 2-Butanone |

Region I guidelines direct all positive results to be estimated. However, the above compounds were not detected in any of the associated samples.

**Semivolatiles**

The % RSD for 2-Fluorophenol was greater than 30% (but less than 50%) for the ICV on May 17, 1990. The %D for the following compounds was greater than 25% (but less than 50%) for the CCVs on the following dates:

| | |
|---|---|
| June 8, 1990 | Benzoic acid |
| | 4-Chloroaniline |
| | 3,3'-Dichlorobenzidine |
| June 10, 1990 | 4-Chloroaniline |
| | 2,4-Dinitrophenol |
| June 11, 1990 | N-nitroso-di-n-propylamine |
| | Benzoic acid |
| June 12, 1990 | Benzoic acid |
| June 15, 1990 | Nitrobenzene |
| | 4-Chloroaniline |
| | Benzo (b) fluoranthene |
| | Benzo (k) fluoranthene |

The %D was greater than 50% for 3,3'-Dichlorobenzidine on June 15, 1990. The above compounds were not detected in any of the associated samples. Region I guidelines direct all non-detects to be estimated if the % D is greater than 50%. The CCV on June 15, 1990 affected the dilution analysis of G127A.

**Blanks**

The pesticide/PCB and semivolatile blanks contained no contaminants. The volatile blanks contained the following contaminants:

| Compound | Maximum Concentration ug/l | Action Level ug/l |
|---|---|---|
| Methylene chloride | 16 | 160 |
| Acetone | 19 | 190 |
| Chloroform | 23 | 115 |

Region I guidelines direct the following actions:

- if the concentration is less than the CRQL, report the CRQL followed by a U;
- if the concentration is greater than the CRQL but less than the action level, report the concentration followed by a U;
- if the concentration is greater than the action level, report the concentration unqualified.

Surrogate Recoveries

The volatile and semivolatile surrogates were all within QC limits. The pesticide/PCB surrogate recovery for dibutylchlorendate was 0 for G127B and G131. The laboratory reported that the surrogate had been diluted out.

Region I directs positive results to be estimated and non-detects to be rejected if surrogate recoveries are less than 10%.

Matrix Spike/Matrix Spike Duplicate

The semivolatile and pesticide/PCB percent recoveries (%R) and relative percent difference (RPDs) were within QC limits. The volatile spike compound 1,1-Dichloroethene had an RPD of 32%, exceeding its control limit of 14%.

Region I guidelines direct positive results for any compound that does not meet the RPD criteria to be estimated.

INORGANICS

Calibration Verification

The %R for potassium was slightly below the QC limits for CCV4 and CCV5 (89.3% and 88.3%, respectively) on June 28, 1990. This affected the dissolved metals results for samples G131, G132, G126A, G126B, and Field Blank B.

Region I guidelines direct that all potassium results for the affected samples be estimated.

**Laboratory and Field Blank Analyses**

The total metals blanks contained the following contaminants:

| Compound | Maximum Concentration ug/l | Action Level ug/l |
|---|---|---|
| Iron | 37.2 | 186 |
| Sodium | 723 | 3615 |
| Aluminum | 71.8 | 359 |
| Barium | 3.4 | 17 |
| Calcium | 292 | 1460 |
| Copper | 6.4 | 32 |
| Manganese | 1.5 | 7.5 |
| Zinc | 15.2 | 76 |
| Selenium | 2.2 | 11 |

The dissolved metals blanks contained the following contaminants:

| Compound | Maximum Concentration ug/l | Action Level ug/l |
|---|---|---|
| Iron | 64.4 | 322 |
| Calcium | 649 | 3245 |
| Aluminum | 107 | 535 |
| Sodium | 3140 | 15700 |
| Barium | 12.0 | 60 |
| Magnesium | 107 | 535 |
| Manganese | 13.0 | 65 |
| Zinc | 11.5 | 57.5 |

Region I guidelines direct the following blank actions:

- if the concentration is greater than the IDL but less than the action level, report the concentration followed by a U;
- if the sample concentration is greater than the action level, report the concentration unqualified.

**ICP Interference Check Sample (ICS) Results**

The following samples and analytes were affected by Calcium interferences:

positive interference:

| | |
|---|---|
| total Manganese | G123, GI31, G132 |
| total Sodium | G123, GI31, GI32 |
| dissolved Manganese | GI32 |
| dissolved Sodium | GI32 |

negative interference:

| | |
|---|---|
| total Zinc | G123, G131, G132 |
| total Silver | G123, G131, G132 |
| dissolved Zinc | G132 |
| dissolved silver | G132 |

Region I guidelines direct positive results for the listed samples and analytes to be estimated. Also, if a negative interference is present, non-detects should be estimated.

**Furnace Atomic Absorption Results**

The method of standard additions (MSA) was applied to sample G123 for total Lead analysis. Although the method was performed twice, the correlation coefficient was less than 0.995 both times.

Region I guidelines direct sample results to be estimated if the correlation coefficient is less than 0.995.

The Region I validation worksheets are attached for your information. If you have any further questions, please contact Elizabeth Auda at 609-273-1110.

Very truly yours,

GOLDER ASSOCIATES INC.

Mary C. Bourcier
Chemist

Kenneth R. Moser
Associate

Attachments

cc: Elizabeth M. Auda/Golder (w/out attachments)
Robert Glazier/Golder (w/out attachments)
Lori Anne Hendel/Golder (w/attachments)
Brian Thomas/Roux Associates (w/attachments)

MCB/KRM/d

# APPENDIX I

Ground-Water/Surface-Water Investigation Plan
Ground-Water Quality Data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: | | OW-1 | OW-1A | OW-4 | OW-6 | OW-9 | OW-10 | OW-11 | OW-12 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 3/20/90 | 3/19/90 | 3/19/90 | 3/16/90 | 3/19/90 | 3/20/90 | 3/20/90 | 3/15/90 | |
| Volatile Organic Compounds (Concentrations in ug/L) | CRQL | | | | | | | | | IDL |
| Chloromethane | 10 | 1 A | 2 U | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 2 |
| Bromomethane | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 2 |
| Vinyl chloride | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 2 |
| Chloroethane | 10 | 3 A | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 2 |
| Methylene chloride | 5 | 5 U | 3 U | 12 U | 13 U | 13 U | 1 U | 2 U | 8 U | 2 |
| Acetone | 10 | <10 B | <10 B | 6 A | <10 U | <10 B | <10 B | <10 B | 16 U | 2 |
| Carbon disulfide | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 1,1-Dichloroethene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 1,1-Dichloroethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| trans-1,2-Dichloroethylene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Chloroform | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 1,2-Dichloroethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 2-Butanone | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 1 |
| 1,1,1-Trichloroethane | 5 | <5 B | <5 B | <5 B | 3 A | <5 B | <5 B | <5 B | <5 B | 1 |
| Carbon tetrachloride | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Vinyl acetate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 2 |
| Bromodichloromethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 1,1,2,2-Tetrachloroethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 1,2-Dichloropropane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| trans-1,3-Dichloropropene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Trichloroethene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Dibromochloromethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 1,1,2-Trichloroethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Benzene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 46 B | 1 |
| cis-1,3-Dichloropropene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 2-Chloroethylvinyl ether | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 2 |
| Bromoform | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 2-Hexanone | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 2 |
| 4-Methyl-2-pentanone | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 2 |
| Tetrachloroethene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 1 |
| Toluene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 U | 4 A | 1 |
| Chlorobenzene | 5 | 25 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Ethylbenzene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Styrene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Total xylenes | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |

