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Arthur D Little

**Performance of
Sampling Activities
at MTL, Watertown,
Massachusetts for
EG&G Idaho, Inc.**

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**Final Report
Prepared for
U.S. Army Toxic and
Hazardous Materials Agency
and EG&G Idaho, Inc.**

May 1990

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Performance of Sampling Activities at MTL
Watertown, Massachusetts
for EG&G Idaho, Inc.

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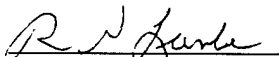
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Abstract

Arthur D. Little, Inc., was retained by EG&G Idaho, Inc., under subcontract C87-131488 issued pursuant to Contract No. DE-AC07-761D01570 to conduct geotechnical services at the Material Technology Laboratory (MTL) in Watertown, Massachusetts. The objective of this "resampling" episode was to perform another round of sampling activities in support of the remedial investigation. This sampling is intended to duplicate, to the extent possible, the sampling performed in 1988.

The Army Materials Technology Laboratory (MTL) is located in Watertown, Massachusetts about six miles west of Boston. The facility currently occupies approximately 47 acres on the north bank of the Charles River and includes ten major structures used for research, development, testing and manufacturing.

The efforts involved in this investigation included:

- Collection of 18 groundwater samples at 16 existing monitoring wells. Two wells were sampled twice with the second sampling performed on a different day. Two field blanks were submitted with these samples. Trip blanks for volatiles were submitted with shipment of all volatile samples;
- Determination of water levels at 16 existing monitoring wells;
- Collection of 22 shallow surface soil samples taken by hand auger. This included two duplicate samples and two field blanks;
- Collection of three sediment samples from storm sewer catch basins;
- Collection of seven 24 hour composite samples from storm sewer outfalls on the Charles River;
- Collection of eight surface water and storage tank samples; and
- Collection of a sample of water from the reactor emergency coolant tank.

Samples were collected for volatile organics, base/neutral/acid extractables (semivolatile organics), pesticide/PCB's, metals, cyanide, and sulfide. The five samples collected adjacent to transformers were analyzed for PCBs only. Analyses necessary to chemically characterize samples in accordance with U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) certified methods were not completed under this contract but are provided under the USATHAMA Class contract with Arthur D. Little. Analytical data will be provided along with modeling, assessments, evaluations and conclusions in the Remedial Investigation (RI) Report.

The duration of the program was approximately nine weeks. Field activities commenced on February 5, 1990. All of the above tasks were successfully accomplished.

Arthur D. Little

1.0 Introduction

Arthur D. Little, Inc., was retained by EG&G Idaho, Inc., under subcontract C87-131488 issued pursuant to Contract No. DE-AC07-761D01570 to conduct geotechnical services at the Material Technology Laboratory (MTL) in Watertown, Massachusetts. The objective of this "resampling" episode was to perform another round of sampling activities in support of the remedial investigation. This sampling is intended to duplicate, to the extent possible, the sampling performed in 1988.

Analyses necessary to chemically characterize samples in accordance with U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) certified methods were not completed under this contract but are provided under the USATHAMA Class contract with Arthur D. Little.

1.1 Scope of Work

The efforts involved in this investigation included:

- Collection of 18 groundwater samples at 16 existing monitoring wells. Two wells were sampled twice with the second sampling performed on a different day. Two field blanks were submitted with these samples. Trip blanks for volatiles were submitted with shipment of all volatile samples;
- Determination of water levels at 16 existing monitoring wells;
- Collection of 22 shallow surface soil samples taken by hand auger. This included two duplicate samples and two field blanks;
- Collection of three sediment samples from storm sewer catch basins;
- Collection of seven 24 hour composite samples from storm sewer outfalls o the Charles River.
- Collection of eight surface water and storage tank samples; and
- Collection of a sample of water from the reactor emergency coolant tank.

All samples were collected in accordance with the USATHAMA QA Program, December 1986, 2nd Edition, March 1987, and Geotechnical Requirements for Drilling, Monitor Wells, Data Acquisition and Reports, March 1987. All samples were preserved as specified in that plan. Prior to transport all samples were screened for radioactivity. All samples were transported to the Arthur D. Little analytical laboratory and full chain of custody was maintained for all samples.

Samples were collected for volatile organics, base/neutral/acid extractables (semivolatile organics), pesticides/PCB's, metals, cyanide, and sulfide. The five samples collected adjacent to transformers were analyzed for PCBs only.

Chemical analysis necessary to develop data was conducted under a separate contract (under USATHAMA Class contract with Arthur D. Little) and thus will not be discussed in this final report. The list of compounds analyzed was specified by EG&G Idaho based on the previous sampling performed in 1988. Analytical data will be provided along with modeling, assessments, evaluations, and conclusions in the Remedial Investigation (RI) Report.

A review of options for disposal of purge waters was prepared. Purge water was contained in 55 gallon drums and stored on wooden pallets. Drums are labeled by the designation RI - MW - well number.

The duration of the program was approximately nine weeks. Field activities commenced on February 5, 1990. All of the above tasks were successfully accomplished.

Prior to commencing work at MTL, Arthur D. Little prepared a Health and Safety Plan, a Quality Control Plan, and a Sampling Plan. These plans, approved by EG&G Idaho and USATHAMA, detailed our procedures for site safety, operating procedures and quality objectives for site activities, locations of all samples and sampling procedures. During the program, quality objectives and performance were audited by Arthur D. Little's Quality Control Manager and during activity on site, safety procedures were monitored by Arthur D. Little's site Health and Safety Manager.

2.0 Site Location and History

2.1 Site Location

The Army Materials Technology Laboratory (MTL) is located in Watertown, Massachusetts about six miles west of Boston (see Figure 2.1). The facility currently occupies approximately 47 acres on the north bank of the Charles River and includes ten major structures used for research, development, testing and manufacturing.

2.2 Site History and Description

The MTL was originally established as the Watertown Arsenal in 1816 by order of President James Madison. The arsenal was initially used for the storage, cleaning, repair, and issue of small arms and ordinance supplies. Manufacturing was conducted on a limited scale until 1830. Activities were then expanded to include the manufacture of field, siege and seacoast guns, and gun carriages. During the Civil War, the arsenal was mobilized for the war effort and produced vast quantities of ammunition. In the 1880s the arsenal assumed responsibility for material testing and experimentation; special operations included mixing paint, preparing lubricants, waterproofing paper cartridges, and preparing ingredients for pyrotechnics such as post fires, fuzes, rock-fire, torches, fireballs, and signal rockets. In the final two decades of the 19th century, the arsenal was engaged in the manufacture of newly designed, field and siege, breech-loading steel guns and their carriages.

Activity at the arsenal increased dramatically during World War I. The facility was used for the production of ordinance supplies. More than 20 buildings were constructed during this period, and employment soared to more than 5,000. At its peak activity during World War II, the arsenal encompassed an area of approximately 131 acres, employed 10,000 people and maintained 53 buildings and structures. The number of employees dropped sharply after World War II. However, the arsenal continued to play an important role in arms development, and in 1953 it produced the famous 75-mm Skysweeper anti-aircraft gun. In 1960, the Army's first neutron radiography research nuclear reactor was dedicated at the facility. The reactor, used for researching the molecular and atomic structures of materials, was later deactivated in 1970.

A phase-down in operation was initiated in 1967. Much of the arsenal property was transferred to the General Services Administration (GSA). In 1968, approximately 55 acres of GSA property was sold to the Town of Watertown and was subsequently used for apartment buildings, the Arsenal Mall, and a public park and playground. Some 47.5 acres on the west end of the arsenal grounds was retained by the Army and later became the Army Materials and Mechanics Research Center (AMMRC), which in 1985 became MTL.

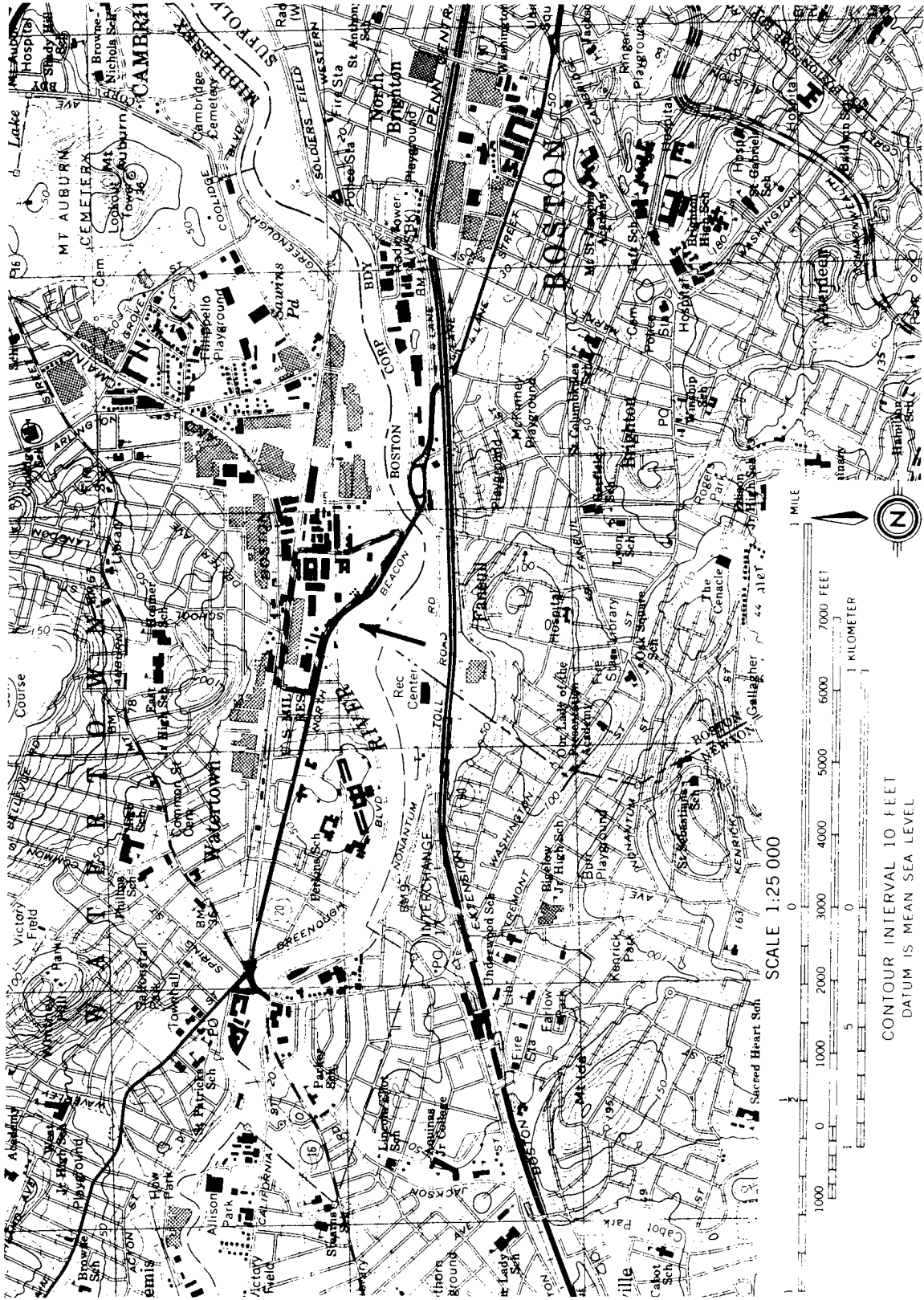


Figure 2.1 Location of Army Materials Technology Laboratory, Watertown, Massachusetts

While known as the AMMRC, the facility was designated a historical landmark by the American Society of Metals. Building 111 is virtually unaltered after 120 years of occupancy. It was placed on the National Register of Historic Places on January 30, 1976. In addition, a National Register nomination was prepared for the Gun Carriage Manufacturing Complex (Building 37, 43, 312, and 313).

Today, MTL employs approximately 600 people and occupies 15 buildings. It continues to function as the Army lead laboratory for materials, materials testing technology, lightweight armor, solid mechanics, and manufacturing testing technology.

3.0 Regional Geology

The following description of regional geology is taken from the 1988 Arthur D. Little report, "Geotechnical Report, Army Materials Technology Laboratory, Watertown, Massachusetts".

3.1 Bedrock Geology

The MTL facility is located within the north central portion of the Boston Basin, a topographic and structural basin bounded on the north and northwest by the North Boundary Thrust Fault, on the west by normal faulting and to the south by the Blue Hills and Ponkapoag Thrust Faults (Figure 3.1). To the southwest, intricate thrusting and tight, east plunging folds complicate the margin. The eastern margin of the basin is beneath Massachusetts Bay (Billings, 1976). Topographically the basin is bounded by low hills to the north, west, and south.

The basin is a structurally bounded depression in Precambrian basement filled with younger Mississippian and Pennsylvanian rocks (LaForge, 1932, Billings, 1976; and Kaye, 1980). At the southwest margin of the basin, the Precambrian basement outcrops in the cores of northeast plunging anticlines. To the south, between the Ponkapoag and Blue Hills Thrust Faults, the basin is intruded by the peralkaline Blue Hills Complex of Cambrian-Devonian age. The Blue Hills complex includes the Quincy Granite and other felsic intrusions. In the southwest portion of the basin, altered felsic and basaltic volcanics of the Mississippian Mattapan Complex are exposed. Volcanics of similar composition assigned to the Mississippian Lynn Complex are crosscut the Precambrian basement and are included as casts in the Pennsylvanian Boston Bay Group (LaForge, 1932).

The Boston Bay Group consists of two formations, the lower Roxbury Conglomerate and the upper Cambridge Argillite. LaForge (1932) subdivided the Roxbury Conglomerate into three members, the Squantum, Dorchester, and Brookline Members. In general, the Roxbury Conglomerate outcrops south of the Charles River over the southern portion of the basin, and the Cambridge Argillite outcrops north of the Charles River.

The Cambridge Argillite is typically a varved or rhythmically layered, indurated siltstone. Beds range in thickness from 0.1 to 8 cm, and vary from dark gray, clay to silt-rich layers, to light gray, very fine to fine-grained sand layers. Graded beds, cross beds, ripple marks, and slump structures are observed.

3.2 Structural Geology

The internal structure of the Boston Basin consists of a series of broad folds, plunging gently to the northeast or east (Billings, 1976). The MTL facility is located on the axis of the Charles River Syncline (Figure 3.1). Most of the fault

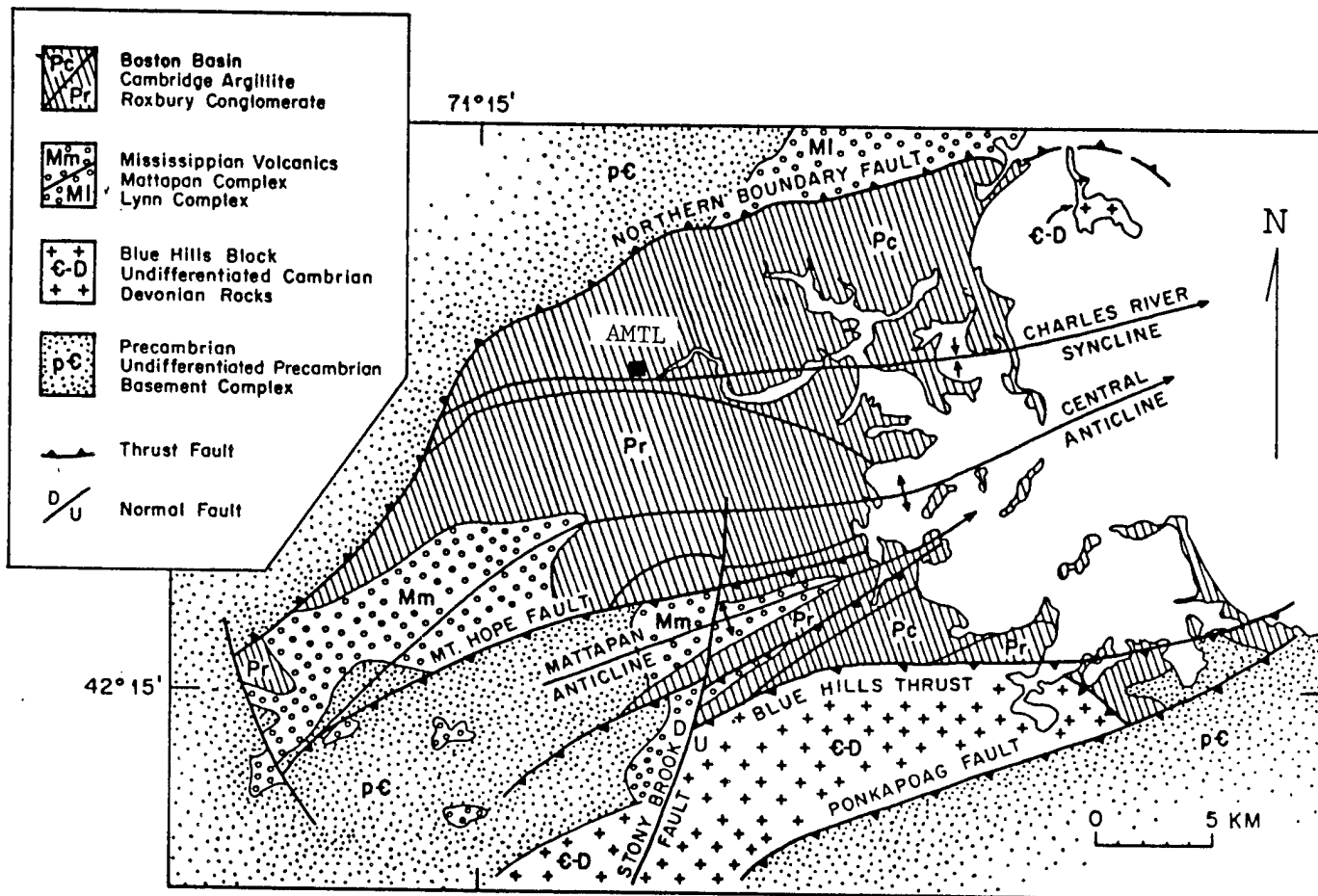


Figure 3.1 General geology of the Boston Basin (after Billings, 1976)

zones in the basin, including the bounding thrust faults, trend east-northeast. The only major exceptions to this area the Stony Brook Fault and an unnamed fault at the southwest margin of the basin, which are both normal faults and trend north-northeast and north-northwest, respectively. The Stony Brook Fault is mapped from Fresh Pond, approximately two miles east of the MTL, south-southwest for approximately 20 miles.

3.3 Quaternary Geology

Numerous glacial advances and retreats in the vicinity of the Boston Basin from 2 million years to 12,000 years ago have left a complex stratigraphic sequence of till, clay, and gravel. In general, the Quaternary aged deposits in the Boston Basin consist of (in ascending order) a basal till overlaying the bedrock, 0 to 70 feet thick, a marine clay, 0 to 60 feet thick, and outwash deposits of sand and gravel, 0 to 50 feet thick. General properties of the basal till and outwash deposits for the Boston area are summarized in Table 3.1.

Table 3.1 General Properties of Basal Till and Outwash Deposits in the Boston Area (After Hatheway, 1982)

Characteristic	Lodgement (Basal) Till	Outwash
Particle Size Gradation	Well graded; very heterogeneous	Gap-graded/poorly sorted semi-homogeneous
Presence of Boulders	Many, including erratics	Few to none
Percent (-) 200 Sieve	20-60	0-10
Percent (-) 0.02 mm	5-30	0-5
Effect of Fines	Governs engineering properties	Nil
Relative Density	Stiff - hard	Loose - moderately compact
Particle Shape	Angular-subangular	Subangular-rounded
Liquid Limit (%)	15-30	Non-plastic
Plasticity Index	0-20	Non-plastic
Standard Penetration (blows)	20-200+	0-20+
Cohesion (KN/m ²)	0-25	approx. 0
Friction Angle (°)	15-33	25-45
Consolidation Ratio	Overconsolidated	Normal to underconsolidated
Permeability (in situ) (cm/sec)	10 ⁻⁵ to 10 ⁻⁹	10 ⁻² to 10 ⁻⁵

4.0 Site Geology

The following description of site geology is taken from the 1988 Arthur D. Little report, "Geotechnical Report, Army Materials Technology Laboratory, Watertown, Massachusetts", unless otherwise referenced.

4.1 Site Location

The Materials Technology Laboratory is located on the north bank of the Charles River in a generally flat area, decreasing in elevation (National Geodetic Vertical Datum, 1929) from approximately 36 feet at the north to approximately 2.4 feet (river elevation) at the south (Figure 4.1). Almost the entire MTL facility is situated on a low bluff, approximately 20 feet above the river elevation.

There are no known streams or natural drainages emptying to the Charles River in the vicinity of the MTL. All surface run-off is collected in the storm drain network and discharged to the river.

The locations of bore holes and monitoring wells placed at MTL during the 1988 geotechnical investigation by Arthur D. Little are shown in Figure 4.2. Two geologic cross sections, oriented approximately northwest-southeast are presented in Figure 4.3 and 4.4.

4.2 Bedrock Geology

The MTL facility is underlain by siltstone of the Pennsylvanian Cambridge Argillite. The siltstone was encountered at a depth of 61.5 feet in hole C01, at the northwest corner of the facility. At this location, the siltstone was very finely laminated with dark bluish gray silt to clay beds, and light bluish gray, very fine to fine-grained, sandy graded beds.

Observation of joints in a nearby outcrop, approximately 1 1/4 miles southwest of the facility, indicates three broad orientations:

- Parallel to bedding, oriented approximately east-west, dipping about 20-30° south;
- A dominant set, oriented north-northeast, dipping nearly vertical; and
- Parallel to shear zones, oriented east-northeast.

The north-northeast joint orientation is also that generally followed by felsic dikes in the Boston Basin (striking N15-45°E, dipping 60-90°) and the Stony Brook Fault.

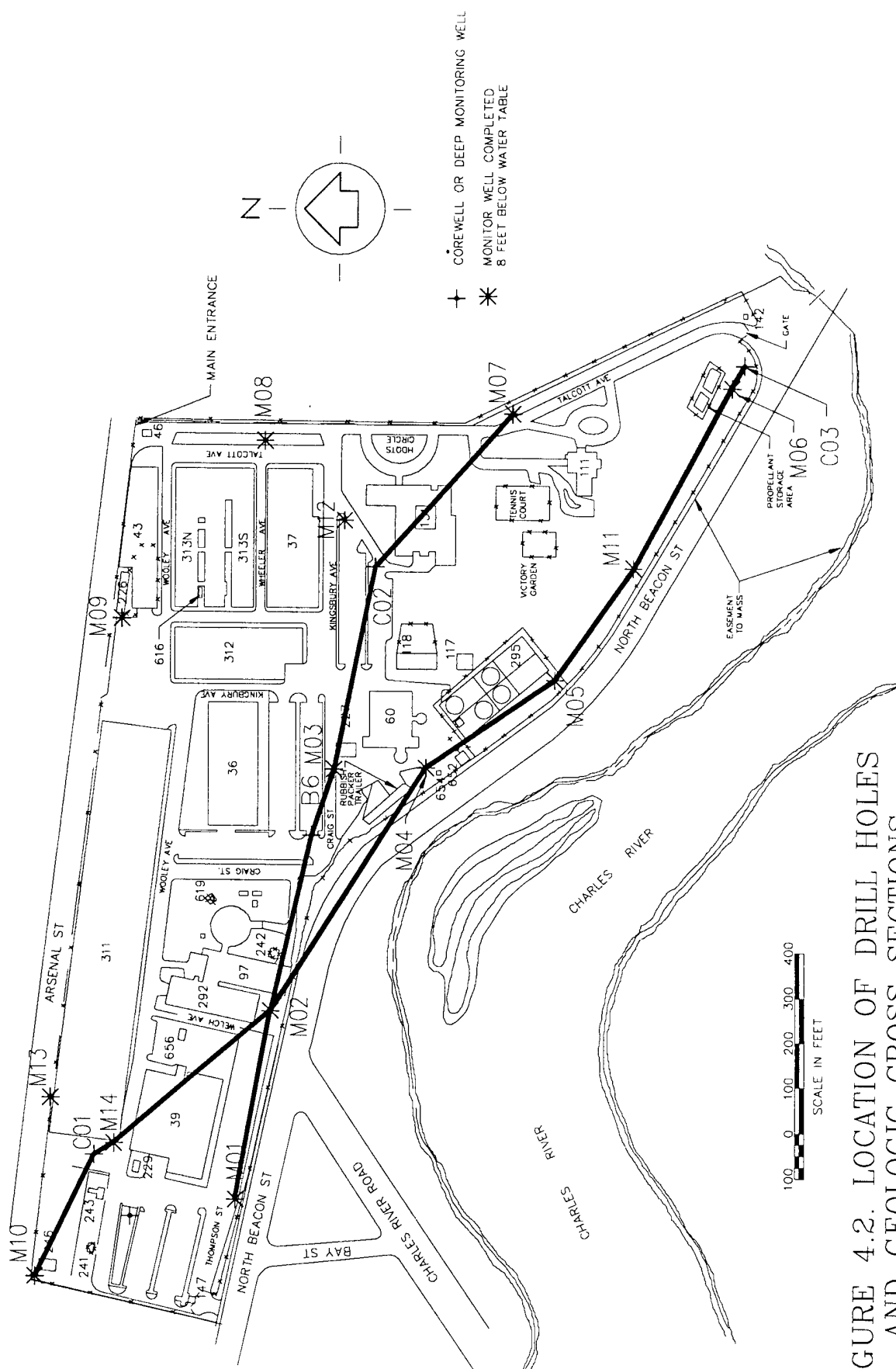


FIGURE 4.2. LOCATION OF DRILL HOLES
AND GEOLOGIC CROSS SECTIONS

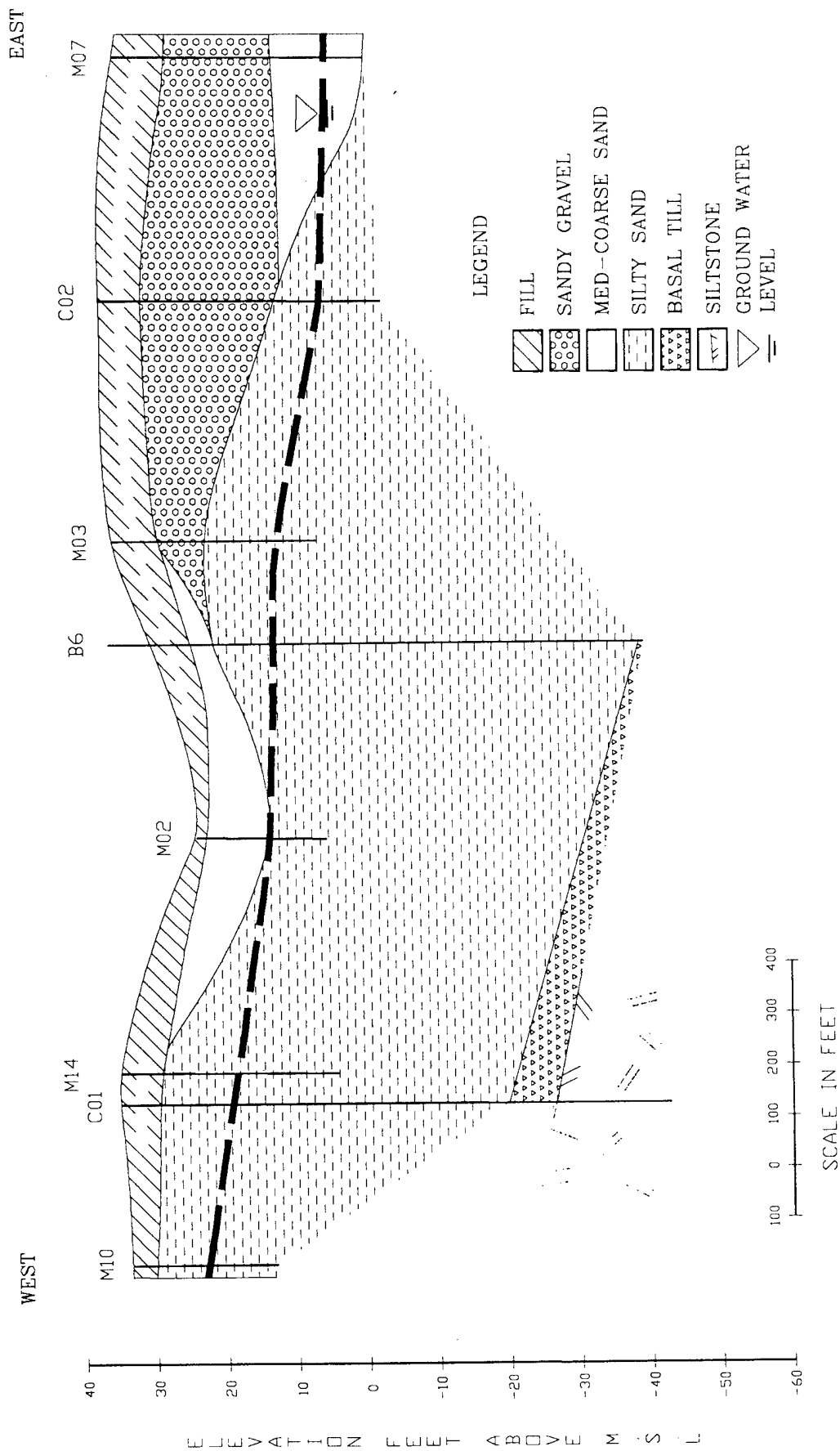
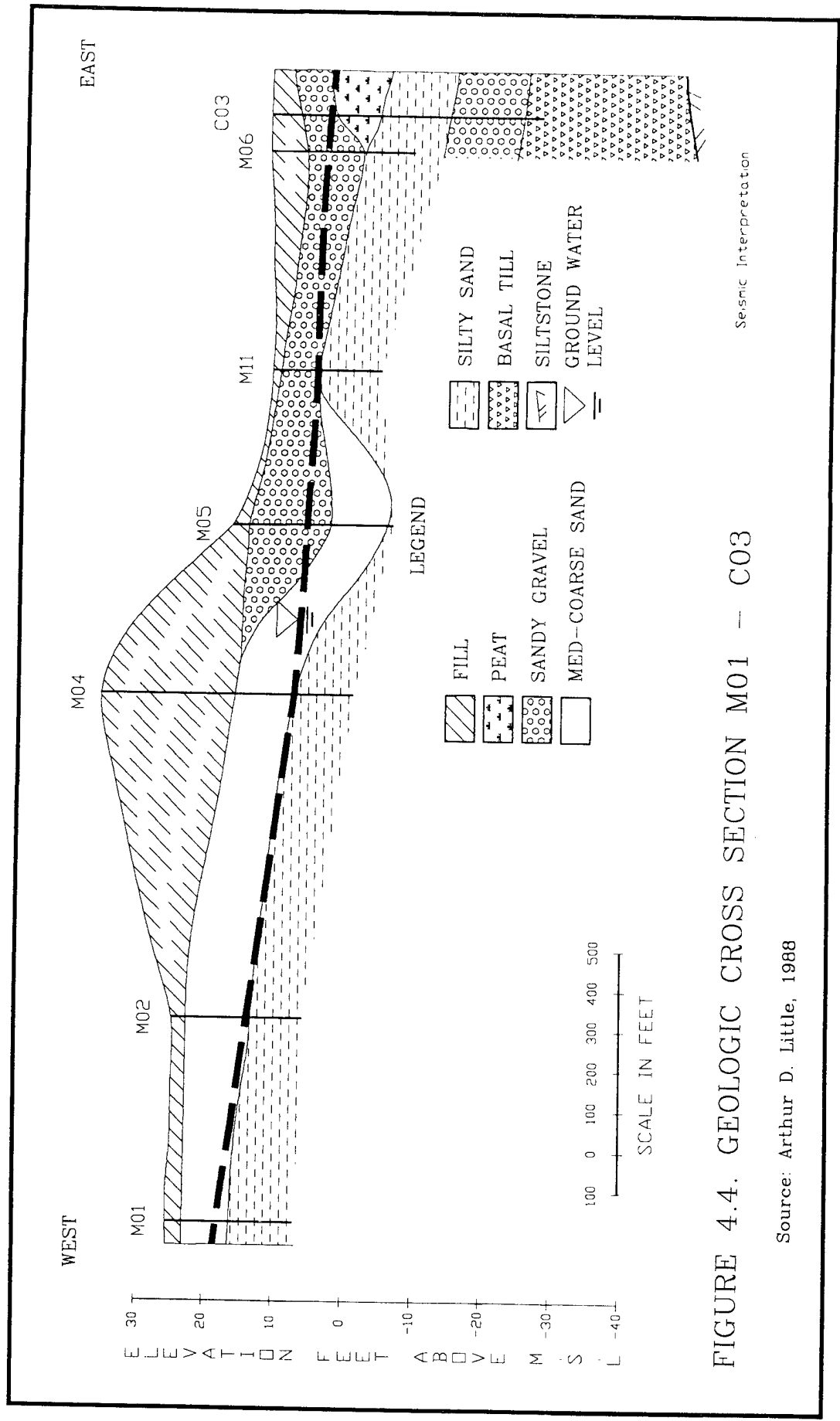


FIGURE 4.3. GEOLOGIC CROSS SECTION M10 - M07

Source: Arthur D. Little, 1988



Seismic Interpretation

FIGURE 4.4. GEOLOGIC CROSS SECTION M01 - C03

Source: Arthur D. Little, 1988

4.3 Quaternary Geology

Estimates based on drilling (Figure 4.3 and 4.4) and a seismic refraction survey (Figures 4.5 and 4.6), suggest approximately 45 to 120 feet of Quaternary sediments have been deposited over the Cambridge Argillite bedrock at the MTL. While the precise stratigraphy varies from hole to hole, a generalized ascending sequence consists of a basal till of fairly cohesive, silt rich gravel; a moderate to well sorted, olive brown, silty, fine-grained sand; a medium to coarse-grained brown sand, locally grading to about 30% gravel; locally a sandy peat; and finally, fill material or disturbed sand and gravel.

Depth from surface to bedrock was estimated across the site using three seismic refraction profiles (Figure 4.5). The results of these three profiles, shown in Figure 4.6, indicate a generally gently undulating surface. The east-west profile shows a bedrock surface varying from 47 feet (below surface) at the northwest corner of the facility, falling off to about 110 feet and then rising to 90 feet at the northeast corner. The north-south profiles show a decrease in depth from 120 feet at the north to about 65 feet at the south. Based on the east-west seismic refraction profile bedrock at location C01 was predicted at 57 feet; the actual depth, based on drilling was 61.5 feet.