* - Indicates a replicate sample
CRQL - Contract Required Quantitation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: | | OW-13 | OW-13* | OW-14 | OW-15 | OW-16 | OW-17 | OW-18 | OW-18A | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 3/19/90 | 3/19/90 | 3/15/90 | 3/19/90 | 3/20/90 | 3/15/90 | 3/15/90 | 3/15/90 | |
| Volatile Organic Compounds (Concentrations in ug/L) | CRQL | | | | | | | | | IDL |
| Chloromethane | 10 | <10 B | <10 B | <10 B | <10 B | <5000 B | <250 B | <10 B | <10 B | 2 |
| Bromomethane | 10 | <10 B | <10 B | <10 B | <10 B | <5000 B | <250 B | <10 B | <10 B | 2 |
| Vinyl chloride | 10 | <10 B | <10 B | <10 B | <10 B | <5000 B | <250 B | <10 B | <10 B | 2 |
| Chloroethane | 10 | <10 B | <10 B | <10 B | <10 B | <5000 B | <250 B | <10 B | <10 B | 2 |
| Methylene chloride | 5 | <5 A | <5 A | 7 U | 6 U | 780 U | 160 U | 5 U | 9 U | 2 |
| Acetone | 10 | <10 B | 5 A | <10 A | <10 B | 37000 U | <250 A | 6 U | <10 B | 2 |
| Carbon disulfide | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 1 |
| 1,1-Dichloroethene | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 1 |
| 1,1-Dichloroethane | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | 2 A | 2 A | 1 |
| trans-1,2-Dichloroethylene | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 1 |
| Chloroform | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 1 |
| 1,2-Dichloroethane | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 1 |
| 2-Butanone | 10 | <10 B | <10 B | <10 B | <10 B | <5000 B | <250 B | <10 B | <10 B | 1 |
| 1,1,1-Trichloroethane | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 1 |
| Carbon tetrachloride | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 1 |
| Vinyl acetate | 10 | <10 B | <10 B | <10 B | <10 B | <5000 B | <250 B | <10 B | <10 B | 2 |
| Bromodichloromethane | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 1 |
| 1,1,2,2-Tetrachloroethane | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 1 |
| 1,2-Dichloropropane | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 1 |
| trans-1,3-Dichloropropene | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 1 |
| Trichloroethene | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 1 |
| Dibromochloromethane | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 1 |
| 1,1,2-Trichloroethane | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 1 |
| Benzene | 5 | 4 A | 4 A | <5 B | <5 B | <2500 A | 2000 A | <5 B | <5 B | 1 |
| cis-1,3-Dichloropropene | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 1 |
| 2-Chloroethylvinyl ether | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 2 |
| Bromoform | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 1 |
| 2-Hexanone | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 2 |
| 4-Methyl-2-pentanone | 10 | <10 B | <10 B | <10 B | <10 B | <5000 B | <250 B | <10 B | <10 B | 2 |
| Tetrachloroethene | 10 | <10 B | <10 B | <10 B | <10 B | <5000 B | <250 B | <10 B | <10 B | 1 |
| Toluene | 5 | <5 B | <5 B | <5 B | <5 B | 29000 A | <130 A | <5 B | <5 B | 1 |
| Chlorobenzene | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 1 |
| Ethylbenzene | 5 | <5 B | <5 B | <5 B | <5 B | <2500 A | <130 A | <5 B | <5 B | 1 |
| Styrene | 5 | <5 B | <5 B | <5 B | <5 B | <2500 B | <130 B | <5 B | <5 B | 1 |
| Total xylenes | 5 | <5 B | <5 B | <5 B | <5 B | <2500 A | <130 A | <5 B | <5 B | 1 |

* - Indicates a replicate sample
CRQL - Contract Required Quantitation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: | | OW-19 | OW-19A | OW-20 | OW-21 | OW-21* | OW-22 | OW-28 | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 3/16/90 | 3/16/90 | 3/16/90 | 3/21/90 | 3/21/90 | 3/21/90 | 3/22/90 | |
| Volatile Organic Compounds (Concentrations in ug/L) | CRQL | | | | | | | | IDL |
| Chloromethane | 10 | <10 B | <10 B | <10 B | 1 U | <10 B | <10 B | <10 B | 2 |
| Bromomethane | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 2 |
| Vinyl chloride | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 2 |
| Chloroethane | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 2 |
| Methylene chloride | 5 | 6 U | 5 U | 5 U | 2 U | 3 U | <5 U | 2 U | 2 |
| Acetone | 10 | 6 U | 11 U | 9 U | 2 U | 1 U | <10 U | 9 U | 2 |
| Carbon disulfide | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 1,1-Dichloroethene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 1,1-Dichloroethane | 5 | <5 B | <5 B | 5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| trans-1,2-Dichloroethylene | 5 | <5 B | <5 B | 28 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Chloroform | 5 | <5 B | <5 B | <5 B | 2 A | 2 A | 6 B | 2 A | 1 |
| 1,2-Dichloroethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 2-Butanone | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 1 |
| 1,1,1-Trichloroethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Carbon tetrachloride | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Vinyl acetate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 2 |
| Bromodichloromethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 1,1,2,2-Tetrachloroethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 1,2-Dichloropropane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| trans-1,3-Dichloropropene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Trichloroethene | 5 | 1 A | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Dibromochloromethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 1,1,2-Trichloroethane | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Benzene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| cis-1,3-Dichloropropene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 2-Chloroethylvinyl ether | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 2 |
| Bromoform | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| 2-Hexanone | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 2 |
| 4-Methyl-2-pentanone | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 2 |
| Tetrachloroethene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 1 |
| Toluene | 5 | <5 B | <5 B | 3 A | 8 A | <5 B | 1 B | 38 B | 1 |
| Chlorobenzene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Ethylbenzene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Styrene | 5 | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | <5 B | 1 |
| Total xylenes | 5 | <5 B | <5 B | 3 A | <5 B | <5 B | <5 B | <5 B | 1 |

* - Indicates a replicate sample
CRQL - Contract Required Quantitation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: | | OW-1 | OW-1A | OW-4 | OW-6 | OW-9 | OW-10 | OW-11 | OW-12 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 3/20/90 | 3/19/90 | 3/19/90 | 3/16/90 | 3/19/90 | 3/20/90 | 3/20/90 | 3/15/90 | |
| Semi-Volatile Organic Compounds (Concentrations in ug/L) | CRQL | | | | | | | | | IDL |
| Phenol | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | 3 A | 5 |
| bis (2-Chloroethyl) ether | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 2-Chlorophenol | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 1,3-Dichlorobenzene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 1,4-Dichlorobenzene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Benzyl alcohol | 10 | 4 A | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 10 |
| 1,2-Dichlorobenzene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 2-Methylphenol | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 5 |
| bis (2-Chloroisopropyl) ether | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 4-Methylphenol | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 5 |
| N-Nitroso-di-n-propylamine | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 10 |
| Hexachloroethane | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 10 |
| Nitrobenzene | 10 | <10 A | <10 B | <10 B | <13 B | <10 B | <10 A | <10 A | <10 B | 5 |
| Isophorone | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 2-Nitrophenol | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 10 |
| 2,4-Dimethylphenol | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 10 |
| Benzoic acid | 50 | <50 B | <50 B | <50 B | <63 A | <50 B | <50 B | <50 B | 58 U | 25 |
| bis (2-Chloroethoxy) methane | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 2,4-Dichlorophenol | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 1,2,4-Trichlorobenzene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Naphthalene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 3 |
| 4-Chloroaniline | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Hexachlorobutadiene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 4-Chloro-3-methylphenol | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 10 |
| 2-Methylnaphthalene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 10 |
| Hexachlorocyclopentadiene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 10 |
| 2,4,6-Trichlorophenol | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 10 |
| 2,4,5-Trichlorophenol | 50 | <50 B | <50 B | <50 B | <63 B | <50 B | <50 B | <50 B | <50 B | 10 |
| 2-Chloronaphthalene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 4 |
| 2-Nitroaniline | 50 | <50 B | <50 B | <50 B | <63 B | <50 B | <50 B | <50 B | <50 B | 10 |
| Dimethyl phthalate | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 4 |
| Acenaphthylene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 3 |
| 2,6-Dinitrotoluene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 10 |
| 3-Nitroaniline | 50 | <50 B | <50 B | <50 B | <63 B | <50 B | <50 B | <50 B | <50 B | 10 |
| Acenaphthene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 3 |
| 2,4-Dinitrophenol | 50 | <50 A | <50 B | <50 B | <63 B | <50 B | <50 A | <50 A | <50 A | 25 |
| 4-Nitrophenol | 50 | <50 B | <50 B | <50 B | <63 B | <50 B | <50 B | <50 B | <50 B | 15 |
| Dibenzofuran | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 4 |
| 2,4-Dinitrotoluene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 10 |
| Diethylphthalate | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 4 |
| 4-Chlorophenyl-phenylether | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Fluorene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 4 |
| 4-Nitroaniline | 50 | <50 A | <50 A | <50 A | <63 A | <50 A | <50 A | <50 A | <50 A | 10 |
| 4,6-Dinitro-2-methylphenol | 50 | <50 B | <50 B | <50 B | <63 B | <50 B | <50 B | <50 B | <50 B | 15 |

(1) Cannot be separated from Diphenylamine
* - Indicates a replicate sample
CRQL - Contract Required Quantitation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: | | OW-1 | OW-1A | OW-4 | OW-6 | OW-9 | OW-10 | OW-11 | OW-12 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 3/20/90 | 3/19/90 | 3/19/90 | 3/16/90 | 3/19/90 | 3/20/90 | 3/20/90 | 3/15/90 | |
| Semi-Volatile Organic Compounds (Concentrations in ug/L) | CRQL | | | | | | | | | IDL |
| N-Nitrosodiphenylamine (1) | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | 2 A | 3 A | 5 |
| 4-Bromophenyl-phenylether | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Hexachlorobenzene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Pentachlorophenol | 50 | <50 B | <50 B | <50 B | <63 B | <50 B | <50 B | <50 B | <50 B | 10 |
| Phenanthrene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Anthracene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Di-n-butylphthalate | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Fluoranthene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Pyrene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Butylbenzylphthalate | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 3,3'-Dichlorobenzidine | 20 | <20 B | <20 A | <20 A | <25 B | <20 A | <20 B | <20 B | <20 B | 5 |
| Benzo (a) anthracene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 3 |
| bis (2-Ethylhexyl) phthalate | 10 | <10 B | 4 A | 4 A | <13 B | <10 B | 3 A | <10 B | <10 B | 4 |
| Chrysene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Di-n-octyl phthalate | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Benzo (b) fluoranthene | 10 | <10 A | <10 B | <10 B | <13 B | <10 B | <10 A | <10 A | <10 B | 3 |
| Benzo (k) fluoranthene | 10 | <10 A | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Benzo (a) pyrene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Indeno (1,2,3-cd) pyrene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 4 |
| Dibenzo (a,h) anthracene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Benzo (g,h,i) perylene | 10 | <10 B | <10 B | <10 B | <13 B | <10 B | <10 B | <10 B | <10 B | 3 |

(1) Cannot be separated from Diphenylamine
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Validation Codes

B - Quantitative data
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U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: | | OW-13 | OW-13* | OW-14 | OW-15 | OW-16 | OW-17 | OW-18 | OW-18A | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 3/19/90 | 3/19/90 | 3/15/90 | 3/19/90 | 3/20/90 | 3/15/90 | 3/15/90 | 3/15/90 | |
| Semi-Volatile Organic Compounds (Concentrations in ug/L) | CRQL | | | | | | | | | IDL |
| Phenol | 10 | <10 B | <10 B | <10 B | <10 B | 130 B | 6 A | <13 B | <10 B | 5 |
| bis (2-Chloroethyl) ether | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 5 |
| 2-Chlorophenol | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 5 |
| 1,3-Dichlorobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 5 |
| 1,4-Dichlorobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 5 |
| Benzyl alcohol | 10 | <10 B | <10 B | <10 B | <10 B | <200 A | <10 B | <13 B | <10 B | 10 |
| 1,2-Dichlorobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 5 |
| 2-Methylphenol | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 5 |
| bis (2-Chloroisopropyl) ether | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 5 |
| 4-Methylphenol | 10 | <10 B | <10 B | <10 B | <10 B | 3400 B | <10 B | <13 B | <10 B | 5 |
| N-Nitroso-di-n-propylamine | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 10 |
| Hexachloroethane | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 10 |
| Nitrobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 5 |
| Isophorone | 10 | <10 B | <10 B | <10 B | <10 B | <200 A | <10 B | <13 B | <10 B | 5 |
| 2-Nitrophenol | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 10 |
| 2,4-Dimethylphenol | 10 | <10 B | <10 B | <10 B | <10 B | <200 A | <10 B | <13 B | <10 B | 10 |
| Benzoic acid | 50 | <50 B | <50 B | <50 A | <50 B | 2000 A | <50 A | <63 A | <50 A | 25 |
| bis (2-Chloroethoxy) methane | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 5 |
| 2,4-Dichlorophenol | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 5 |
| 1,2,4-Trichlorobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 5 |
| Naphthalene | 10 | <10 B | <10 B | <10 B | <10 B | <200 A | <10 B | <13 B | <10 B | 3 |
| 4-Chloroaniline | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 5 |
| Hexachlorobutadiene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 5 |
| 4-Chloro-3-methylphenol | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 10 |
| 2-Methylnaphthalene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 10 |
| Hexachlorocyclopentadiene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 10 |
| 2,4,6-Trichlorophenol | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 10 |
| 2,4,5-Trichlorophenol | 50 | <50 B | <50 B | <50 B | <50 B | <1000 B | <50 B | <63 B | <50 B | 10 |
| 2-Chloronaphthalene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 4 |
| 2-Nitroaniline | 50 | <50 B | <50 B | <50 B | <50 B | <1000 B | <50 B | <63 B | <50 B | 10 |
| Dimethyl phthalate | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 4 |
| Acenaphthylene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 3 |
| 2,6-Dinitrotoluene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 10 |
| 3-Nitroaniline | 50 | <50 B | <50 B | <50 B | <50 B | <1000 B | <50 B | <63 B | <50 B | 10 |
| Acenaphthene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 3 |
| 2,4-Dinitrophenol | 50 | <50 B | <50 B | <50 A | <50 B | <1000 A | <50 A | <63 A | <50 A | 25 |
| 4-Nitrophenol | 50 | <50 B | <50 B | <50 B | <50 B | <1000 B | <50 B | <63 B | <50 B | 15 |
| Dibenzofuran | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 4 |
| 2,4-Dinitrotoluene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 10 |
| Diethylphthalate | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 4 |
| 4-Chlorophenyl-phenylether | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 5 |
| Fluorene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 4 |
| 4-Nitroaniline | 50 | <50 A | <50 A | <50 A | <50 A | <1000 A | <50 A | <63 A | <50 A | 10 |
| 4,6-Dinitro-2-methylphenol | 50 | <50 B | <50 B | <50 B | <50 B | <1000 B | <50 B | <63 B | <50 B | 15 |

(1) Cannot be separated from Diphenylamine
* - Indicates a replicate sample
CRQL - Contract Required Quantitation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: | | OW-13 | OW-13* | OW-14 | OW-15 | OW-16 | OW-17 | OW-18 | OW-18A | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 3/19/90 | 3/19/90 | 3/15/90 | 3/19/90 | 3/20/90 | 3/15/90 | 3/15/90 | 3/15/90 | |
| Semi-Volatile Organic Compounds (Concentrations in ug/L) | CRQL | | | | | | | | | IDL |
| N-Nitrosodiphenylamine (1) | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 5 |
| 4-Bromophenyl-phenylether | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 5 |
| Hexachlorobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 5 |
| Pentachlorophenol | 50 | <50 B | <50 B | <50 B | <50 B | <1000 B | <50 B | <63 B | <50 B | 10 |
| Phenanthrene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 3 |
| Anthracene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 3 |
| Di-n-butylphthalate | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 3 |
| Fluoranthene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 3 |
| Pyrene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 3 |
| Butylbenzylphthalate | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 5 |
| 3,3'-Dichlorobenzidine | 20 | <20 B | <20 A | <20 B | <20 A | <400 B | <20 B | <25 B | <20 B | 5 |
| Benzo (a) anthracene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 3 |
| bis (2-Ethylhexyl) phthalate | 10 | <10 B | 7 A | <10 B | <10 B | 64 B | <10 B | <13 B | <10 B | 4 |
| Chrysene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 3 |
| Di-n-octyl phthalate | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 3 |
| Benzo (b) fluoranthene | 10 | <10 B | <10 B | <10 B | <10 B | <200 A | <10 B | <13 B | <10 B | 3 |
| Benzo (k) fluoranthene | 10 | <10 B | <10 B | <10 B | <10 B | <200 A | <10 B | <13 B | <10 B | 3 |
| Benzo (a) pyrene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 3 |
| Indeno (1,2,3-cd) pyrene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 4 |
| Dibenzo (a,h) anthracene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 3 |
| Benzo (g,h,i) perylene | 10 | <10 B | <10 B | <10 B | <10 B | <200 B | <10 B | <13 B | <10 B | 3 |