4.3.1 Basal Till

The basal till was encountered in only two holes on site, C01 and C03 and penetrated only in C01. In C01, the till was only six feet thick and consisted of round to subround cobbles of granite and felsic volcanics and subangular fragments of argillite. No split spoon samples were obtained in the till in C01 because of refusal, so the composition of the matrix is not known. In C03, the till consisted of a gray green, silt-rich gravel with angular decomposed rock fragments and medium to coarse-grained sand. While the exact thickness of the till is not known at C03, based on the depth of bedrock estimated from the seismic refraction profile, it would appear to be approximately 25 feet thick. In drilling previously completed to gather geotechnical data for foundation design, the till was encountered in a hole approximately 200 feet west of MW03 at a depth of 76 feet. The till was described as a dense brown, clayey to silty sand with gravel.

4.3.2 Silty Sand

The silty sand is found across the site and is usually comprised of a moderate to well sorted, very fine to fine-grained sand, with a silty-clayey matrix, commonly laminated. Its thickness ranges from approximately 10 feet in C03 to 50 feet in C01. It does not appear to be encountered in MW07 or MW08 and is thinnest in C03, so it may pinch out eastward. Since it was penetrated only in these two holes, it is not possible to make any conclusions regarding systemic variations in thickness. The silty sand probably represents a distal outwash deposit in a lacustrine environment.

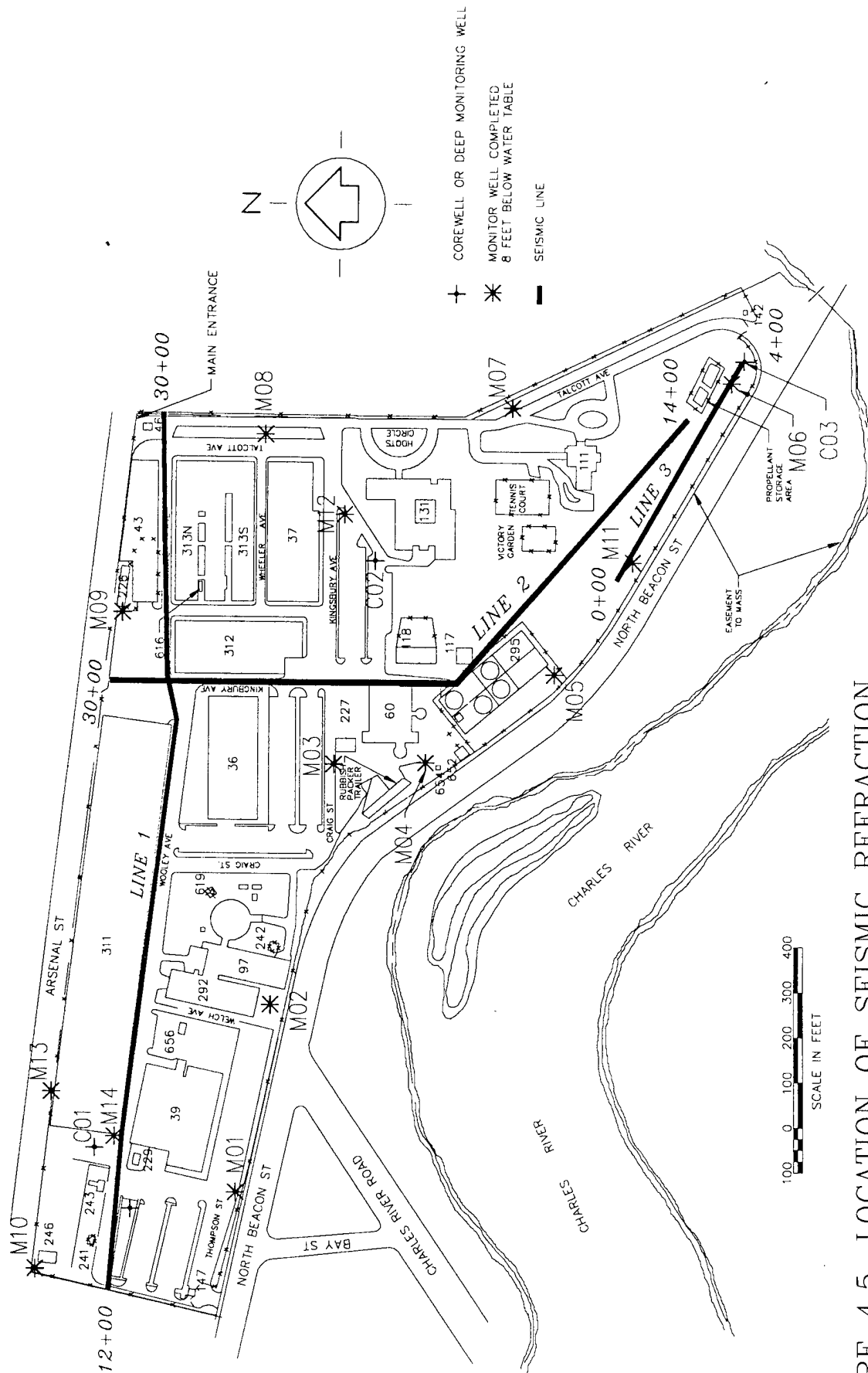
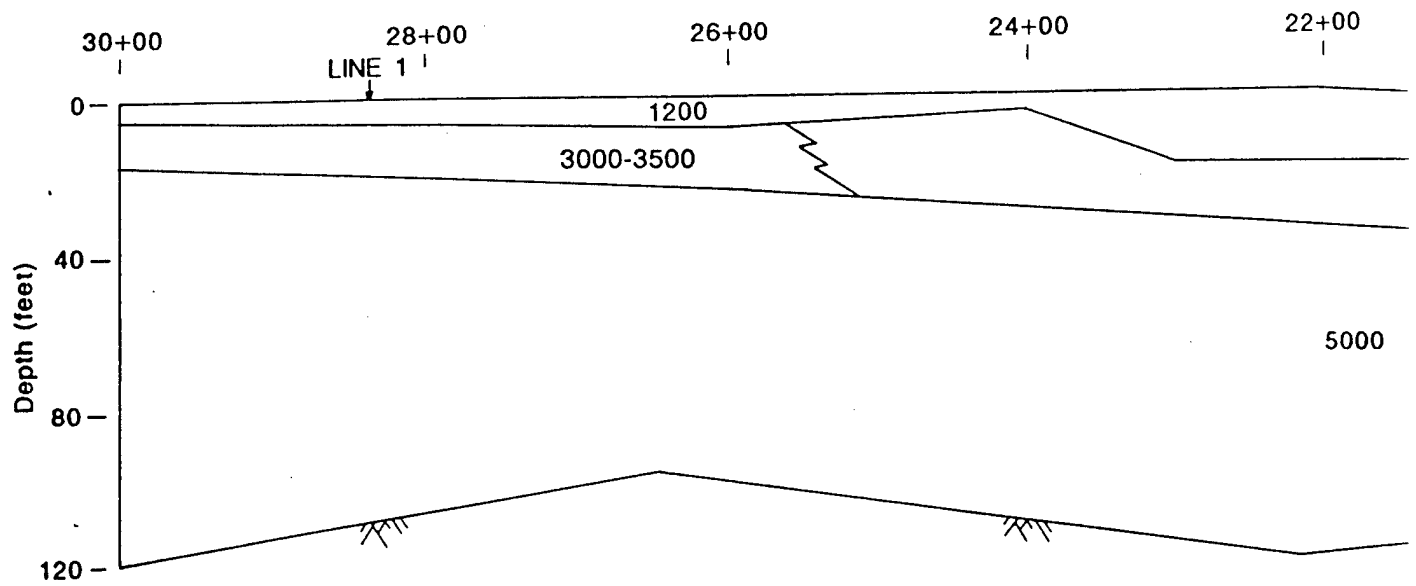
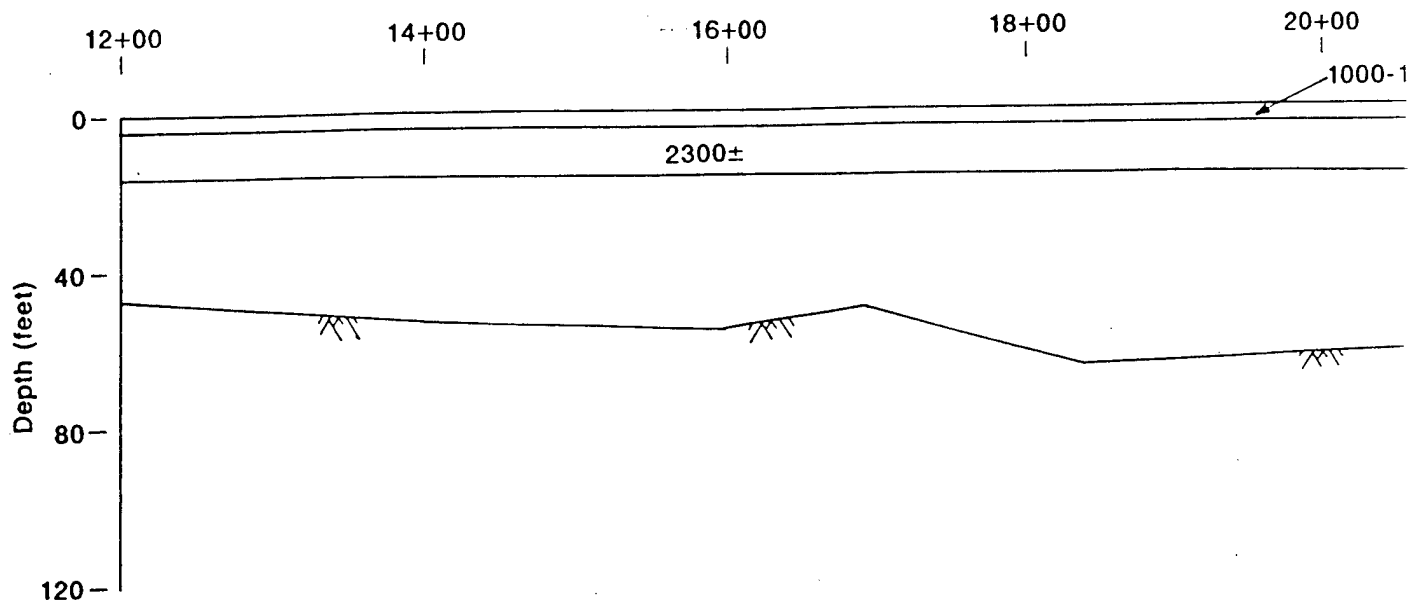


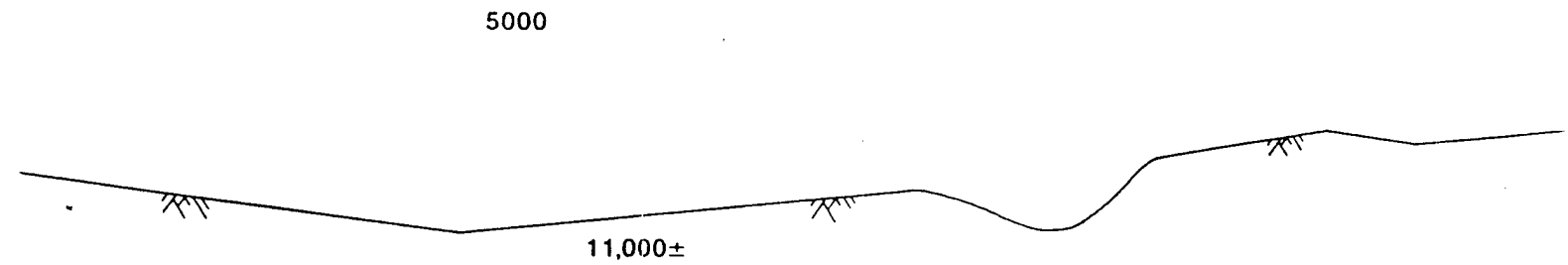
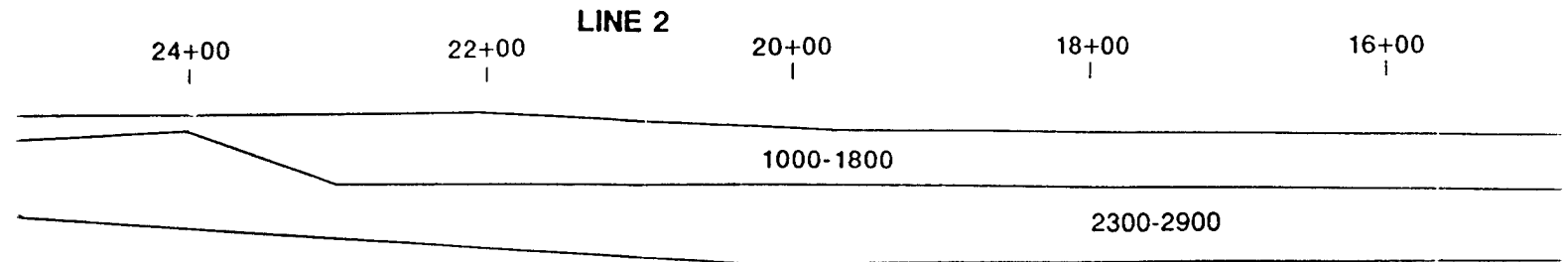
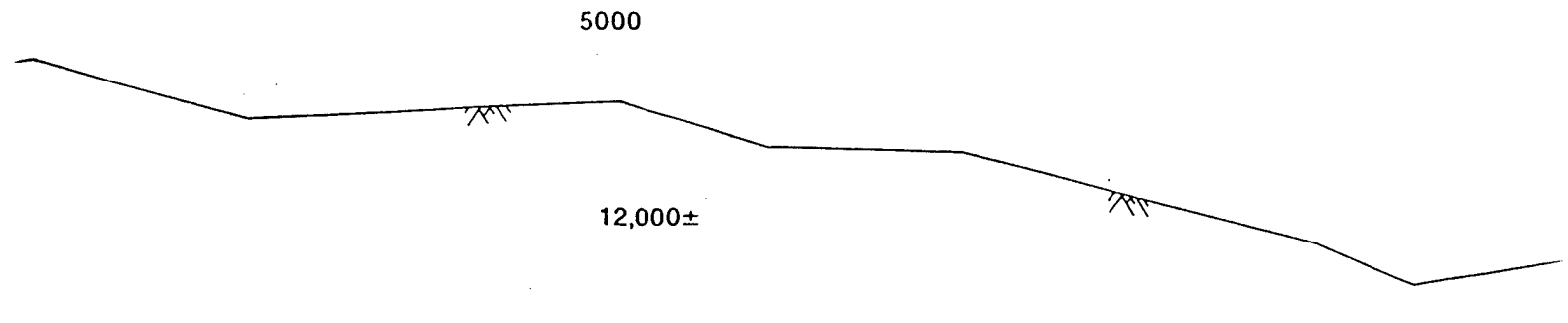
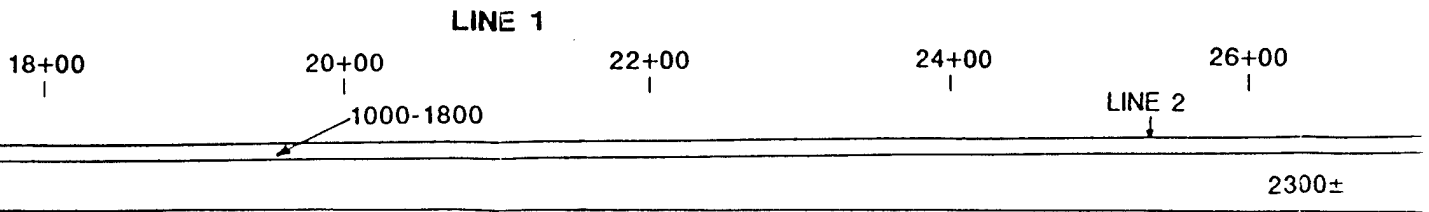
FIGURE 4.5. LOCATION OF SEISMIC REFRACTION PROFILES

Source: Arthur D. Little, 1988



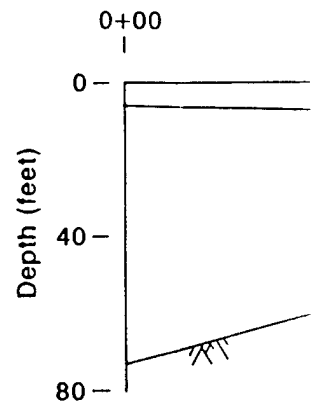
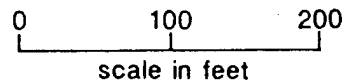
NOTE:

Seismic velocities are in feet/sec.



DTE:

Seismic velocities are in feet/sec.



2

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24+00

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LINE 2

2300±

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- 120

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Depth (feet)

40-

80-

100 200
scale in feet

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A. D. LITTLE, INC.

SEISMIC REFRACTION PROFILES

Figure 4.6

17

7/88

3

4.3.3 Medium to Course Sand/Gravel

The medium to coarse-grained sand/gravel unit is highly variable in textural composition and is not found over the entire site. Where encountered, it lays above the silty sand and is overlain by fill and disturbed sands and gravels. It was not encountered in the northwest corner of the facility (Figure 4.3) and seems to grade from a medium to coarse-grain, well sorted, brown sand in the west portion of the facility to a yellowish brown, poorly sorted, gravel (30-40% pebbles and cobbles) with a poorly sorted, fine to coarse-grained sand matrix to the east. It ranges in thickness from absent to more than 35 feet, but averages approximately 10 feet. It is sometimes difficult to distinguish the gravel from disturbed or fill material, but in most cases the fill gravels were grayish brown and contained exotic debris such as brick, slag, concrete, and ceramics. The sand/gravel deposits probably represent fluvial (glacial meltwater) deposits.