(1) Cannot be separated from Diphenylamine
* - Indicates a replicate sample
CRQL - Contract Required Quantitation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: | | OW-19 | OW-19A | OW-20 | OW-21 | OW-21* | OW-22 | OW-28 | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 3/16/90 | 3/16/90 | 3/16/90 | 3/21/90 | 3/21/90 | 3/21/90 | 3/22/90 | |
| Semi-Volatile Organic Compounds (Concentrations in ug/L) | CRQL | | | | | | | | IDL |
| Phenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| bis (2-Chloroethyl) ether | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 2-Chlorophenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 1,3-Dichlorobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 1,4-Dichlorobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Benzyl alcohol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| 1,2-Dichlorobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 2-Methylphenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| bis (2-Chloroisopropyl) ether | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 4-Methylphenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| N-Nitroso-di-n-propylamine | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| Hexachloroethane | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| Nitrobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Isophorone | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 2-Nitrophenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| 2,4-Dimethylphenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| Benzoic acid | 50 | <50 A | <50 A | <50 B | <50 B | <50 B | <50 B | <50 B | 25 |
| bis (2-Chloroethoxy) methane | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 2,4-Dichlorophenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 1,2,4-Trichlorobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Naphthalene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| 4-Chloroaniline | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Hexachlorobutadiene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 4-Chloro-3-methylphenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| 2-Methylnaphthalene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| Hexachlorocyclopentadiene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| 2,4,6-Trichlorophenol | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| 2,4,5-Trichlorophenol | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | 10 |
| 2-Chloronaphthalene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 4 |
| 2-Nitroaniline | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | 10 |
| Dimethyl phthalate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 4 |
| Acenaphthylene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| 2,6-Dinitrotoluene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| 3-Nitroaniline | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | 10 |
| Acenaphthene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| 2,4-Dinitrophenol | 50 | <50 A | <50 A | <50 A | <50 A | <50 B | <50 A | <50 A | 25 |
| 4-Nitrophenol | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | 15 |
| Dibenzofuran | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 4 |
| 2,4-Dinitrotoluene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 10 |
| Diethylphthalate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 4 |
| 4-Chlorophenyl-phenylether | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Fluorene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 4 |
| 4-Nitroaniline | 50 | <50 A | <50 A | <50 A | <50 A | <50 A | <50 A | <50 A | 10 |
| 4,6-Dinitro-2-methylphenol | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | 15 |

(1) Cannot be separated from Diphenylamine
* - Indicates a replicate sample
CRQL - Contract Required Quantitation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: | | OW-19 | OW-19A | OW-20 | OW-21 | OW-21* | OW-22 | OW-28 | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 3/16/90 | 3/16/90 | 3/16/90 | 3/21/90 | 3/21/90 | 3/21/90 | 3/22/90 | |
| Semi-Volatile Organic Compounds (Concentrations in ug/L) | CRQL | | | | | | | | IDL |
| N-Nitrosodiphenylamine (1) | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 4-Bromophenyl-phenylether | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Hexachlorobenzene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| Pentachlorophenol | 50 | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | <50 B | 10 |
| Phenanthrene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Anthracene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Di-n-butylphthalate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Fluoranthene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Pyrene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Butylbenzylphthalate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 5 |
| 3,3'-Dichlorobenzidine | 20 | <20 B | <20 B | <20 B | <20 B | <20 B | <20 B | <20 B | 5 |
| Benzo (a) anthracene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| bis (2-Ethylhexyl) phthalate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 4 |
| Chrysene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Di-n-octyl phthalate | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Benzo (b) fluoranthene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Benzo (k) fluoranthene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Benzo (a) pyrene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Indeno (1,2,3-cd) pyrene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 4 |
| Dibenzo (a,h) anthracene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |
| Benzo (g,h,i) perylene | 10 | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | <10 B | 3 |

(1) Cannot be separated from Diphenylamine
* - Indicates a replicate sample
CRQL - Contract Required Quantitation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: | | OW-1 | OW-1A | OW-4 | OW-6 | OW-9 | OW-10 | OW-11 | OW-12 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 3/20/90 | 3/19/90 | 3/19/90 | 3/16/90 | 3/19/90 | 3/20/90 | 3/20/90 | 3/15/90 | |
| Pesticide\PCB Compounds (Concentrations in ug/L) | CRQL | | | | | | | | | IDL |
| alpha-BHC | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.01 |
| beta-BHC | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.02 |
| delta-BHC | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.01 |
| gamma-BHC (Lindane) | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.01 |
| Heptachlor | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.01 |
| Aldrin | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.01 |
| Heptachlor epoxide | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.01 |
| Endosulfan I | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.02 |
| Dieldrin | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| 4,4'-DDE | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| Endrin | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.05 |
| Endosulfan II | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| 4,4'-DDD | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| Endosulfan sulfate | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.08 |
| 4,4'-DDT | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.08 |
| Methoxychlor | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.06 |
| Endrin ketone | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.08 |
| Chlordane | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.12 |
| Toxaphene | 1.0 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 0.40 |
| Aroclor-1016 | 0.5 | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | 0.38 |
| Aroclor-1221 | 0.5 | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | 0.29 |
| Aroclor-1232 | 0.5 | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | 0.40 |
| Aroclor-1242 | 0.5 | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | 0.45 |
| Aroclor-1248 | 0.5 | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | 0.31 |
| Aroclor-1254 | 1.0 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 0.42 |
| Aroclor-1260 | 1.0 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 0.25 |

* - Indicates a replicate sample
CRQL - Contract Required Quantitation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: | | OW-13 | OW-13* | OW-14 | OW-15 | OW-16 | OW-17 | OW-18 | OW-18A | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 3/19/90 | 3/19/90 | 3/15/90 | 3/19/90 | 3/20/90 | 3/15/90 | 3/15/90 | 3/15/90 | |
| Pesticide\PCB Compounds (Concentrations in ug/L) | CRQL | | | | | | | | | IDL |
| alpha-BHC | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.01 |
| beta-BHC | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.02 |
| delta-BHC | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.01 |
| gamma-BHC (Lindane) | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.01 |
| Heptachlor | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.01 |
| Aldrin | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.01 |
| Heptachlor epoxide | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.01 |
| Endosulfan I | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.02 |
| Dieldrin | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| 4,4'-DDE | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| Endrin | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.05 |
| Endosulfan II | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| 4,4'-DDD | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| Endosulfan sulfate | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.08 |
| 4,4'-DDT | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.08 |
| Methoxychlor | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.06 |
| Endrin ketone | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.08 |
| Chlordane | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.12 |
| Toxaphene | 1.0 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 0.40 |
| Aroclor-1016 | 0.5 | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | 0.38 |
| Aroclor-1221 | 0.5 | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | 0.29 |
| Aroclor-1232 | 0.5 | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | 0.40 |
| Aroclor-1242 | 0.5 | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | 0.45 |
| Aroclor-1248 | 0.5 | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | 0.31 |
| Aroclor-1254 | 1.0 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 0.42 |
| Aroclor-1260 | 1.0 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 0.25 |