4.3.4 Peat

In C03 at the southeast corner of the facility (Figure 4.4), a sequence of organic rich sand and sandy peat was encountered. This is the lowest portion of the MTL (11.9 feet), about 9 to 10 feet above normal Charles River elevation. The sandy peat probably represents a flood plain wetland deposit and consisted of grayish brown woody plant fragments and silty fine sand. When exposed to air, the peat gave off a sulfurous odor and immediately oxidized to a black brown color. Peat was not encountered in MW11 or MW06, the other low elevation hole locations.

4.3.5 Fill and Surficial Soils

Fill at the MTL facility is variable in distribution and thickness but is generally less than 20 feet. Usually the fill consists of poorly sorted sandy gravel, grayish brown in color. It commonly contains exotic debris such as brick, slag, concrete, and ceramics which can be used to distinguish it from the underlying fluvial gravels.

The surficial soil at the MTL is classified as Merrimac gravelly sand loam. It consists of 6 to 10 inches of dark brown gravelly sandy loam overlying 15 to 25 inches of yellow brown, friable gravelly sandy loam. The soil has been repeatedly disturbed during the history of the MTL by various construction activities.

4.4 Hydrology

The following description of hydrology at the MTL facility is taken from the 1988 Arthur D. Little report, Geotechnical report, Army Materials Technology Laboratory, Watertown, Massachusetts.

4.4.1 Surface Water

Surface water run-off and natural drainage at the MTL has been greatly influenced by modifications made to the natural land surface by construction of various structures and paved areas such as roads and parking lots. Watertown, in the

vicinity of the MTL, is heavily developed. The nearest pond, Swains Pond, is approximately 3,000 feet east of the MTL. The Charles River, one of the primary drainages in the Metropolitan Boston area, borders the site to the south. There are no known streams or other natural drainages to the Charles River in the vicinity of the MTL. Current surface drainage is dominantly to the storm sewer system which discharges into the river. Some natural run-off will follow topography toward the river. Natural recharge through seepage is probably quite minimal in the vicinity of the MTL because of the number of structures and paved areas.

4.4.2 Groundwater

Characterization of groundwater hydraulics at the MTL is based on 17 borings and 16 monitor wells installed at the site during May and June of 1988. Water level measurements were taken and in situ permeabilities measured by falling and rising head tests. Hydraulic parameters are summarized in Table 4.1.

Water level measurements taken at all wells and the Charles River on July 13, 1988 and February 8, 1990 (Table 4.2). Groundwater contours are estimated based on the 1988 data. These contours indicate flow is generally to the south, toward the River. In the northeast corner of the site, flow is to the southeast initially and then swings around to the south. Using the contours shown in Figure 4.7, gradients were estimated (Table 4.1). Figure 4.8 shows groundwater contours for the well measurements taken February 8, 1990.

Hydraulic conductivities (k) were calculated by the method of Hvorslev (Freeze and Cherry, 1979) using measurements of the maximum displacement of water and subsequent recoveries to equilibrium as a function of time (slug tests). The hydraulic conductivities calculated from the falling head and rising head tests are presented in Table 4.3 along with laboratory measurements of hydraulic conductivity. The results from monitor wells MW03, MW04, MW07 and MW14 are of questionable quality due to the erratic nature of the data; therefore, they are not used in our characterization of groundwater hydraulics.

The test results can be categorized based on the material in which the well was screened. Using data from monitor wells screened in silty sand (C02, C03, MW05, MW06, MW09, and MW11) an average value of k is 6.4×10^{-3} m/sec with a range from 7.06×10^{-4} to 1.30×10^{-2} cm/sec. For the medium to coarse-grained sandy gravel (MW01, MW02, MW08, MW12, and MW13) an average value of k is 2.7×10^{-2} cm/sec with a range from 4.24×10^{-3} to 3.30×10^{-2} cm/sec. These values are within expected ranges of values for silty sand (10^{-5} to 10^{-1} cm/sec) and sand (10^{-3} to 1 cm/sec) (Freeze and Cherry, 1979).

Hydraulic conductivity of the bedrock, the Cambridge Argillite (actually a siltstone), was determined by pressure testing of a packed bedrock interval (68-78 feet). Values of k ranged from 1.72×10^{-7} to 8.88×10^{-7} cm/sec and averaged 4.1×10^{-7} cm/sec. A value of 10^{-7} cm/sec is at the high end of the range for shale

Table 4.1 Hydraulic Parameters

1. Gradient (i)

- a. West portion: 0.025 to south.
- b. East central portion: 0.030 to southeast, swings to 0.005 to south.

2. Hydraulic Conductivity (k)

- a. Silty sand:
 6.4×10^{-3} cm/sec (average)
 7.06×10^{-4} - 1.30×10^{-2} cm/sec (range)
- b. Medium-coarse sandy gravel:
 2.7×10^{-2} cm/sec (average)
 4.24×10^{-3} - 3.30×10^{-2} cm/sec (range)
- c. Siltstone:
 4.1×10^{-7} cm/sec (average)
 1.72×10^{-7} - 8.88×10^{-7} cm/sec (range)

3. Flow Rate (Q)

- a. $0.016 \text{ m}^3/\text{sec}$ (98 gpm).

4. Flow Velocity (v)

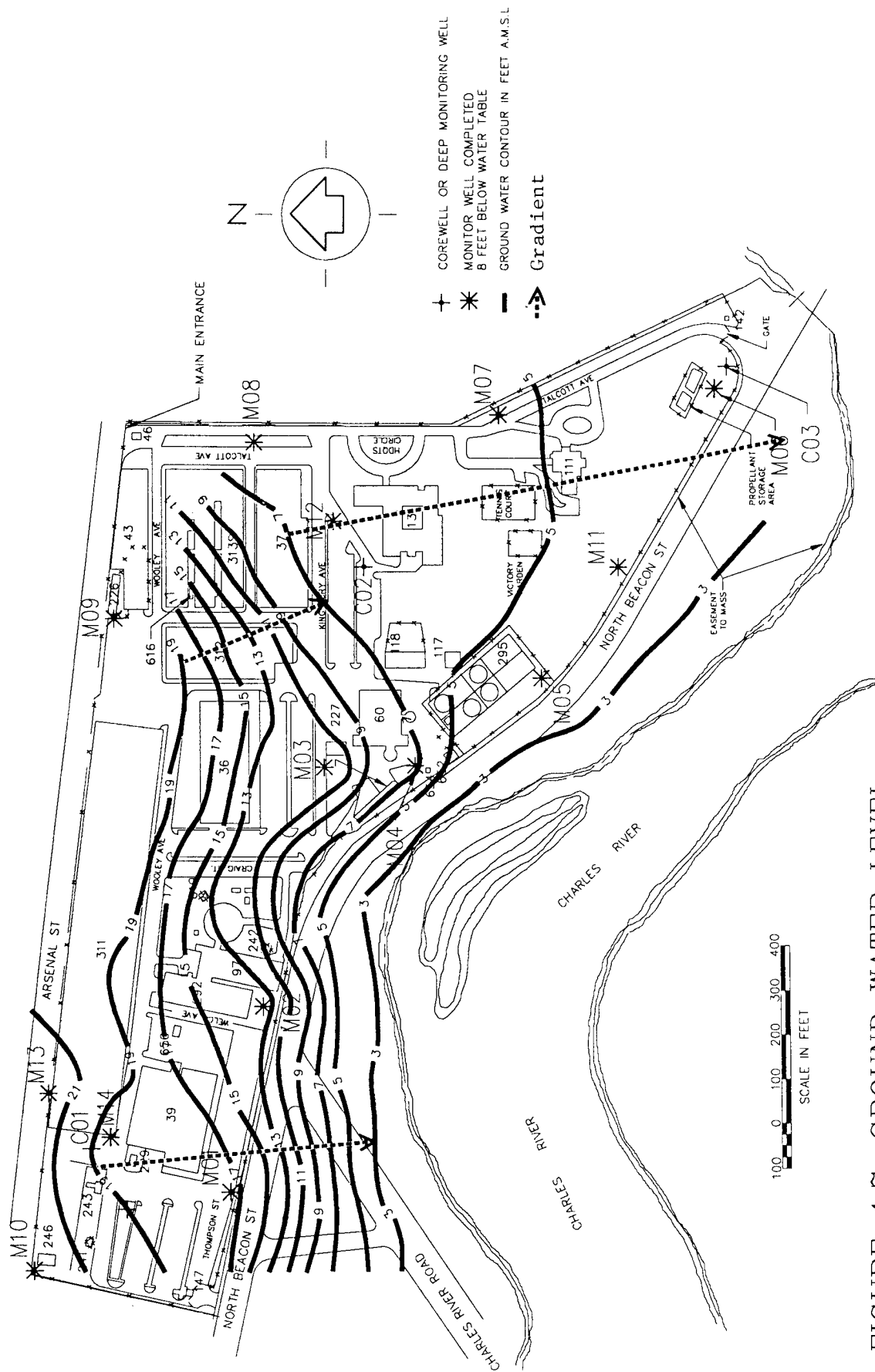
- a. Site average: 4.5×10^{-4} cm/sec (142 m/year).
- b. Southeast portion: 4.5×10^{-5} cm/sec (14.2 m/year).

Table 4.2 Groundwater Surface Elevations

Monitor Well	Elevation of Well* (Feet M.S.L.)	July 13, 1988		February 8, 1990	
		Water Depth** (Feet)	Water Elevation (Feet M.S.L.)	Water Depth** (Feet)	Water Elevation (Feet M.S.L.)
C02	37.49	31.63	5.86	30.99	6.5
C03	11.90	8.45	3.45	8.13	3.78
M01	24.98	7.56	17.42	6.71	18.27
M02	24.04	10.49	13.55	9.25	14.79
M03	36.63	23.75	12.88	22.33	14.30
M04	36.52	29.19	7.33	28.25	8.27
M05	15.93	10.82	5.11	9.32	6.61
M06	11.96	8.15	3.81	7.44	4.52
M07	34.84	29.67	5.17	29.88	4.97
M08	39.48	33.70	5.78	33.15	6.33
M09	37.03	16.77	20.26	12.53	24.50
M010	32.86	11.00	21.86	9.05	23.81
M011	11.01	6.17	4.84	4.77	6.24
M012	38.52	32.14	6.38	32.23	6.29
M013	35.30	13.19	22.11	12.30	23.00
M014	35.49	17.19	18.30	15.54	19.95

* Elevation of well is ground surface because of flush mount.

** Depth below ground surface.



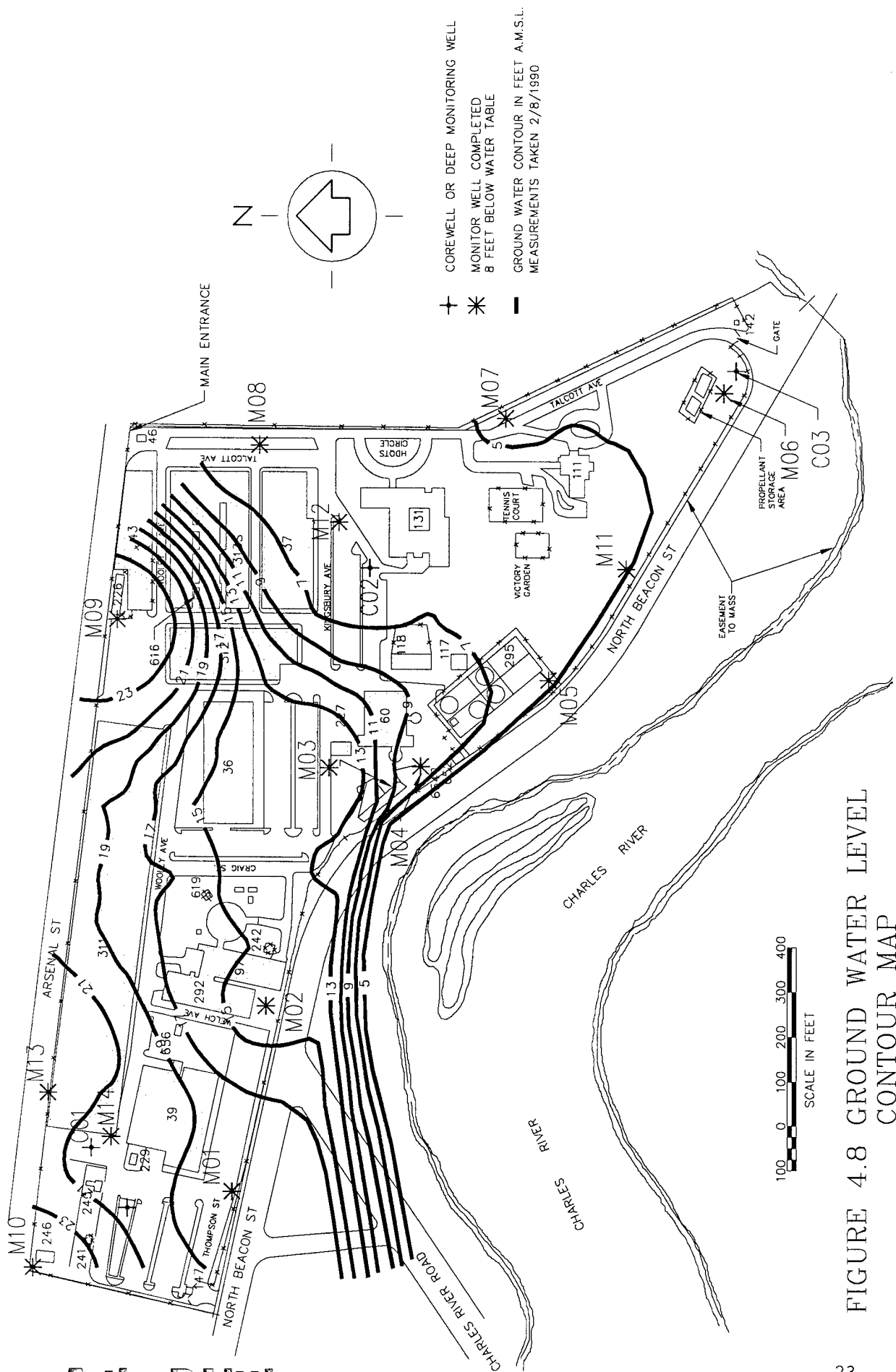


Table 4.3 Calculated in Situ Hydraulic Conductivity Measurements

Well No.	Lithology	Rising Head	Hydraulic Conductivity (cm/sec) Falling Head	Laboratory
C01	Silty sand	-	-	2.2×10^{-6}
C02	Silty sand	9.53×10^{-3}	3.35×10^{-2}	-
C03	Silty sand	9.53×10^{-3}	9.18×10^{-3}	1.0×10^{-7}
MW01	Medium-coarse sand	1.20×10^{-2}	2.75×10^{-2}	2.5×10^{-7}
MW02	Fine-coarse sand	2.82×10^{-2}	3.35×10^{-3}	1.5×10^{-6}
MW03	Silty sand	4.24×10^{-2}	*	-
MW04	Fine-coarse sand	2.47×10^{-2}	*	-
MW05	Silty sand	1.34×10^{-2}	*	-
MW06	Silty sand	6.35×10^{-2}	1.06×10^{-3}	-
MW07	Fine-coarse sand	6.35×10^{-2}	*	-
MW08	Medium sand	3.32×10^{-2}	1.66×10^{-2}	-
MW09	Silty sand	4.24×10^{-3}	3.04×10^{-2}	-
MW10	Medium sand	4.24×10^{-3}	6.71×10^{-3}	-
MW11	Silty sand	7.06×10^{-4}	1.41×10^{-3}	-
MW12	Fine-medium sand	3.00×10^{-2}	6.00×10^{-2}	-
MW13	Fine-coarse sand	2.29×10^{-2}	3.07×10^{-2}	-
MW14	Silty sand	1.09×10^{-2}	*	6.0×10^{-7}

* Indicates erratic or insufficient data or insufficient displacement of water level.

- Indicates laboratory tests could not be run.

(10^{-7} to 10^{-11} cm/sec) confirming some fracturing is present in the siltstone, at least near the surface. Compacted natural clay liners for solid waste landfills are in the range of 10^{-7} to 10^{-8} cm/sec, so by comparison, the siltstone does provide an effective basal confining layer for the overlying aquifer in unconsolidated glacial sediments.

We did not determine an in situ hydraulic conductivity for the basal till. Values of k reported by Hatheway (1982) range from 10^{-5} to 10^{-9} cm/sec.

Locally, the hydraulics of groundwater movement beneath the site are controlled by the confining nature of the bedrock and the hydraulic conductivity of the silty sand. Groundwater shows a general gradient 0.03 to the south. West of MW03, the gradient increases slightly as the water encounters the lower conductivity of the silty sand. As the silty sand grades to coarser sand and sandy gravel eastward, the hydraulic conductivity increases and the gradient decreases.