* - Indicates a replicate sample
CRQL - Contract Required Quantitation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: | | OW-19 | OW-19A | OW-20 | OW-21 | OW-21* | OW-22 | |
|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 3/16/90 | 3/16/90 | 3/16/90 | 3/21/90 | 3/21/90 | 3/21/90 | |
| Pesticide\PCB Compounds (Concentrations in ug/L) | CRQL | | | | | | | IDL |
| alpha-BHC | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.01 |
| beta-BHC | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.02 |
| delta-BHC | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.01 |
| gamma-BHC (Lindane) | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.01 |
| Heptachlor | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.01 |
| Aldrin | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.01 |
| Heptachlor epoxide | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.01 |
| Endosulfan I | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.02 |
| Dieldrin | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| 4,4'-DDE | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| Endrin | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.05 |
| Endosulfan II | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| 4,4'-DDD | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.02 |
| Endosulfan sulfate | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.08 |
| 4,4'-DDT | 0.10 | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | <0.10 B | 0.08 |
| Methoxychlor | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.06 |
| Endrin ketone | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.08 |
| Chlordane | 0.05 | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | <0.05 B | 0.12 |
| Toxaphene | 1.0 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 0.40 |
| Aroclor-1016 | 0.5 | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | 0.38 |
| Aroclor-1221 | 0.5 | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | 0.29 |
| Aroclor-1232 | 0.5 | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | 0.40 |
| Aroclor-1242 | 0.5 | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | 0.45 |
| Aroclor-1248 | 0.5 | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | <0.5 B | 0.31 |
| Aroclor-1254 | 1.0 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 0.42 |
| Aroclor-1260 | 1.0 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 0.25 |

* - Indicates a replicate sample
CRQL - Contract Required Quantitation Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: / Sample Date: | IDL | OW-1 3/20/90 | OW-1A 3/19/90 | OW-4 3/19/90 | OW-6 3/16/90 | OW-9 3/19/90 | OW-10 3/20/90 | OW-11 3/20/90 | OW-12 3/15/90 | CRDL |
|---|---|---|---|---|---|---|---|---|---|---|
| Inorganic Compounds (Concentrations in ug/L) | | | | | | | | | | |
| Aluminum | 27 | 540 B | 7150 B | 44.3 B | 3810 B | 686 B | 4790 B | 704 B | <27.0 B | 200 |
| Antimony | 37 | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | 60 |
| Arsenic | 2 | <2 B | <2 B | <2 B | 4.3 B | 103 B | 38.3 B | 190 B | 344 B | 10 |
| Barium | 2 | 11.6 B | 21.9 B | 16.9 B | 26.3 B | 13.2 B | 49.3 B | 43 B | 67.6 B | 200 |
| Beryllium | 1 | <1.0 B | 1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 5 |
| Cadmium | 5 | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | 6.5 B | <5.0 B | <5.0 B | 5 |
| Calcium | 20 | 162,000 B | 24,200 B | 38,300 B | 36,600 B | 139,000 B | 10,400 B | 37,100 B | 517,000 B | 5000 |
| Chromium | 3 | <3.0 B | 6.2 B | 4.6 B | 6.1 B | 3.4 B | <3.0 B | 5.5 B | 38.9 B | 10 |
| Cobalt | 7 | <7.0 B | 47.8 B | <7.0 B | 9.3 B | <7.0 B | <7.0 B | <7.0 B | <7.0 B | 50 |
| Copper | 6 | 9.3 B | 40.1 B | <6.0 B | 16.7 B | 15.3 B | 450 B | 17.1 B | <6.0 B | 25 |
| Iron | 3 | 716 B | 2,250 B | 30700 B | 5320 B | 66,300 B | 1,080 B | 17600 B | 13,900 B | 100 |
| Lead | 2 | <2 B | 3.4 B | <2 B | 4.1 B | 3.5 B | 6.4 B | 17.0 B | <2 B | 5 |
| Magnesium | 37 | 25,300 B | 6,530 B | 4,390 B | 11,400 B | 14,800 B | 1,770 B | 2,750 B | 107,000 B | 5000 |
| Manganese | 1 | 1400 B | 2610 B | 92.5 B | 273 B | 389 B | 66.6 B | 367 B | 469 B | 15 |
| Mercury | 0.2 | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | 0.4 B | <0.2 B | 0.2 |
| Nickel | 12 | <12.0 B | 71.9 B | <12.0 B | <12.0 B | <12.0 B | <12.0 B | <12.0 B | <12.0 B | 40 |
| Potassium | 900 | 4,440 B | 7,220 B | 2,670 B | 3,250 B | 3,330 B | 2,370 B | 3,020 B | 8,660 B | 5000 |
| Selenium | 2 | <2 B | <2 B | 2.0 B | <2 B | <2 B | <2 B | 2.6 B | <2 B | 5 |
| Silver | 3 | <3.0 B | 571 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | 10 |
| Sodium | 38 | 50,400 B | 8,790 B | 105,000 B | 34,400 B | 17,500 B | 22,300 B | 9,960 B | 130,000 B | 5000 |
| Thallium | 4 | <4 B | <4 B | <4 B | <4 B | <4 B | <4 B | <4 B | <4 B | 10 |
| Vanadium | 6 | <6.0 B | 6.6 B | <6.0 B | 8.0 B | <6.0 B | <6.0 B | <6.0 B | 16.8 B | 50 |
| Zinc | 8 | <20 A | 93.1 A | <20 A | 44 U | 33.1 U | 3,100 A | 1460 A | 31.7 U | 20 |
| Tin | 28 | <28.0 B | <28.0 B | <28.0 B | <28.0 B | <28.0 B | <28.0 B | <28.0 B | <28.0 B | |
| Hardness (mg/L) | | 509 B | 87.3 B | 114 B | 138 B | 408 B | 33.2 B | 104 B | 1,730 B | |

* - Indicates a replicate sample
CRDL - Contract Required Detection Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: | | OW-13 | OW-13* | OW-14 | OW-15 | OW-16 | OW-17 | OW-18 | OW-18A | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 3/19/90 | 3/19/90 | 3/15/90 | 3/19/90 | 3/20/90 | 3/15/90 | 3/15/90 | 3/15/90 | |
| Inorganic Compounds (Concentrations in ug/L) | IDL | | | | | | | | | CRDL |
| Aluminum | 27 | 127 B | 56.5 B | 242 B | 432 B | 871 B | 122 B | 92 B | 749 B | 200 |
| Antimony | 37 | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | 60 |
| Arsenic | 2 | 30.1 B | 25.4 B | 124 B | <2 B | 2,250 B | 146 B | 3.3 B | 9.7 B | 10 |
| Barium | 2 | 32.7 B | 28.6 B | 19.4 B | 31.5 B | 380 B | 51.3 B | 18.9 B | 20.5 B | 200 |
| Beryllium | 1 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 5 |
| Cadmium | 5 | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | 27.4 B | 20.3 B | 5 |
| Calcium | 20 | 98,100 B | 88,200 B | 81,300 B | 13,300 B | 14,500 B | 251,000 B | 84,300 B | 116,000 B | 5000 |
| Chromium | 3 | 4.7 B | <3.0 B | 6.3 B | <3.0 B | 160 B | 38.1 B | <3.0 B | 4.7 B | 10 |
| Cobalt | 7 | <7.0 B | <7.0 B | 8.5 B | <7.0 B | 8.1 B | 10.9 B | 18.3 B | 19.5 B | 50 |
| Copper | 6 | <6.0 B | <6.0 B | 80.7 B | 8.8 B | 12.8 B | 7.1 B | 158 B | 145 B | 25 |
| Iron | 3 | 16,500 B | 14,800 B | 21,600 B | 2,140 B | 6710 B | 16000 B | 836 B | 11,600 B | 100 |
| Lead | 2 | <2 B | <2 B | 299 B | 10.6 B | 5.8 B | <2 B | 2.0 B | 13.5 B | 5 |
| Magnesium | 37 | 11,500 B | 11,200 B | 4,750 B | 3,040 B | 206,000 B | 75,900 B | 8,660 B | 9,480 B | 5000 |
| Manganese | 1 | 2,020 B | 1,730 B | 43.7 B | 124 B | 27.1 B | 485 B | 767 B | 665 B | 15 |
| Mercury | 0.2 | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | 0.2 |
| Nickel | 12 | <12.0 B | <12.0 B | <12.0 B | <12.0 B | 45.4 B | 24.7 B | <12.0 B | <12.0 B | 40 |
| Potassium | 900 | 7,220 B | 6,160 B | 3,470 B | 2,460 B | 72,600 B | 31,300 B | 6,670 B | 5,390 B | 5000 |
| Selenium | 2 | <2 B | <2 B | 50.5 B | <2 B | <2 B | <2 B | <2 B | 5.6 B | 5 |
| Silver | 3 | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | 10 |
| Sodium | 38 | 18,600 B | 19,800 B | 11,800 B | 73,900 B | 131,000 B | 757,000 B | 66,100 B | 33,300 B | 5000 |
| Thallium | 4 | <4 B | <4 B | <4 B | <4 B | <4 B | <4 B | <4 B | <4 B | 10 |
| Vanadium | 6 | <6.0 B | <6.0 B | <6.0 B | <6.0 B | 192 B | 25.9 B | <6.0 B | <6.0 B | 50 |
| Zinc | 8 | 246 A | 133 B | 1,910 A | 20.3 B | 21 U | 54.5 U | 8,040 A | 7,870 A | 20 |
| Tin | 28 | <28.0 B | <28.0 B | <28.0 B | <28.0 B | <28.0 B | <28.0 B | <28.0 B | <28.0 B | |
| Hardness (mg/L) | | 292 B | 266 B | 223 B | 45.7 B | 884 B | 939 B | 246 B | 329 B | |

* - Indicates a replicate sample
CRDL - Contract Required Detection Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: | | OW-19 | OW-19A | OW-20 | OW-21 | OW-21* | OW-22 | OW-28 | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 3/16/90 | 3/16/90 | 3/16/90 | 3/21/90 | 3/21/90 | 3/21/90 | 3/21/90 | |
| Inorganic Compounds (Concentrations in ug/L) | IDL | | | | | | | | CRDL |
| Aluminum | 27 | 124 B | 530 B | 609 B | 3,050 B | 2,680 B | 40800 B | 224,000 B | 200 |
| Antimony | 37 | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <74.0 B | 60 |
| Arsenic | 2 | 3.9 B | 115 B | 4.4 B | 3.3 B | 2.7 B | 22.7 B | 67 B | 10 |
| Barium | 2 | 28.7 B | 32.1 B | 18.4 B | 33.8 B | 32.5 B | 276 B | 729 B | 200 |
| Beryllium | 1 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 1.1 B | 8.8 B | 5 |
| Cadmium | 5 | <5.0 B | 12.8 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | 5 |
| Calcium | 20 | 20,900 B | 26,400 B | 49,700 B | 45,300 B | 46,500 B | 197,000 B | 60,700 B | 5000 |
| Chromium | 3 | <3.0 B | 6.4 B | 3.1 B | 6.7 B | 4.6 B | 153 B | 326 B | 10 |
| Cobalt | 7 | 48.7 B | 32.4 B | <7.0 B | <7.0 B | <7.0 B | 40.4 B | 157 B | 50 |
| Copper | 6 | 9.4 B | 13.3 B | 8.1 B | 12.1 B | 8.9 B | 191 B | 447 B | 25 |
| Iron | 3 | 1,410 B | 9,580 B | 2,100 B | 3,010 B | 2,540 B | 50,200 B | 226,000 B | 100 |
| Lead | 2 | 19.7 B | 4.6 B | 8.5 B | 3.2 B | 2.8 B | 44.5 B | 162 B | 5 |
| Magnesium | 37 | 4,680 B | 4,980 B | 11,700 B | 6,830 B | 6,850 B | 63,500 B | 75,900 B | 5000 |
| Manganese | 1 | 1,740 B | 1290 B | 128 B | 1,440 B | 1,460 B | 3,480 B | 3,920 B | 15 |
| Mercury | 0.2 | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | 0.3 B | 0.2 |
| Nickel | 12 | <12.0 B | <12.0 B | <12.0 B | <12.0 B | <12.0 B | 66.6 B | 261 B | 40 |
| Potassium | 900 | 4,810 B | 4,710 B | 3,870 B | 2,840 B | 2,750 B | 18,300 B | 38,400 B | 5000 |
| Selenium | 2 | <2 B | <2 B | <2 B | <2 B | <2 B | <2 B | <2 B | 5 |
| Silver | 3 | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | 10 |
| Sodium | 38 | 46,600 B | 23,500 B | 17,900 B | 9,510 B | 9,670 B | 27,500 B | 26,900 B | 5000 |
| Thallium | 4 | <4 B | <4 B | <4 B | <4 B | <4 B | <4 B | <4 B | 10 |
| Vanadium | 6 | <6.0 B | <6.0 B | <6.0 B | <6.0 B | <6.0 B | 70.9 B | 370 B | 50 |
| Zinc | 8 | 381 A | 421 A | 187 A | 21.7 U | 16.6 U | 135 A | 821 A | 20 |
| Tin | 28 | <28.0 B | <28.0 B | <28.0 B | <28.0 B | <28.0 B | <28.0 B | <56.0 B | |
| Hardness (mg/L) | | 71.4 B | 86.4 B | 172 B | 141 B | 144 B | 753 B | 464 B | |

* - Indicates a replicate sample
CRDL - Contract Required Detection Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: / Sample Date: | IDL | OW-1 3/20/90 | OW-1A 3/19/90 | OW-4 3/19/90 | OW-6 3/16/90 | OW-9 3/19/90 | OW-10 3/20/90 | OW-11 3/20/90 | OW-12 3/15/90 | CRDL |
|---|---|---|---|---|---|---|---|---|---|---|
| Inorganic Compounds (Concentrations in ug/L) | | | | | | | | | | |
| Aluminum | 27 | 399 B | 5,010 B | <27.0 B | <27.0 B | <27.0 B | 140 B | 158 B | <27.0 B | 200 |
| Antimony | 37 | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | 60 |
| Arsenic | 2 | <2 B | <2 B | <2 B | <2 B | 2.8 B | <2 B | 162 B | 422 B | 10 |
| Barium | 2 | 36.7 A | 20.8 A | 91.8 A | 59.6 A | 19.1 A | 51.3 A | 49.9 A | 101 A | 200 |
| Beryllium | 1 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 5 |
| Cadmium | 5 | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | 8.8 B | <5.0 B | <5.0 B | 5 |
| Calcium | 20 | 156,000 A | 22,800 A | 42,500 A | 37,500 A | 141,000 A | 10,600 A | 38,900 A | 491,000 A | 5000 |
| Chromium | 3 | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | 35.5 B | 10 |
| Cobalt | 7 | <7.0 B | <7.0 B | <7.0 B | <7.0 B | <7.0 B | <7.0 B | <7.0 B | <7.0 B | 50 |
| Copper | 6 | <6.0 B | 11.5 B | <6.0 B | <6.0 B | <6.0 B | 321 B | <6.0 B | <6.0 B | 25 |
| Iron | 3 | 151 A | <20 B | <20 B | <100 B | 32 A | 16.9 U | 12,000 A | 5,130 A | 100 |
| Lead | 2 | <2 B | <2 B | <2 B | <2 B | <2 B | <2 B | <2 B | <2 B | 5 |
| Magnesium | 37 | 24,600 A | 6,120 A | 4,960 A | 11,000 A | 15,100 A | 1,700 A | 2,970 A | 108,000 A | 5000 |
| Manganese | 1 | 1,330 B | 1.4 B | 20.2 B | 1.2 B | 115 B | 59.1 B | 423 B | 400 B | 15 |
| Mercury | 0.2 | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | 0.2 |
| Nickel | 12 | <12.0 B | 20 B | <12.0 B | <12.0 B | <12.0 B | <12.0 B | <12.0 B | <12.0 B | 40 |
| Potassium | 900 | 3,220 B | 6,440 B | 2,350 B | 2,880 B | 2,870 B | 1,840 B | 2,580 B | 9,180 B | 5000 |
| Selenium | 2 | <2 B | <2 B | <2 B | <2 B | <2 B | <2 B | <2 B | <2 B | 5 |
| Silver | 3 | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | 10 |
| Sodium | 38 | 51,100 A | 11,600 U | 123,000 A | 41,400 A | 232,000 A | 25,800 A | 14,600 A | 150,000 A | 5000 |
| Thallium | 4 | <4 B | <4 B | <4 B | <4 B | <4 B | <4 B | <4 B | <4 B | 10 |
| Vanadium | 6 | <6.0 B | <6.0 B | <6.0 B | <6.0 B | <6.0 B | <6.0 B | <6.0 B | 22.4 B | 50 |
| Zinc | 8 | 44.6 U | 72.8 U | 27.1 U | 23.2 U | 42.1 U | 3,180 U | 913 U | 46.3 U | 20 |
| Tin | 28 | <29.0 B | <28.0 B | <28.0 B | <28.0 B | <28.0 B | <28.0 B | <28.0 B | <28.0 B | |
| Hardness (mg/L) | | 491 B | 82.1 B | 118 B | 139 B | 414 B | 33.5 B | 109 B | 1670 B | |