To calculate a representative flow rate (Q), a cross sectional area perpendicular to the gradient extending from near MW01, then east to near MW03, and finally northeast to near MW08, approximately 2,000 feet in length was selected. The aquifer thickness (H) ranged from approximately 40 feet at the west to 47 feet at the east. We assumed that the siltstone provided an effective basal confining layer for the aquifer. The cross sectional flow area was estimated at 8080 m². Review of the drill logs and cross section MW10-MW07 (Figure 4-3) suggests that the silty sand is the predominate hydrologic unit. Review of the seismic fairly uniform material, based on consistent seismic velocities of 5,000 feet/sec. Based on the preceding arguments, a hydraulic conductivity of 6.4×10^{-3} cm/sec, the average for the silty sand, was used. An average gradient (i) of 0.03 was selected. The flow rate, Q , can now be calculated:

$$\begin{aligned} Q &= k i A \\ &= 0.016 \text{ m}^3/\text{sec} \text{ (98 gpm)} \\ &= 504576 \text{ m}^3/\text{year} \text{ (51,508,800 gal/year)} \end{aligned}$$

Representative average linear velocities can be calculated by:

$$v = ki/n$$

Using an average porosity (n) of 0.43 for the silty sand, gradients (i) of 0.03 and 0.003 and the average hydraulic conductivity (k) for the silty sand, calculated flow velocities range from 6.4×10^{-4} cm/sec (142 m/year) to 4.5×10^{-5} cm/sec (14.2m/year) where 4.5×10^{-4} cm/sec is most representative over all but the southeast corner of the site. Since the average porosity (n) determined in laboratory testing is lower than the effective porosity, these average linear velocities represent lower limits of linear velocity.

5.0 Sampling Activities

Arthur D. Little was retained by EG&G Idaho, Inc. to conduct sampling activities at the Materials Technology Laboratory, in Watertown, Massachusetts. The objective of the "resampling" episode was to perform another round of sampling activities in support of the remedial investigation. This sampling was intended to duplicate, to the extent possible, the sampling performed in 1988. Our sampling program extended from February 8 to February 23, 1990, and consisted of the collection of the following samples:

- 18 ground water samples at 16 existing monitoring wells, which included two duplicates;
- 22 shallow soil samples, which included two duplicates;
- 3 storm sewer sediments;
- 7 outfall 24-hour composite samples;
- 8 tank and sump samples (3 sludge, 2 aqueous, 3 oil); and,
- 1 water sample from the reactor emergency coolant tank.

The final list of samples varied from the original scope in that, the water sample from the reactor emergency cooling tank was added, one 24-hour composite outfall sampling site was added, one of the sumps was dry (07AQU01), so a sludge sample was taken instead of an aqueous sample, and one sludge (05SLG01) was not taken upon direction from EG&G.

Table 5.1 lists the sample identification, type, location and compounds analyzed. Figures 5.1 through 5.5 show the locations of ground water, soil, storm sewer sediment, outfall and tank and sump samples.

Copies of original field documentation, including Ground Water Monitoring Reports, Soil Sample Logs, Monitoring Well Sampling Data Sheets, Tank and Sump Sampling Data Sheets, and Chain-of-Custody Forms are included in the tabbed appendices.

5.1 Ground Water Samples

Eighteen ground water samples were taken from 16 monitoring wells, originally installed in 1988. Of the 18, two were duplicate samples taken on the day following the original sample, without repurging the well.

Table 5.1: Proposed Samples and Analytes

Sample No.	Analysis to be Performed
<i>Groundwater Samples</i>	
C0-2	Complete analysis ¹
C0-3	Complete analysis ¹
MW-01	Complete analysis ¹
MW-02	Complete analysis ¹
MW-03	Complete analysis ¹
MW-04	Complete analysis ¹
MW-05	Complete analysis ¹
MW-06	Complete analysis ¹
MW-07	Complete analysis ¹
MW-08	Complete analysis ¹
MW-09	Complete analysis ¹
MW-10	Complete analysis ¹
MW-11	Complete analysis ¹
MW-12	Complete analysis ¹
MW-13	Complete analysis ¹
MW-14	Complete analysis ¹
C0-2 duplicate	Complete analysis ¹
MW-04 duplicate	Complete analysis ¹

Table 5.1 (continued)

Sample No.	Sample Location	Depth	Analysis to be Performed
<i>Shallow Soil Samples</i>			
01SOL01	W side of Bldg. 243	1-6 inches	Complete analysis ¹
02SOL01	Steel floor Bldg. 311	1-6 inches	Complete analysis ¹
03SOL01	Transformer Case, NW side Bldg. 43	1-6 inches	PCB
06SUB01	S of Bldg. 100	6-18 inches	Complete analysis ¹
06SOL01	Transformer area	1-6 inches	PCB
09SOL01	NE side of Bldg. 100	1-6 inches	PCB
	Transformer cage		
09SOL02	W side of Bldg. 313	1-6 inches	PCB
	Transformer cage		
	E side of Bldg. 313		
12SUB01	Grass area S of Bldg. 60	6-18 inches	Complete analysis ¹
13SOL01	Transformer area, S of Bldg. 131	1-6 inches	PCB
14SUB01	SE Corner, unit 14	6-18 inches	Complete analysis ¹
14SUB02	NW corner, unit 14	1-6 inches	Complete analysis ¹
15SOL01	SE corner, unit 15	1-6 inches	Complete analysis ¹
15SOL02	NW corner, unit 15	1-6 inches	Complete analysis ¹
17SUB01	W third, unit 17	6-18 inches	Complete analysis ¹
17SUB02	Center, unit 17	6-18 inches	Complete analysis ¹
17SUB03	E third, unit 17	6-18 inches	Complete analysis ¹
17SOL01	E third, unit 17	1-6 inches	Complete analysis ¹
17SOL02	Middle third, unit 17	1-6 inches	Complete analysis ¹
01SOL01	W side of Bldg. 243	1-6 inches	Complete analysis ¹
duplicate			
06SUB01	S of Bldg. 100	6-18 inches	Complete analysis ¹
duplicate			

Table 5.1 (continued)

Sample No.	Sample Location	Sample Type	Analysis to be Performed
<i>Storm Sewer Samples</i>			
01SED01	Storms sewer, NW corner unit 1	Sediment	Complete analysis ¹
09SLG01	Storm sewer, corner of Wooley and Talcott	Sediment	Complete analysis ¹
12SLG01	Storm drain, unit 12	Sediment	Complete analysis ¹
<i>Tank and Sump Samples</i>			
01AQU01	Sump, E side of Bldg. 243	Liquid	Complete analysis ¹
030IL01	W tank, Bldg. 226	Oil	Complete analysis ¹
030IL02	E tank, Bldg. 226	Oil	Complete analysis ¹
03SLG01	Floor, Bldg. 226	Sludge	Complete analysis ¹
05SLG02	Sewer cleanout W side Bldg. 39	Sludge	Complete analysis ¹
050IL01	Tank, E side of Bldg. 39	Oil	Complete analysis ¹
06AQU01	Underground tank, SE of Reactor	Liquid	Complete analysis ¹
07AQU01	Sump, Bldg. 36	Sludge	Complete analysis ¹
09AQU01	Cistern under Bldg. 313C	Liquid	Complete analysis ¹

Table 5.1 (continued)

Sample No.	Sample Location	Depth	Analysis to be Performed
<i>Sewer Outfall Samples (24 Hour Composite)</i>			
16AQU01	SE Guard Gate, Bldg. 42		Complete analysis ¹
17AQU01	SE of Bldg. 6252		Complete analysis ¹
17AQU02	E of Tank Farm		Complete analysis ¹
18AQU01	E of MW-01, Parking Lot S of Bldg. 39		Complete analysis ¹
18AQU02	Wooley Ave, NE Corner Bldg. 292		Complete analysis ¹
18AQU03	Lawn S of Reactor		Complete analysis ¹
18AQU04	E of MW-02, SE Corner Bldg. 292		Complete analysis ¹
<i>Blank Samples</i>			
TB	Trip blanks with volatile organic samples	As required	Volatile organics
FB	Field blanks - 2 for soil and 2 for ground water		Complete analysis ¹

¹Complete analysis includes volatile organics, semivolatile organics, (base/neutral/acid extractables), pesticides, PCBs, metal (Al, Sb, As, Ba, Be, Cd, Cu, Cr, Co, Ca, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Tl, U, Sm, V, Zn), cyanide, and sulfide.

Metals analysis of groundwater samples refers to dissolved metals.

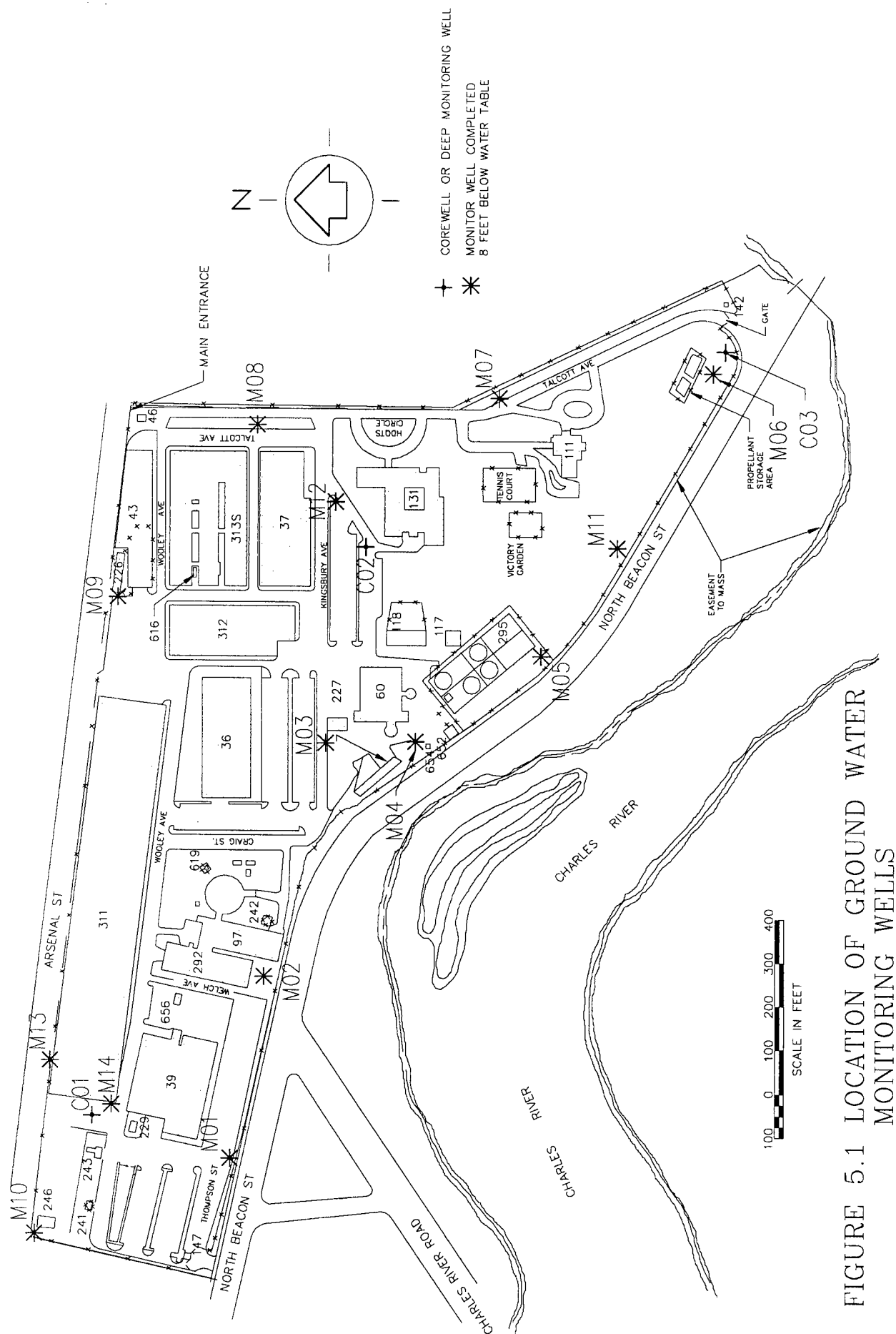


FIGURE 5.1 LOCATION OF GROUND WATER MONITORING WELLS

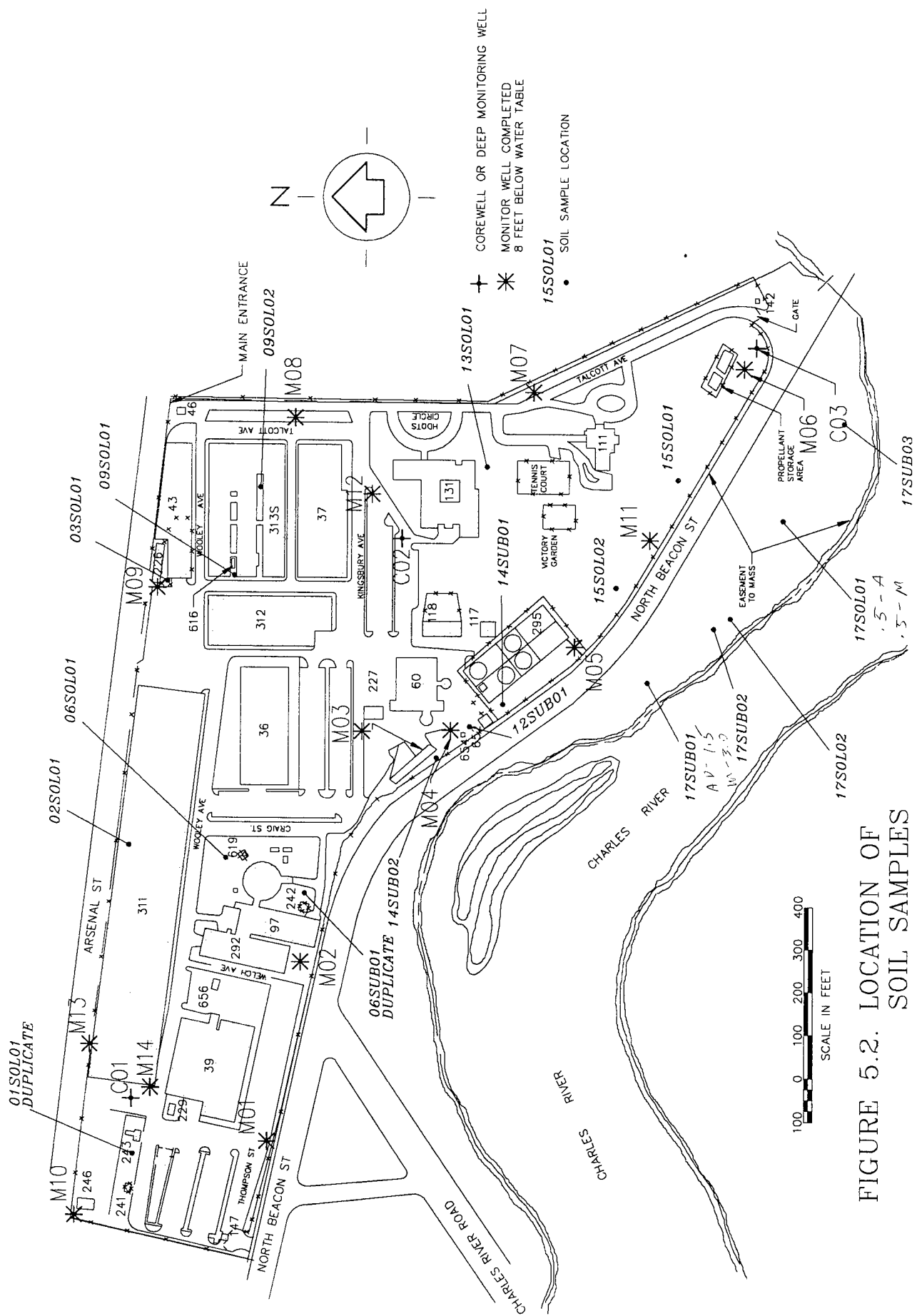


FIGURE 5.2. LOCATION OF SOIL SAMPLES

Source: Arthur D. Little, 1988

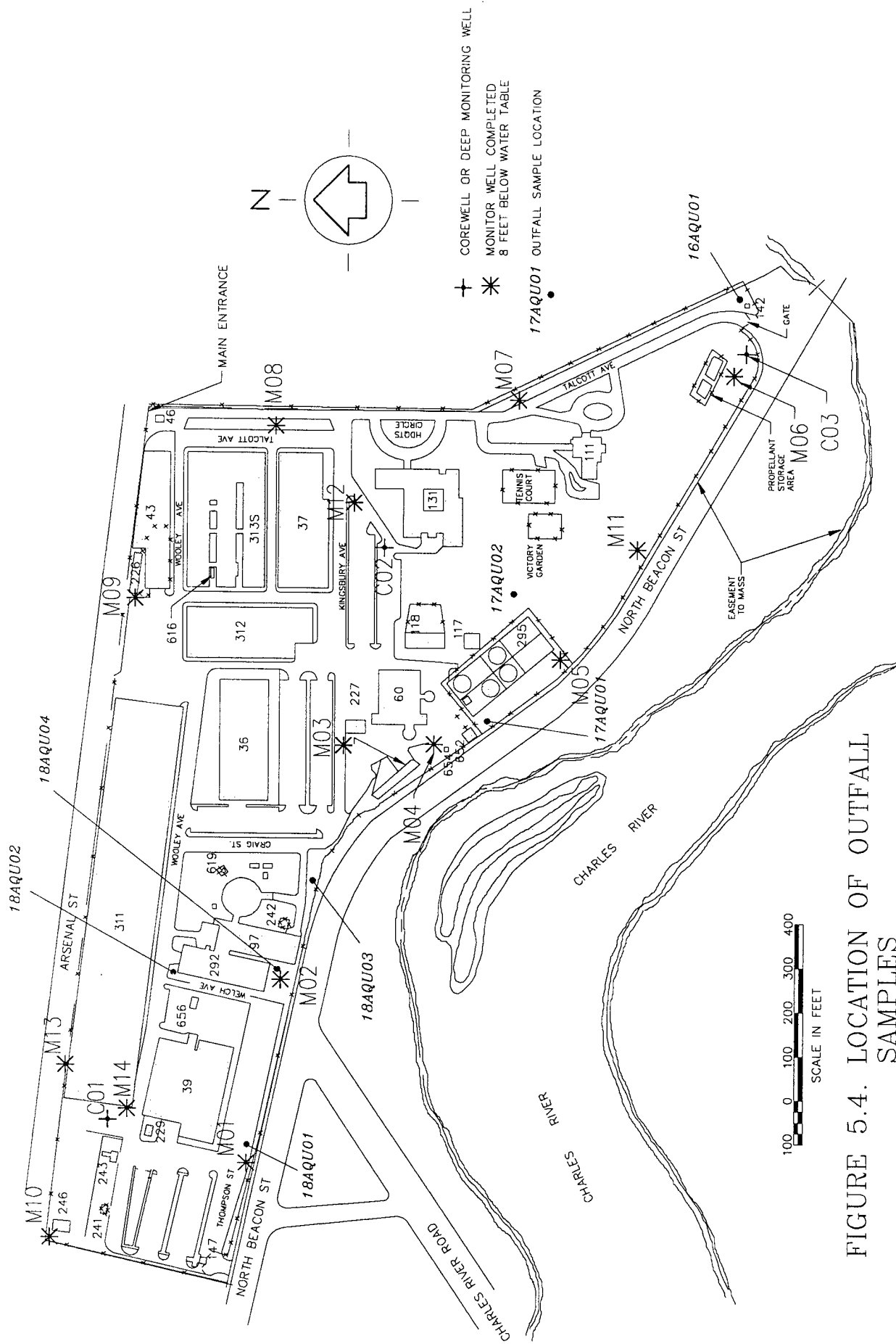


FIGURE 5.4. LOCATION OF OUTFALL SAMPLES

Source: Arthur D. Little, 1988

5.1.1 Methods

All wells were opened in the presence of the site health and safety officer, and the head space monitored with an HNu P-101 photoionization detector for the presence of volatile organic compounds. Readings are recorded on the water level sheets. Only well CO-2 registered above background, at approximately 200 ppm. The site health and safety officer declared that well CO-2 would be sampled with level C protection. Water levels were then measured using a Solinst electric water level probe. All wells were opened, monitored and measured (water levels) on March 8.

Wells were purged by removing 5 well and annular space (assuming 30% porosity) volumes, using a decontaminated submersible pump. Water was observed for suspended solids, temperature, pH and conductivity stabilization. Meters were calibrated according to the frequencies specified in Table 5.2. Purging was completed when the desired volume of water was removed or the well pumped dry. Well MW-03 was purged with a stainless steel bailer until it went dry. Purge water was containerized in DOT-approved 55 gallon drums and labeled with date, well number, and number of drum on both the drum and the lid.

All wells were sampled using a Teflon or stainless steel bailer which was decontaminated between wells. Samples were immediately collected for volatile organic compounds by gently pouring well water into two 40 ml, amber glass bottles with Teflon septa caps. The bottle was sealed and checked to insure that no air bubbles were trapped in the bottle. Subsequent samples were collected for semivolatile organic compounds, cyanide, pesticides/PCBs, sulfide, and metals. Sample containers used for each sample are listed in Table 5.3. Water samples taken for metals were poured into a dedicated, clean glass bottle (previously rinsed with water from the well), and filtered utilizing clean Teflon tubing, a peristaltic pump and a 45 micron SamplePro filter. Samples were preserved according to the procedures listed in Table 5.4, labeled and placed in coolers with ice. A chain-of-custody was filled out, the cooler was monitored for radioactivity using a Geiger Muller meter (all samples passed the screening), and then the cooler was sealed. At the end of each day the coolers were transported by the field crew to the Arthur D. Little analytical laboratory in Cambridge.

Sample labels were filled out and preservatives added to the sample containers in a field office set up by Arthur D. Little at the MTL. During purging, the well waters were tested for free chlorine, using potassium iodide test paper, for sulfide using lead acetate paper, pH, conductivity, and temperature. The presence of either chloride or sulfide require a different procedure for sample perservation. No chloride or sulfide were detected in any of the ground water samples collected. so routine preservation procedures were used.

Duplicate samples were collected for wells CO-2 and MW-04 on the day following the first sample. After the collection of the duplicate samples, equipment blanks

Table 5.3: Sample Container, Preservation and Holding Time

Analytes	Matrix	Bottle Size	Preservation	Holding Time
TCL+30 Volatile Organics	Soil	40mL VOA (3)	Cool <4°C	14 days
TCL+30 Semi Volatile Organics	Soil	1 x 1L Amber	Cool <4°C	7 Days (extraction) 40 Days (to analysis)
PCBs	Soil	1 x 1L Amber	Cool <4°C	7 Days
Cyanide	Soil	1 x 250 mL Amber	Cool <4°C	14 Days
Metals/TCL Metals	Soil	1 x 500 mL Amber	Cool <4°C	28 Days
TCL+30 Volatile Organics	Water	40 mL VOA (3)	HCL pH <2 Na ₂ S ₂ O ₃ if free Cl Cool <4°C	14 Days
TCL+30 Semi Volatile Organics	Water	1 x 1 gal Amber	Na ₂ S ₂ O ₃ if free Cl Cool <4°C	7 Days
Cyanide	Water	1 x 1 L Polyeth	Cool <4°C Test for sulfide with lead acetate paper, Cadmium Nitrate if present NaOH pH<12 0.6 gm Ascorbid Acid if free Cl	14 Days
Sulfide	Water	1 x 1 L Polyeth	2mL/L 2N ZnAcetate NaOH pH >9 Cool <4°C	7 Days
Metals/TCL Metals	Water	1 x 1 Polyeth	HNO ₃ pH<2	28 Days

Table 5.4: Water Sample Preservation

Volatiles -	Test for presence of free chlorine using potassium iodide test paper. If present add sodium thiosulfate at level of 0.008% per Liter (1 drop 1N/40mL). Adjust pH of solution to pH <2 with HCL (4 - 6 drops conc HCL/40mL).
Semi-volatile -	Test for presence of free chlorine using potassium iodide test paper. If present, add sodium thiosulfate at level of 0.008% per Liter (2mL/Gal).
Cyanide -	Test for presence of sulfide with lead acetate paper. If present, add cadmium nitrate until sulfide no longer detected. Test for presence of free chlorine with potassium iodide paper. If present, add ascorbic acid at rate of 0.6 gm per Liter. Add Sodium Hydroxide to pH > 12 (2-5 mL/Liter).
Sulfide -	Add 2 mL/Liter of 2N Zinc Acetate solution. Add NaOH to pH>9 (2-4 mL/Liter)
Metals -	Add HNO ₃ to pH<2 (2-5 mL/Liter)

(2) were taken by decontaminating the bailer and then capturing distilled, deionized water passed through the bailer.

The bailers were decontaminated between each well by triple rinsing in distilled, deionized water. The clean bailers were wrapped in aluminum foil to prevent contamination during transport and handling between wells. PVC gloves were used to handle all clean equipment. Dedicated bailer twine was used for each well. Rinse water was collected and drummed in the same manner as the purge water.

5.1.2 Modifications

The only modifications to the original work plan were the use of a stainless steel bailer in addition to the Teflon bailer and the need for level C protection in the collection of the sample and duplicate for well CO-2.

5.2 Soil Samples

Twenty-two shallow soil samples were taken from locations specified by EG&G, approved by USATHAMA and staked by the Arthur D. Little Project Manager. Two of the 22 samples were duplicates. These sample locations correspond to original soil sampling locations.

5.2.1 Methods

All soil samples were collected using a decontaminated 3-inch stainless steel bucket-type hand auger. An area approximately 6 inches in diameter was cut in the sod using a decontaminated stainless steel trowel to remove the sod and root zone from the sample area. Surface soil samples were taken at a depth from approximately 1 to 6 inches depth; subsurface samples were taken at approximately 6 to 18 inches depth. To obtain the desired volume, several holes were made adjacent to one another. The sample for volatile organic compounds was taken immediately by rapidly filling 2 40ml amber, glass bottles as full as possible to eliminate head space, and capped with a Teflon septa seal. Subsequent samples were taken for semivolatile organic compounds, pesticides/PCBs, metals, cyanide, and sulfide. Five samples, taken adjacent to transformers, were taken only for PCBs (03SOL01, 06SOL01, 09SOL01, 09SOL02, and 13SOL01). Sample containers used are listed in Table 5.3. Sample containers were labeled, placed in a cooler with ice, a chain-of-custody was filled out, the cooler was monitored for radioactivity with a Geiger Muller meter (all samples passed the screening), and then sealed. At the end of each day, the field crew transported the cooler to the Arthur D. Little analytical laboratory in Cambridge.

Duplicate samples were collected at 01SOL01 and 06SUB01.

The soil auger and trowel were decontaminated by first scrubbing the equipment with a nylon-bristle brush to remove soil and debris adhering to the equipment.

They were next scrubbed with MTL tap water and a nylon-bristle brush, and finally triple rinsed in distilled, deionized water. Decontaminated equipment was wrapped in aluminum foil to prevent contamination during transport and handling between sites. All clean equipment was handled with latex rubber or PVC gloves.

5.2.2 Modifications

The only modification to the original work plan involved the taking of the equipment blanks. Normally these are taken after a piece of sampling equipment is decontaminated after the last event of the day or after a site suspected to be contaminated is sampled. We specified taking the equipment blank after the duplicate samples. This was inadvertently omitted by the field crew. To correct this omission, each duplicate sample site (01SOL01 and 06SUB01) was resampled, the sample discarded, the hand auger decontaminated according the specified procedure, and an equipment blank taken by passing distilled, deionized water through the auger bucket, and collecting it in the proper sample containers. A memorandum documenting this event is included with the chain-of-custody record.

5.3 Storm Sewer Sediment Samples

Three storm sewer sediment samples were collected from storm sewer catch basins at locations specified by EG&G and approved by USATHAMA. These sample locations correspond to original sampling locations.

5.3.1 Methods

Prior to removing the storm sewer grate, the catch basin was monitored for radioactivity with a Geiger Muller meter and for volatile organic compounds with an HNu P-101 photoionization detector. All catch basins were approved for sampling. The grate was then removed and a sediment sample taken. Samples were taken using a decontaminated Pyrex glass beaker attached with a stainless steel clamp to a wood extension pole. Sample containers used were the same as that specified for soil samples in Table 5.3.

The first sample taken was for volatile organic compounds; subsequent samples were taken for semivolatile organic compounds, pesticides/PCBs, cyanide, and sulfide. Samples were labeled, placed in a cooler with ice, a chain-of-custody completed, monitored for radioactivity with a Geiger Muller meter (all samples passed the screening), and then sealed. At the end of the day the sample cooler was transported to the Arthur D. Little analytical laboratory by the field crew.

No duplicate samples were taken as none were required in the scope of work.

Decontamination of the Pyrex beaker used for sampling was performed using the procedure described previously for the soil sampling equipment.

5.4 Outfall 24-Hour Composite Samples

Seven outfalls were sampled by collecting a 24-hour composite sample at each outfall location. The outfalls were all on the MTL property at locations designated by EG&G, and approved by USATHAMA. These samples correspond to original sample locations.

5.4.1 Methods

To guarantee the security of the samples, they were taken manually rather than with an automatic sampler. The 24-hour composite was developed by taking a subsample at 4 hour intervals on February 22 and 23, at 2130 hr., 0130 hr., 0530 hr., 0930 hr., 1330 hr., and 1730 hr. Using a decontaminated stainless steel dipper, 1.5 liters was obtained of the discharge flowing from the pipe and placed into a clean 10 liter glass compositing jar, one for each outfall. As there was no flow in the outfall for sample 17AQU01, standing fluid was sampled from the sump. Samples for volatile organic compounds were taken as a single sample during the initial February 22 2130 hour event. Samples for semivolatile organic compounds, pesticides/PCBs, metals, cyanide and sulfide were taken as aliquots from the 10 liter compositing jar at the end of the 24-hour event. Samples were placed in containers and preserved according to the specifications in Tables 5.3 and 5.4 for water samples. Metals were not filtered, however, since it was felt that particulate transport of adsorbed metals was a significant transport mechanism for the discharge. Samples were labeled, placed into a cooler with ice, a chain-of-custody completed, the cooler was monitored for radioactivity using a Geiger Muller meter (all samples passed the screening) and the cooler then sealed. At the end of the 24-hour sampling event, the coolers were transported to the Arthur D. Little laboratory in Cambridge.

No duplicate samples were taken, as none were required in the scope of work.

The stainless steel dipper was decontaminated between outfalls by triple rinsing in distilled deionized water.

5.4.2 Modifications

In the work plan we had specified taking the subsamples from the outfall with a Pyrex glass beaker, but due to equipment availability were able to use a stainless steel dipper designed for such sampling. We had also suggested in the original sampling plan that 2 samples be taken for volatile organic compounds, one during the night and one during the day to capture diurnal variations in the discharge that might be due to variation in the operations at MTL over the 24 day. At the direction of EG&G, only one sample for volatile organic compounds was taken from each outfall.

5.5 Tank and Sump Samples

Eight samples were taken from tanks and sumps; 3 sludge samples, 2 aqueous samples and 3 oil samples.

5.5.1 Methods

Prior to sampling, all tanks or sumps were monitored with an HNu P-101 photoionization detector. The three sludge samples (05SLG02, 03SLG01, and 07AQU01 - no fluid in sump so a sludge sample was taken) were collected using a decontaminated Pyrex glass beaker and filling the appropriate sample container listed in Table 5.3 for soils. Samples for volatile organic compounds were taken first.

The two aqueous samples (01AQU01 and 09AQU01) were taken with a decontaminated bailer. Aqueous samples were placed in the appropriate sample containers as listed for water in Table 5.3, and preserved according to the specifications of Table 5.4.

The 3 samples of oil were obtained with a dedicated, decontaminated Teflon bailer, accessing the tanks through the vent stacks. Portions of the piping were removed by MTL staff to facilitate the sampling. Samples for volatile organic compounds were taken first using 2 40 ml amber, glass bottles with Teflon septa screw caps. Care was taken to make sure that no air remained in the sample bottle. An additional 500ml amber, glass bottle was filled for the remaining analytical requirements: semivolatile organic compounds, pesticides/PCBs, metals, cyanide, and sulfide.

5.5.2 Modifications

A sample originally designated for a storm sewer clean-out under Building 39 (05SLG01) was not taken at the direction of EG&G, since there was no flow or sludge. A sample from a sump in the basement of Building 36 (07AQU01) which was originally designated as an aqueous sample was taken as a sludge sample, at the direction of EG&G, since there was no liquid in the sump. While our work plan assumed all sampling would be at level D, and excluded confined space entry work, a sludge sample taken from the tank vault (03SLG01) was taken under the supervision of the site health and safety officer, with the sampler wearing an SCBA. Entry was made after the tank vault had been suitably ventilated, using Arthur D. Little's procedures for confined space entry.

5.6 Water Sample from the Reactor Emergency Coolant Tank

Two water samples were taken from the reactor emergency coolant tank.

5.6.1 Methods

Two water samples were taken from the emergency reactor coolant tank by the site health and safety officer, who is also Arthur D. Little's Radiation Safety Officer. Before the sample was taken, the tank was monitored with a Geiger Muller detector for radioactivity; no abnormal readings were detected. The samples were taken by immersing a 1 gallon, amber glass sample bottle in the tank. Access to the tank was gained through a trap door. The samples were preserved by adjusting the pH to less than 2.0 with nitric acid. The samples were labeled, screened for radioactivity with a Geiger Muller meter, placed in a cooler with ice, a chain-of-custody completed and the cooler sealed. The cooler was transported to the Arthur D. Little analytical laboratory in Cambridge by the field crew.

5.6.2 Modifications

Two samples were taken from the cistern. One was included in the original scope of work and one sample was not included. The sample called for in the sampling plan was taken and analyzed for non-radiological contamination. The additional sample was taken by Arthur D. Little personnel, then shipped to EG&G Idaho for radiological analysis.

References

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- Arthur D. Little, Inc., April 1988. Performance of Geotechnical Services at AMTL Watertown, Massachusetts: I. Health and Safety Plan; II. Quality Control Plan; III. Sampling Plan.
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- LaForge, L., 1932. Geology of the Boston Area, Massachusetts: U.S. Geol. Surv. Bull 839, 105 pp.
- U.S. Army Toxic and Hazardous Materials Agency, Aberdeen Proving Ground, MD, March 1987. Geotechnical Requirements for Drilling, Monitor Wells, Data Acquisition, and Reports.

Arthur D Little

Well No.	W-11
Client	E & G
Project	
Case No.	