* - Indicates a replicate sample
CRDL - Contract Required Detection Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: | | OW-13 | OW-13* | OW-14 | OW-15 | OW-16 | OW-17 | OW-18 | OW-18A | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 3/19/90 | 3/19/90 | 3/15/90 | 3/19/90 | 3/20/90 | 3/15/90 | 3/15/90 | 3/15/90 | |
| Inorganic Compounds (Concentrations in ug/L) | IDL | | | | | | | | | CRDL |
| Aluminum | 27 | <27.0 B | <27.0 B | <27.0 B | <27.0 B | <27.0 B | <27.0 B | <27.0 B | <27.0 B | 200 |
| Antimony | 37 | <37.0 B | <37.0 B | <37.0 B | <37.0 B | 43.9 B | <37.0 B | <37.0 B | <37.0 B | 60 |
| Arsenic | 2 | 20.6 B | 20.4 B | 7.5 B | <2 B | 2,860 B | 164 B | <2 B | <2 B | 10 |
| Barium | 2 | 66.6 A | 63.2 A | 28.0 A | 69.6 A | 245 A | 51.9 A | 196 A | 46 A | 200 |
| Beryllium | 1 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 5 |
| Cadmium | 5 | <5.0 B | <5.0 B | 5.5 B | <5.0 B | <5.0 B | <5.0 B | 25.2 B | 20.5 B | 5 |
| Calcium | 20 | 88,900 A | 88,800 A | 87,900 A | 11,700 A | 13,900 A | 236,000 A | 83,300 A | 122,000 A | 5000 |
| Chromium | 3 | <3.0 B | <3.0 B | <3.0 B | <3.0 B | 138 B | 26.5 B | <3.0 B | <3.0 B | 10 |
| Cobalt | 7 | <7.0 B | <7.0 B | 10.3 B | <7.0 B | <7.0 B | <7.0 B | 16.8 B | 19.1 B | 50 |
| Copper | 6 | <6.0 B | <6.0 B | 17.6 B | <6.0 B | <6.0 B | <6.0 B | 122 B | 35.1 B | 25 |
| Iron | 3 | 3,080 A | 3,350 A | 628 A | 42.2 A | 870 A | 831 A | 577 A | 42.7 A | 100 |
| Lead | 2 | <2 B | <2 B | 16.3 B | <2 B | <2 B | <2 B | <2 B | <2 B | 5 |
| Magnesium | 37 | 11,300 A | 10,900 A | 5,170 A | 2,530 A | 193,000 A | 70,800 A | 8,580 A | 9,490 A | 5000 |
| Manganese | 1 | 1,760 B | 1,780 B | 47.4 B | 77.3 B | 7.6 B | 436 B | 736 B | 671 B | 15 |
| Mercury | 0.2 | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | 0.2 |
| Nickel | 12 | <12.0 B | <12.0 B | <12.0 B | <12.0 B | 54.1 B | <12.0 B | 13.3 B | 18.2 B | 40 |
| Potassium | 900 | 6,360 B | 6,380 B | 3,110 B | 1,520 B | 69,100 B | 261,000 B | 6,070 B | 5,660 B | 5000 |
| Selenium | 2 | <2 B | <2 B | 35.2 B | <2 B | <2 B | <2 B | 2.0 B | 5.6 B | 5 |
| Silver | 3 | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | 10 |
| Sodium | 38 | 21,900 A | 20,900 A | 12,700 A | 68,700 A | 142,000 A | 663,000 A | 63,100 A | 42,200 A | 5000 |
| Thallium | 4 | <4 B | <4 B | <4 B | <4 B | <4 B | <4 B | <4 B | <4 B | 10 |
| Vanadium | 6 | <6.0 B | <6.0 B | <6.0 B | <6.0 B | 183 B | 13.4 B | <6.0 B | <6.0 B | 50 |
| Zinc | 8 | 38.9 U | 48.3 U | 2,110 U | 26.6 U | 97.9 U | 78.5 U | 8,000 U | 7,220 U | 20 |
| Tin | 28 | <28.0 B | <28.0 B | <28.0 B | <28.0 B | 59 B | <28.0 B | <28.0 B | <28.0 B | |
| Hardness (mg/L) | | 268 B | 267 B | 241 B | 39.6 B | 829 B | 881 B | 243 B | 344 B | |

* - Indicates a replicate sample
CRDL - Contract Required Detection Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: | | OW-19 | OW-19A | OW-20 | OW-21 | OW-21* | OW-22 | OW-28 | |
|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | 3/16/90 | 3/16/90 | 3/16/90 | 3/21/90 | 3/21/90 | 3/21/90 | 3/21/90 | |
| Inorganic Compounds (Concentrations in ug/L) | IDL | | | | | | | | CRDL |
| Aluminum | 27 | <27.0 B | <27.0 B | <27.0 B | <27.0 B | <27.0 B | <27.0 B | <27.0 B | 200 |
| Antimony | 37 | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | <37.0 B | 60 |
| Arsenic | 2 | <2 B | 17.7 B | <2 B | <2 B | <2 B | 4.4 B | <2 B | 10 |
| Barium | 2 | 130 A | 45.3 A | 42 A | 42.7 A | 57.8 A | 196 A | 91.6 A | 200 |
| Beryllium | 1 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | 5 |
| Cadmium | 5 | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | <5.0 B | 5 |
| Calcium | 20 | 20,900 A | 25,700 A | 47,200 A | 48,500 A | 48,000 A | 198,000 A | 18,100 A | 5000 |
| Chromium | 3 | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | 4.2 B | <3.0 B | 10 |
| Cobalt | 7 | 12.6 B | 25.9 B | <7.0 B | <7.0 B | <7.0 B | <7.0 B | <7.0 B | 50 |
| Copper | 6 | <6.0 B | <6.0 B | <6.0 B | <6.0 B | <6.0 B | <6.0 B | <6.0 B | 25 |
| Iron | 3 | <100 B | 1,160 A | 412 A | 152 A | 131 A | 6,320 A | 13.7 A | 100 |
| Lead | 2 | <2 B | <2 B | <2 B | <2 B | <2 B | <2 B | <2 B | 5 |
| Magnesium | 37 | 4,710 A | 4,780 A | 11,300 A | 6,740 A | 6,650 A | 52,100 A | 3,260 A | 5000 |
| Manganese | 1 | 1,060 B | 1230 B | 109 B | 1,510 B | 1,460 B | 3,020 B | 450 B | 15 |
| Mercury | 0.2 | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | <0.2 B | 0.2 |
| Nickel | 12 | <12.0 B | <12.0 B | <12.0 B | <12.0 B | <12.0 B | <12.0 B | <12.0 B | 40 |
| Potassium | 900 | 4,310 B | 4,110 B | 3,290 B | 2,420 B | 2,360 B | 10,500 B | 4,990 B | 5000 |
| Selenium | 2 | <2 B | <2 B | <2 B | <2 B | <2 B | <2 B | <2 B | 5 |
| Silver | 3 | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | <3.0 B | 10 |
| Sodium | 38 | 46,500 A | 27,600 A | 22,700 A | 10,200 A | 13,500 A | 26,400 A | 23,800 A | 5000 |
| Thallium | 4 | <4 B | <4 B | <4 B | <4 B | <4 B | <4 B | <4 B | 10 |
| Vanadium | 6 | <6.0 B | <6.0 B | <6.0 B | <6.0 B | <6.0 B | <6.0 B | <6.0 B | 50 |
| Zinc | 8 | 437 U | 219 U | 51 U | 31.9 U | 121 U | 45.7 U | 28.7 U | 20 |
| Tin | 28 | <28.0 B | <28.0 B | <28.0 B | <28.0 B | <28.0 B | <28.0 B | <28.0 B | |
| Hardness (mg/L) | | 71.6 B | 83.8 B | 164 B | 149 B | 126 B | 709 B | 58.6 B | |