LOCATION

Description	Flush w/ wall mount
Elevation	

High P.D. Electrostatic
Background Absorption
Electrostatic Field Meter

Arthur D Little

[illegible]

Arthur D Little	Monitoring Well Sampling Data Sheet	Well No. <u>CO-2</u>
		Client <u>EG&G/USATHAMA</u>
		Project <u>AMTL-WATERTOWN</u>
		Case No. <u>61453-50</u>

Evacuation Method <u>PUMP (SUBMERSEBLE)</u>	Date <u>2-12-90</u>	LOCATION
Sampling Method <u>BASLER (LEVEL C)</u>	Equipment Used (Calibrated <u>Y/N</u>) <u>HNU-PID, TEMP/COND. METER</u>	
Sampling Personnel <u>J. FORTNER,</u> <u>C. MARTEL, S. FOSTER</u>	Initial Well PID (ppm) <u>188 ppm</u>	

WELL VOLUME (* use appropriate values in table for each code letter)

V well	Depth Screen Bottom	Depth Water	Gallons of Water (well)
<u>.66</u>	<u>38.48</u>	<u>34.34</u>	<u>2.73</u>

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus	Depth Screen Bottom	Depth Bottom of Seal	Gallons of Water (annulus)
<u>1.06</u>	<u>38.48</u>	<u>34.34</u>	<u>4.38</u>

WATER TO BE REMOVED

Gallons of Water (well)	Gallons of Water (annulus)	Removal Multiplier	Total Gallons to be Removed	Actual Gallons Removed
<u>2.73</u>	<u>4.39</u>	<u>5</u>	<u>35.6</u>	<u>35</u>

MEASUREMENTS						Well		Annulus *	
						V well	dia	V annulus	
Well Purging	Time	pH	Conduct.	Temp.	Free CL ⁻ <u>Y/N</u>	Dissolved Oxygen	2"	6.5	0.46gal/ft
	<u>1608</u>	<u>6.49</u>	<u>0.42</u>	<u>15°C</u>	<u>NO</u>	<u>-</u>		7.25	0.59gal/ft
	<u>1616</u>	<u>6.5</u>	<u>0.33</u>	<u>15.6°C</u>	<u>NO</u>	<u>-</u>		7.75	0.69gal/ft
	<u>1625</u>	<u>6.4</u>	<u>0.34</u>	<u>14.4°C</u>	<u>NO</u>	<u>-</u>		8.25	0.79gal/ft
	<u>1632</u>	<u>5.5</u>	<u>0.32</u>	<u>15.0°C</u>	<u>NO</u>	<u>-</u>		4"	8.25
						10.25	1.06gal/ft		
						12.25	1.63gal/ft		
Post Sampling							6"	12.25	1.41gal/ft
								1.5gal/ft	

SAMPLING

Decontamination Procedures Used ☐ Detergent Wash, Water Rinse, Solvent Used _____ ☐ Detergent Wash, Water Rinse, Solvent Rinse, Water Rinse ☐ Detergent Wash, Water Rinse ☒ Other 3x D.I. H₂O RINSE

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
<u>CO-2</u>	<u>TCC+30 VOL.</u>	<u>40</u>	<u>NO</u>	<u>HCL pH<2, ICE</u>	<u>AMBER GLASS (3)</u>	<u>1705</u>
<u>CO-2</u>	<u>TCC+30 SEME</u>	<u>1 GALLON</u>	<u>NO</u>	<u>ICE</u>	<u>" (1)</u>	<u>1705</u>
<u>CO-2</u>	<u>CYANIDE</u>	<u>1L</u>	<u>NO</u>	<u>ICE, NaOH pH>12</u>	<u>POLYETHYLENE</u>	<u>1705</u>
<u>CO-2</u>	<u>SULFIDE</u>	<u>1L</u>	<u>NO</u>	<u>ICE, NaOH pH>9</u>	<u>"</u>	<u>1705</u>
<u>CO-2</u>	<u>METALS</u>	<u>1L</u>	<u>YES</u>	<u>ICE, HNO₃ pH<2</u>	<u>"</u>	<u>1705</u>
				<u>+ 2N ALKALINE</u>		

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)

SAMPLED WELL IN LEVEL C DUE TO 5-20PPM READING IN BREATHING ZONE. EXCLUSION ZONE WAS DEFINED. THIS WELL WILL BE DUPLICATE SAMPLED TOMORROW AFTER SITTING FOR 24 HOURS.

Signature Arthur D Little Date 2-12-90 No. of Bottles 7

Arthur D Little

Arthur D Little	Monitoring Well Sampling Data Sheet		Well No. <u>CO-3</u>
			Client <u>EG+G/USATHAMA</u>
			Project <u>AMTL-WATERIDAW</u>
			Case No. <u>61453-50</u>
Evacuation Method <u>PUMP (SUBMERSIBLE)</u>		Date <u>2-14-90</u>	LOCATION
Sampling Method <u>BATLER</u>		Equipment Used (Calibrated ☒ N) <u>HND-PID, TEMP/COND. METER</u>	
Sampling Personnel <u>N. FORTNER</u> <u>C. MARTEL</u>		Initial Well PID (ppm) <u>0.6 ppm</u>	

WELL VOLUME (* use appropriate values in table for each code letter)

V well	Depth Screen Bottom	Depth Water	Gallons of Water (well)
<u>.66</u>	<u>33.07</u>	<u>7.73</u>	<u>16.7</u>

$$\text{V well} \times [(\text{Depth Screen Bottom} - \text{Depth Water})] = \text{Gallons of Water (well)}$$

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus	Depth Screen Bottom	Depth Bottom of Seal	Gallons of Water (annulus)
<u>1.06</u>	<u>33.07</u>	<u>7.73</u>	<u>26.9</u>

$$\text{V annulus} \times [(\text{Depth Screen Bottom} - \text{Depth Bottom of Seal})] = \text{Gallons of Water (annulus)}$$

WATER TO BE REMOVED

Gallons of Water (well)	Gallons of Water (annulus)	Removal Multiplier	Total Gallons to be Removed	Actual Gallons Removed
<u>16.7</u>	<u>26.9</u>	<u>5</u>	<u>218</u>	<u>220</u>

$$[(\text{Gallons of Water (well)} + \text{Gallons of Water (annulus)})] \times \text{Removal Multiplier} = \text{Total Gallons to be Removed}$$

MEASUREMENTS
Well Purging

Time	pH	Conduct.	Temp.	Free CL ⁻ ☒ N	Dissolved Oxygen	Well V well	Annulus * dia V annulus
<u>1007</u>	<u>6.69</u>	<u>0.65</u>	<u>12.5°C</u>	<u>No</u>	-	2" 0.17gal/ft	6.5 0.46gal/ft
<u>1030</u>	<u>6.59</u>	<u>0.85</u>	<u>13.0°C</u>	<u>No</u>	-		7.25 0.59gal/ft
<u>1058</u>	<u>6.56</u>	<u>0.87</u>	<u>13.0°C</u>	<u>No</u>	-		7.75 0.69gal/ft
<u>1127</u>	<u>6.53</u>	<u>0.88</u>	<u>12.9°C</u>	<u>No</u>	-		8.25 0.79gal/ft
<u>1255</u>	<u>6.60</u>	<u>0.86</u>	<u>12.9°C</u>	<u>No</u>	-	4" 0.66gal/ft	8.25 0.64gal/ft
<u>1322</u>	<u>6.70</u>	<u>0.70</u>	<u>13.1°C</u>	<u>No</u>	-		10.25 1.06gal/ft
Post Sampling						6" 1.5gal/ft	12.25 1.63gal/ft
							12.25 1.41gal/ft

SAMPLING

Decontamination Procedures Used ☐ Detergent Wash, Water Rinse, Solvent Used _____ ☐ Detergent Wash, Water Rinse, Solvent Rinse, Water Rinse ☒ Other 3x D.I. H₂O RINSE

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
<u>CO-3</u>	<u>TCL+30 VOLA.</u>	<u>40 ml</u>	<u>No</u>	<u>ICE, HCl pH 4.2</u>	<u>AMBER GLASS (3)</u>	<u>1444</u>
<u>CO-3</u>	<u>TCL+30 SEMI.</u>	<u>1 GALLON</u>	<u>No</u>	<u>ICE, HCl</u>	<u>" (1)</u>	<u>1444</u>
<u>CO-3</u>	<u>LYANEDS</u>	<u>1 L</u>	<u>No</u>	<u>ICE, NaOH pH 12</u>	<u>POLYETHYLENE</u>	<u>1444</u>
<u>CO-3</u>	<u>SULFIDE</u>	<u>1 L</u>	<u>No</u>	<u>ICE, NaOH pH 12</u> <u>+ Zn ACETATE</u>	<u>" "</u>	<u>1444</u>
<u>CO-3</u>	<u>METALS</u>	<u>1 L</u>	<u>Yes</u>	<u>ICE, HNO₃ pH 4.2</u>	<u>" "</u>	<u>1444</u>

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)

FILLED 3 DRUMS, HAD TO STOP PUMPING 'TIL ADDITIONAL DRUMS ARRIVED. STOPPED PUMPING 1127, RESUMED PUMPING 1255, COMPLETED PUMPING 1322.

Signature John J. Fortner Date 2-14-90 No. of Bottles 7

Arthur D Little

Arthur D Little	Monitoring Well Sampling Data Sheet		Well No. <u>MN-01</u>
			Client <u>EG&G/USATHAMA</u>
			Project <u>AMTL-WATERGATE</u>
			Case No. <u>61453-50</u>
Evacuation Method <u>PUMP (SUBMERSTIBLE)</u>		Date <u>2-8-90</u>	LOCATION <u>MN-01</u> <u>NORTH BEACH ST.</u>
Sampling Method <u>BAILER</u>		Equipment Used (Calibrated ☒ Y/N) <u>MM-PSD, COND. METER, PH PAP, THERM.</u>	
Sampling Personnel <u>J. FORNER</u> <u>P. CONN</u>		Initial Well PID (ppm) <u>0.5 ppm</u>	

WELL VOLUME (* use appropriate values in table for each code letter)

V well	Depth Screen Bottom	Depth Water	Gallons of Water (well)
<u>6.6</u>	<u>16.2</u>	<u>5.77</u>	<u>6.9</u>

$\times [(\text{Depth Screen Bottom} - \text{Depth Water})] =$

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus	Depth Screen Bottom	Depth Bottom of Seal	Gallons of Water (annulus)
<u>1.06</u>	<u>16.2</u>	<u>5.77</u>	<u>11.05</u>

$\times [(\text{Depth Screen Bottom} - \text{Depth Bottom of Seal})] =$

WATER TO BE REMOVED

Gallons of Water (well)	Gallons of Water (annulus)	Removal Multiplier	Total Gallons to be Removed	Actual Gallons Removed
<u>6.9</u>	<u>11.05</u>	<u>5</u>	<u>89.75</u>	<u>90-95</u>

$[(\text{Gallons of Water (well)} + \text{Gallons of Water (annulus)})] \times \text{Removal Multiplier} =$

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL ⁻ (Y/N)	Dissolved Oxygen	Well	Annulus *	
						V well	dia	V annulus
<u>1455</u>	<u>6.0</u>	<u>1.89</u>	<u>11.0°C</u>	<u>No</u>	<u>-</u>	2" 0.17gal/ft	6.5	0.46gal/ft
<u>1520</u>	<u>6.0</u>	<u>2.40</u>	<u>10.0°C</u>	<u>No</u>	<u>-</u>		7.25	0.59gal/ft
<u>1530</u>	<u>6.0</u>	<u>2.38</u>	<u>10.0°C</u>	<u>No</u>	<u>-</u>		7.75	0.69gal/ft
<u>1546</u>	<u>6.0</u>	<u>2.31</u>	<u>10.0°C</u>	<u>No</u>	<u>-</u>		8.25	0.79gal/ft
<u>1603</u>	<u>6.0</u>	<u>2.28</u>	<u>10.0°C</u>	<u>No</u>	<u>-</u>	4" 0.66gal/ft	8.25	0.64gal/ft
							10.25	1.06gal/ft
							12.25	1.63gal/ft
						6" 1.5gal/ft	12.25	1.41gal/ft

Post Sampling

SAMPLING

Decontamination Procedures Used ☐ Detergent Wash, Water Rinse, Solvent Rinse, Water Rinse ☐ Detergent Wash, Water Rinse ☒ Other 3x D.I. H₂O RINSE

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
<u>MN-01</u>	<u>TEL+30 Vol.</u>	<u>40ml</u>	<u>No</u>	<u>ICE, HCL pH 2</u>	<u>AMBERGLASS (3)</u>	<u>1135</u>
<u>MN-01</u>	<u>TEL+30 SEME</u>	<u>1 GALLON</u>	<u>No</u>	<u>Ice</u>	<u>" (1)</u>	<u>1135</u>
<u>MN-01</u>	<u>CYNSEOE</u>	<u>1L</u>	<u>No</u>	<u>ICE, NaOH pH 7.2</u>	<u>POLYETHYLENE</u>	<u>1135</u>
<u>MN-01</u>	<u>SULFIDE</u>	<u>1L</u>	<u>No</u>	<u>ICE, NaOH pH 7.2</u>	<u>" "</u>	<u>1135</u>
				<u>+ 2N ACETATE</u>		
<u>MN-01</u>	<u>METALS</u>	<u>1L</u>	<u>YES</u>	<u>ICE, HNO₃ pH 2</u>	<u>" "</u>	<u>1135</u>

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)

WATER IS CLEAR

Signature [Signature] Date 2/8/90 No. of Bottles 7

Arthur D Little

Arthur D Little	Monitoring Well Sampling Data Sheet		Well No. <u>MW-02</u>
			Client <u>EG&G/USATHAMA</u>
			Project <u>AMTL-WATERLOO</u>
			Case No. <u>61453-50</u>
Evacuation Method <u>PUMP (SUBMERSIBLE)</u>		Date <u>2-8-90</u>	LOCATION
Sampling Method <u>BAZIER</u>		Equipment Used (Calibrated ☒ N) <u>RNU-PED, PH PAPER, THERMOMETER</u>	
Sampling Personnel <u>J. FORTNER P. CONN</u>		Initial Well PID (ppm) <u>0.6 ppm</u>	

WELL VOLUME (* use appropriate values in table for each code letter)

V well	Depth Screen Bottom	Depth Water	Gallons of Water (well)
<u>.66</u>	<u>16.42</u>	<u>8.84</u>	<u>5</u>

$$\text{V well} \times [(\text{Depth Screen Bottom} - \text{Depth Water})] = \text{Gallons of Water (well)}$$

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus	Depth Screen Bottom	Depth Bottom of Seal	Gallons of Water (annulus)
<u>1.06</u>	<u>16.42</u>	<u>8.84</u>	<u>8.02</u>

$$\text{V annulus} \times [(\text{Depth Screen Bottom} - \text{Depth Bottom of Seal})] = \text{Gallons of Water (annulus)}$$

WATER TO BE REMOVED

Gallons of Water (well)	Gallons of Water (annulus)	Removal Multiplier	Total Gallons to be Removed	Actual Gallons Removed
<u>5</u>	<u>8</u>	<u>5</u>	<u>65</u>	<u>265</u>

$$[(\text{Gallons of Water (well)} + \text{Gallons of Water (annulus)})] \times \text{Removal Multiplier} = \text{Total Gallons to be Removed}$$

MEASUREMENTS
Well Purging

Time	pH	Conduct.	Temp.	Free CL ⁻ ☒ N	Dissolved Oxygen	Well V well	Annulus * dia	Annulus * V annulus
<u>1200</u>	<u>6.5</u>	<u>1.32</u>	<u>12.0°C</u>	<u>No</u>	<u>-</u>	2" 0.17gal/ft	6.5	0.46gal/ft
<u>1220</u>	<u>6.0</u>	<u>1.54</u>	<u>12.0°C</u>	<u>No</u>	<u>-</u>		7.25	0.59gal/ft
<u>1240</u>	<u>6.0</u>	<u>1.6</u>	<u>13.0°C</u>	<u>No</u>	<u>-</u>		7.75	0.69gal/ft
<u>1325</u>	<u>6.0</u>	<u>1.5</u>	<u>13.0°C</u>	<u>No</u>	<u>-</u>		8.25	0.79gal/ft
						4" 0.66gal/ft	8.25	0.64gal/ft
							10.25	1.06gal/ft
							12.25	1.63gal/ft
						6" 1.5gal/ft	12.25	1.41gal/ft

Post Sampling
SAMPLING

 Decontamination Procedures Used
 Solvent Used _____

☐ Detergent Wash, Water Rinse,
 Solvent Rinse, Water Rinse

☐ Detergent Wash
 Water Rinse

☒ Other
3x D.I. H₂O
RINSE

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
<u>MW-02</u>	<u>TCL-30 Vol.</u>	<u>40 ml</u>	<u>No</u>	<u>ICE, HCl pH < 2</u>	<u>AMBER GLASS (3)</u>	<u>1233</u>
<u>MW-02</u>	<u>TCL-30 SEM</u>	<u>1 GALLON</u>	<u>No</u>	<u>ICE</u>	<u>" (1)</u>	<u>1233</u>
<u>MW-02</u>	<u>CYANIDE</u>	<u>1 L</u>	<u>No</u>	<u>ICE, NaOH pH > 12</u>	<u>POLYETHYLENE</u>	<u>1233</u>
<u>MW-02</u>	<u>SULFIDE</u>	<u>1 L</u>	<u>No</u>	<u>ICE, NaOH pH > 9</u>	<u>" "</u>	<u>1233</u>
				<u>* ZNACETATE</u>		
<u>MW-02</u>	<u>METALS</u>	<u>1 L</u>	<u>YES</u>	<u>ICE, HNO₃ pH < 2</u>	<u>" "</u>	<u>1233</u>