* - Indicates a replicate sample
CRDL - Contract Required Detection Limit
IDL - Instrument Detection Limit

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: / Sample Date: | IDL | OW-1 3/20/90 | OW-1A 3/19/90 | OW-4 3/19/90 | OW-6 3/16/90 | OW-9 3/19/90 | OW-10 3/20/90 | OW-11 3/20/90 | OW-12 3/15/90 |
|---|---|---|---|---|---|---|---|---|---|
| Inorganic Compounds (Concentrations in mg/L) | | | | | | | | | |
| Sulfate | 0.01 | 28.20 U | 19.75 U | 9.83 U | 3.30 U | 451.25 U | 48.00 U | 111.13 U | 1246.50 U |
| Sulfide | 0.004 | 0.004 U | 0.026 U | 0.025 U | 0.014 U | 0.022 U | 0.018 U | 0.015 U | 0.008 U |
| Total Phosphorous | 0.04 | 1.50 U | 0.63 U | 1.45 U | 1.05 U | 0.68 U | 0.88 U | 1.13 U | 1.50 U |
| Bicarbonate | 1.0 | 463 B | 54.9 B | 55.5 B | 42.4 A | 30.0 B | 5.4 B | 65.5 B | 935 B |
| Carbonate | 1.0 | <1.0 B | <1.0 B | <1.0 B | <1.0 A | <1.0 B | <1.0 B | <1.0 B | <1.0 B |
| Chloride | 5.0 | 67.7 B | <5.0 B | 232 B | 86.9 B | 16.8 B | 39.1 B | 19.7 B | 34.7 B |
| Cr+6 | 0.10 | <0.010 B | <0.010 B | <0.010 B | <0.010 U | <0.010 B | <0.010 B | <0.010 B | <0.010 B |
| TOC | 20.5 | 6.9 U | 9.2 U | 1.1 U | 1.2 U | 14.1 U | 4.3 U | 8.6 U | 29.1 A |
| COD | 20 | 33.4 B | 64.7 B | 49.1 B | <20 B | 62.1 B | 23.0 B | 25.6 B | 144 B |
| TSS | 5 | <5.0 B | 27.0 B | 55.5 B | <5.0 B | 222 B | 48.0 B | 35.0 B | 55.0 B |

* - Indicates a replicate sample
IDL - Instrument Detection Limit
-- - Not sampled

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: / Sample Date: | IDL | OW-13 3/19/90 | OW-13* 3/19/90 | OW-14 3/15/90 | OW-15 3/19/90 | OW-16 3/20/90 | OW-17 3/15/90 | OW-18 3/15/90 | OW-18A 3/15/90 |
|---|---|---|---|---|---|---|---|---|---|
| Inorganic Compounds (Concentrations in ug/L) | | | | | | | | | |
| Sulfate | 0.01 | 4.93 U | 53.98 U | 6.20 U | 12.93 U | 0.27 U | 49.15 U | 155.45 U | 181.00 U |
| Sulfide | 0.004 | 0.022 U | 0.017 U | 0.010 U | 0.021 U | 0.113 A | 0.029 U | 0.012 U | 0.010 U |
| Total Phosphorous | 0.04 | 2.80 U | 1.48 B | 0.08 U | 2.58 U | 9.98 B | 1.70 U | <0.04 B | 1.38 U |
| Bicarbonate | 1.0 | 347 B | 351 B | 35.5 B | 10.0 B | 11100 B | 1460 B | 29.6 B | 67.8 B |
| Carbonate | 1.0 | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B | <1.0 B |
| Chloride | 5.0 | 17.0 B | 20.8 B | 15.7 B | 140 B | 146 B | 144 B | 98.4 B | 47.6 B |
| Cr+6 | 0.10 | <0.010 U | <0.010 B | <0.010 U | <0.010 U | <0.010 B | <0.010 B | <0.010 U | <0.010 U |
| TOC | 20.5 | 7.0 B | 7.4 B | 5.1 U | 1.3 B | 2770 A | 160 A | 5.1 U | 5.5 U |
| COD | 20 | 72.5 B | 33.4 B | <20 B | 33.4 B | 1350 B | 454 B | <20 B | 52.3 B |
| TSS | 5 | 40.5 B | 25.5 B | 51.0 B | 18.5 B | 136 B | 97.0 B | 7.0 B | 44.0 B |

* - Indicates a replicate sample
IDL - Instrument Detection Limit
-- - Not sampled

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

Appendix I. Summary of Ground-Water Analyses, Ground-Water/Surface-Water Investigation Plan, Industri-Plex Site Remedial Trust, Woburn, Massachusetts.

| Well Designation: / Sample Date: | IDL | OW-19 3/16/90 | OW-19A 3/16/90 | OW-20 3/16/90 | OW-21 3/21/90 | OW-21* 3/21/90 | OW-22 3/21/90 | OW-28 3/21/90 |
|---|---|---|---|---|---|---|---|---|
| Inorganic Compounds (Concentrations in ug/L) | | | | | | | | |
| Sulfate | 0.01 | 18.35 U | 7.75 U | 160.93 U | 47.690 U | 49.830 U | 565.000 U | 2 U |
| Sulfide | 0.004 | 0.017 U | 0.016 U | 0.019 U | 0.007 U | <0.004 U | 0.005 U | 0.06 U |
| Total Phosphorous | 0.04 | <0.04 B | 0.75 U | 2.80 U | 3.90 U | 3.28 U | 14.15 B | 9 B |
| Bicarbonate | 1.0 | 16.5 U | 59.8 A | 90.5 A | 118 B | 121 B | 321 B | 29.5 B |
| Carbonate | 1.0 | <1.0 A | <1.0 A | <1.0 A | <1.0 B | <1.0 B | <1.0 B | -- |
| Chloride | 5.0 | 42.2 B | 29.9 B | 48.6 B | 10.9 B | 11.0 B | 22.6 B | -- |
| Cr+6 | 0.10 | <0.010 U | <0.010 U | <0.010 U | <0.010 B | <0.010 B | <0.010 B | -- |
| TOC | 20.5 | 3.4 U | 3.4 U | 5.4 U | 4.7 U | 4.6 U | 11.5 U | 8.4 U |
| COD | 20 | <20 B | <20 B | <20 B | <20 B | 24.4 B | 24.4 B | -- |
| TSS | 5 | 10.0 B | 32.0 B | 59.5 B | 76.0 B | 84.0 B | 1,500 B | -- |

* - Indicates a replicate sample
IDL - Instrument Detection Limit
-- - Not sampled

Validation Codes

B - Quantitative data
A - Qualitative data
U - Unusable data

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PLATE 5: ISOPACH OF THE SATURATED UNCONSOLIDATED DEPOSITS

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PLATE 6: ELEVATION OF THE BEDROCK SURFACE

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PLATE 7: ISOPACH OF THE UNCONSOLIDATED DEPOSITS

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PLATE 8: ELEVATION OF WATER TABLE JULY 17, 1990

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PLATE 9: CONCENTRATIONS OF BENZENE AND TOLUENE DETECTED IN GROUND WATER

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PLATE 10: CONCENTRATIONS OF OTHER ORGANIC COMPOUNDS DETECTED IN GROUND WATER

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PLATE 11: DISSOLVED CONCENTRATIONS OF ARSENIC, CHROMIUM AND LEAD IN GROUND WATER

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