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)

THE WATER IS CLEAR

Signature

Date

2/8/90

No. of Bottles

7

Arthur D Little

Arthur D Little	Monitoring Well Sampling Data Sheet		Well No. <u>MW-03</u>
			Client <u>EG&G/USATHAMA</u>
			Project <u>AMTL-WATERWAY</u>
			Case No. <u>61453-50</u>
Evacuation Method <u>BAILER</u>		Date <u>2-12-90</u>	LOCATION
Sampling Method <u>BAILER</u>		Equipment Used (Calibrated ☒ N) <u>HNU-PID, pH/COND. METER</u>	
Sampling Personnel <u>J. FORNER</u> <u>C. MARTEL</u>		Initial Well PID (ppm) <u>0.5 ppm</u>	

WELL VOLUME (* use appropriate values in table for each code letter)

V well	Depth Screen Bottom	Depth Water	Gallons of Water (well)
<u>.66</u>	<u>25.05</u>	<u>21.08</u>	<u>2</u>

x [(25.05 - 21.08)] =

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus	Depth Screen Bottom	Depth Bottom of Seal	Gallons of Water (annulus)
<u>1.06</u>	<u>25.05</u>	<u>21.08</u>	<u>3.3</u>

x [(25.05 - 21.08)] =

WATER TO BE REMOVED

Gallons of Water (well)	Gallons of Water (annulus)	Removal Multiplier	Total Gallons to be Removed	Actual Gallons Removed
<u>2</u>	<u>3.3</u>	<u>5</u>	<u>26.5</u>	<u>18</u>

[(2 + 3.3)] x 5 =

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL ⁻ ☒ N	Dissolved Oxygen	Well V well	Annulus * dia	V annulus
<u>1053</u>	<u>6.99</u>	<u>2.18</u>	<u>17.8°C</u>	<u>No</u>	<u>-</u>	2" 0.17gal/ft	6.5	0.46gal/ft
<u>1107</u>	<u>6.64</u>	<u>2.52</u>	<u>18.9°C</u>	<u>No</u>	<u>-</u>		7.25	0.59gal/ft
<u>1144</u>	<u>6.58</u>	<u>2.69</u>	<u>17.9°C</u>	<u>No</u>	<u>-</u>		7.75	0.69gal/ft
							8.25	0.79gal/ft
						4" 0.66gal/ft	8.25	0.64gal/ft
							10.25	1.06gal/ft
							12.25	1.63gal/ft
						6" 1.5gal/ft	12.25	1.41gal/ft

Post Sampling

SAMPLING

Decontamination Procedures Used ☐ Detergent Wash, Water Rinse, Solvent Rinse, Water Rinse ☐ Detergent Wash, Water Rinse ☒ Other 3.0% J. L. H₂O Rinse

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
<u>MW-03</u>	<u>TEL+30 VOL.</u>	<u>40 ml</u>	<u>No</u>	<u>ICE, HCL pH < 2</u>	<u>AMBER GLASS (3)</u>	<u>1823</u>
<u>MW-03</u>	<u>TEL+30 SEME.</u>	<u>1 GALLON</u>	<u>No</u>	<u>ICE</u>	<u>" (1)</u>	<u>1823</u>
<u>MW-03</u>	<u>CYANIDE</u>	<u>1L</u>	<u>No</u>	<u>ICE, NaOH pH > 12</u>	<u>POLYETHYLENE</u>	<u>1823</u>
<u>MW-03</u>	<u>SULFIDE</u>	<u>1L</u>	<u>No</u>	<u>ICE, NaOH pH > 9</u>	<u>" "</u>	<u>1823</u>
				<u>+ ZINCPHOSPHATE</u>		
<u>MW-03</u>	<u>METALS</u>	<u>1L</u>	<u>YES</u>	<u>ICE, HNO₃ pH < 2</u>	<u>" "</u>	<u>1823</u>

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)

DUE TO REQUIRED LOW VOLUME/ THE FACT THAT THIS WELL HAS A HISTORY OF GOING DRY/ AND TO SAVE TIME, THIS WELL WAS PURGED VIA A BAILER WHEEL PUMP WAS USED TO PURGE MW-04. WHILE BAILING, GLOVES BECAME STICKY, AND BAILER SMELLED OF CEDAR SAP. WELL WENT DRY AFTER PURGING ~ 18 GALLONS

Signature James J. Forner Date 2-12-90 No. of Bottles 7

Arthur D Little

Arthur D Little	Monitoring Well Sampling Data Sheet		Well No. <u>MW-04</u>
			Client <u>EG&G/USATAMA</u>
			Project <u>AMTL-WATERTOWN</u>
			Case No. <u>61453-50</u>
Evacuation Method <u>PUMP (SUBMERSTBLE)</u>	Date <u>2-12-90</u>		
Sampling Method <u>BAILER</u>	Equipment Used (Calibrated ☒ Y/N) <u>HNO₃-PED, pH/TEMP/COND. METERAS</u>		
Sampling Personnel <u>J. FORTNER</u> <u>C. MARTEL</u>	Initial Well PID (ppm) <u>0.6 ppm</u>		

WELL VOLUME (* use appropriate values in table for each code letter)

V well	Depth Screen Bottom	Depth Water	Gallons of Water (well)
<u>.66</u>	<u>34.02</u>	<u>28.05</u>	<u>4</u>

$\times [(\quad) - (\quad)] =$

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus	Depth Screen Bottom	Depth Bottom of Seal	Gallons of Water (annulus)
<u>1.06</u>	<u>34.02</u>	<u>28.05</u>	<u>6.3</u>

$\times [(\quad) - (\quad)] =$

WATER TO BE REMOVED

Gallons of Water (well)	Gallons of Water (annulus)	Removal Multiplier	Total Gallons to be Removed	Actual Gallons Removed
<u>4</u>	<u>6.3</u>	<u>5</u>	<u>51.5</u>	<u>55</u>

$[(\quad) + (\quad)] \times (\quad) =$

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL ⁻ (Y/N)	Dissolved Oxygen	Well V well	Annulus *	
							dia	V annulus
<u>1038</u>	<u>6.87</u>	<u>0.27</u>	<u>19.2°C</u>	<u>No</u>	-	<u>2"</u> <u>0.17gal/ft</u>	<u>6.5</u>	<u>0.46gal/ft</u>
<u>1048</u>	<u>7.11</u>	<u>0.21</u>	<u>24.7°C</u>	<u>No</u>	-		<u>7.25</u>	<u>0.59gal/ft</u>
<u>1103</u>	<u>7.30</u>	<u>0.20</u>	<u>25.0°C</u>	<u>No</u>	-		<u>7.75</u>	<u>0.69gal/ft</u>
<u>1114</u>	<u>7.32</u>	<u>0.21</u>	<u>24.9°C</u>	<u>No</u>	-		<u>8.25</u>	<u>0.79gal/ft</u>
						<u>4"</u> <u>0.66gal/ft</u>	<u>8.25</u>	<u>0.64gal/ft</u>
							<u>10.25</u>	<u>1.06gal/ft</u>
							<u>12.25</u>	<u>1.63gal/ft</u>
						<u>6"</u> <u>1.5gal/ft</u>	<u>12.25</u>	<u>1.41gal/ft</u>

Post Sampling

SAMPLING

Decontamination Procedures Used
Solvent Used _____

☐ Detergent Wash, Water Rinse,
Solvent Rinse, Water Rinse

☐ Detergent Wash
Water Rinse ☒ Other
3x D.I. H₂O RINSE

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
<u>MW-04</u>	<u>TCL+30 YOL</u>	<u>40ML</u>	<u>No</u>	<u>ICE, HCl, pH=2</u>	<u>AMBER GLASS (3)</u>	<u>1802</u>
<u>MW-04</u>	<u>TCL+30 SEMS</u>	<u>1 GALLON</u>	<u>No</u>	<u>ICE</u>	<u>" (1)</u>	<u>1802</u>
<u>MW-04</u>	<u>CYANIDE</u>	<u>1L</u>	<u>No</u>	<u>ICE, NaOH, pH=12</u>	<u>POLYETHYLENE</u>	<u>1802</u>
<u>MW-04</u>	<u>SULFIDE</u>	<u>1L</u>	<u>No</u>	<u>ICE, NaOH, pH=9</u>	<u>"</u>	<u>1802</u>
				<u>+ 2% ARSENATE</u>		
<u>MW-04</u>	<u>METALS</u>	<u>1L</u>	<u>Yes</u>	<u>ICE, HNO₃, pH=2</u>	<u>"</u>	<u>1802</u>

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)

PURGED MW-03 W/ BAILER SIMULTANEOUSLY. THIS WELL WILL BE DUPLICATE SAMPLED TOMORROW AFTER STANDING FOR 24 HOURS.

Signature [Signature] Date 2-12-90 No. of Bottles 7

Arthur D Little

Arthur D Little	Monitoring Well Sampling Data Sheet		Well No. <u>MW-05</u>																																																																																												
			Client <u>EG&G/USATHAMA</u>																																																																																												
			Project <u>AMTL-WATER TOWN</u>																																																																																												
			Case No. <u>61453-50</u>																																																																																												
Evacuation Method <u>PUMP (SUBMERSIBLE)</u>		Date <u>2-13-90</u>		LOCATION 																																																																																											
Sampling Method <u>BATLER</u>		Equipment Used (Calibrated ☒ Y/N) <u>HNO-PID, pH/TEMP/COND. METERS</u>																																																																																													
Sampling Personnel <u>J. FORTNER</u> <u>C. MARTEL</u>		Initial Well PID (ppm) <u>0.6 ppm</u>																																																																																													
WELL VOLUME (* use appropriate values in table for each code letter) V well <u>0.66</u> x [(<u>18.39</u> - <u>8.63</u>)] = Gallons of Water (well) <u>6.4</u>																																																																																															
ANNULAR VOLUME (ASSUME 30% POROSITY) V annulus <u>1.06</u> x [(<u>18.39</u> - <u>8.63</u>)] = Gallons of Water (annulus) <u>10.3</u>																																																																																															
WATER TO BE REMOVED [(<u>6.4</u> + <u>10.3</u>)] x <u>5</u> = Total Gallons to be Removed <u>83.5</u> Actual Gallons Removed <u>20</u>																																																																																															
MEASUREMENTS <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th colspan="6"></th> <th>Well</th> <th colspan="2">Annulus *</th> </tr> <tr> <th colspan="6"></th> <th>V well</th> <th>dia</th> <th>V annulus</th> </tr> </thead> <tbody> <tr> <td colspan="6">Well Purging</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Time</td> <td>pH</td> <td>Conduct.</td> <td>Temp.</td> <td>Free CL⁻</td> <td>Dissolved Oxygen</td> <td></td> <td></td> <td></td> </tr> <tr> <td><u>1200</u></td> <td><u>5.24</u></td> <td><u>0.18</u></td> <td><u>9.8°C</u></td> <td><u>NO</u></td> <td><u>-</u></td> <td rowspan="4"><u>2"</u> <u>0.17gal/ft</u></td> <td><u>6.5</u></td> <td><u>0.46gal/ft</u></td> </tr> <tr> <td><u>1223</u></td> <td colspan="5"><u>WELL RAN DRY, ALLOWED RECHARGE</u></td> <td><u>7.25</u></td> <td><u>0.59gal/ft</u></td> </tr> <tr> <td><u>1240</u></td> <td><u>5.58</u></td> <td><u>0.39</u></td> <td><u>8.9°C</u></td> <td><u>NO</u></td> <td><u>-</u></td> <td><u>7.75</u></td> <td><u>0.69gal/ft</u></td> </tr> <tr> <td><u>1244</u></td> <td colspan="5"><u>WELL RAN DRY, END PUMPING</u></td> <td><u>8.25</u></td> <td><u>0.79gal/ft</u></td> </tr> <tr> <td colspan="6" rowspan="3">Post Sampling</td> <td rowspan="3"><u>4"</u> <u>0.66gal/ft</u></td> <td><u>8.25</u></td> <td><u>0.64gal/ft</u></td> </tr> <tr> <td><u>10.25</u></td> <td><u>1.06gal/ft</u></td> </tr> <tr> <td><u>12.25</u></td> <td><u>1.63gal/ft</u></td> </tr> <tr> <td colspan="6"></td> <td><u>6"</u> <u>1.5gal/ft</u></td> <td><u>12.25</u></td> <td><u>1.41gal/ft</u></td> </tr> </tbody> </table>											Well	Annulus *								V well	dia	V annulus	Well Purging									Time	pH	Conduct.	Temp.	Free CL ⁻	Dissolved Oxygen				<u>1200</u>	<u>5.24</u>	<u>0.18</u>	<u>9.8°C</u>	<u>NO</u>	<u>-</u>	<u>2"</u> <u>0.17gal/ft</u>	<u>6.5</u>	<u>0.46gal/ft</u>	<u>1223</u>	<u>WELL RAN DRY, ALLOWED RECHARGE</u>					<u>7.25</u>	<u>0.59gal/ft</u>	<u>1240</u>	<u>5.58</u>	<u>0.39</u>	<u>8.9°C</u>	<u>NO</u>	<u>-</u>	<u>7.75</u>	<u>0.69gal/ft</u>	<u>1244</u>	<u>WELL RAN DRY, END PUMPING</u>					<u>8.25</u>	<u>0.79gal/ft</u>	Post Sampling						<u>4"</u> <u>0.66gal/ft</u>	<u>8.25</u>	<u>0.64gal/ft</u>	<u>10.25</u>	<u>1.06gal/ft</u>	<u>12.25</u>	<u>1.63gal/ft</u>							<u>6"</u> <u>1.5gal/ft</u>	<u>12.25</u>	<u>1.41gal/ft</u>
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Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time																																																																																									
<u>MW-05</u>	<u>TCL-30 VOL</u>	<u>40ml</u>	<u>NO</u>	<u>ICE, HCl, pH=2</u>	<u>AMBERGLASS (3)</u>	<u>1735</u>																																																																																									
<u>MW-05</u>	<u>TCL-30 SEMI</u>	<u>1 GALLON</u>	<u>NO</u>	<u>ICE</u>	<u>" (1)</u>	<u>1735</u>																																																																																									
<u>MW-05</u>	<u>CYANED</u>	<u>1L</u>	<u>NO</u>	<u>ICE, NaOH pH=12</u>	<u>POLYETHYLENE</u>	<u>1735</u>																																																																																									
<u>MW-05</u>	<u>SULFIDE</u>	<u>1L</u>	<u>NO</u>	<u>ICE, NaOH pH=9</u>	<u>" "</u>	<u>1735</u>																																																																																									
<u>MW-05</u>	<u>METALS</u>	<u>1L</u>	<u>YES</u>	<u>ICE, HNO₃ pH=2</u>	<u>" "</u>	<u>1735</u>																																																																																									

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)

WATER APPEARED EXTREMELY RUSTY, WELL WAS PUMPED DRY TWICE

Signature

[Signature]

Date

2-13-90

No. of Bottles

7

Arthur D Little

Arthur D Little	Monitoring Well Sampling Data Sheet		Well No. <u>MW-06</u>
			Client <u>EGG/USATNAMA</u>
			Project <u>AMTL-WATERIUMW</u>
			Case No. <u>61453-50</u>
Evacuation Method <u>PUMP (SUBMERSIBLE)</u>		Date <u>2-14-90</u>	LOCATION
Sampling Method <u>BATLER</u>		Equipment Used (Calibrated ☒ Y/N) <u>HNA-PID, PH/TEMP/CONO. METERS</u>	
Sampling Personnel <u>J. FORTNER</u> <u>C. MARTEL</u>		Initial Well PID (ppm) <u>0.6 ppm</u>	

WELL VOLUME (* use appropriate values in table for each code letter)

V well	Depth Screen Bottom	Depth Water	Gallons of Water (well)
<u>0.66</u>	<u>15.17</u>	<u>6.87</u>	<u>5.5</u>

$$\text{V well} \times [(\text{Depth Screen Bottom} - \text{Depth Water})] = \text{Gallons of Water (well)}$$

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus	Depth Screen Bottom	Depth Bottom of Seal	Gallons of Water (annulus)
<u>1.06</u>	<u>15.17</u>	<u>6.87</u>	<u>8.8</u>

$$\text{V annulus} \times [(\text{Depth Screen Bottom} - \text{Depth Bottom of Seal})] = \text{Gallons of Water (annulus)}$$

WATER TO BE REMOVED

Gallons of Water (well)	Gallons of Water (annulus)	Removal Multiplier	Total Gallons to be Removed	Actual Gallons Removed
<u>5.5</u>	<u>8.8</u>	<u>5</u>	<u>71.5</u>	<u>75</u>

$$[(\text{Gallons of Water (well)} + \text{Gallons of Water (annulus)})] \times \text{Removal Multiplier} = \text{Total Gallons to be Removed}$$

MEASUREMENTS
Well Purging

Time	pH	Conduct.	Temp.	Free CL ⁻ (Y/N)	Dissolved Oxygen	Well V well	Annulus * dia V annulus
<u>1334</u>	<u>5.94</u>	<u>2.17</u>	<u>10.9°C</u>	<u>No</u>	<u>-</u>	<u>2"</u>	<u>6.5</u> <u>0.46gal/ft</u>
<u>1357</u>	<u>5.26</u>	<u>2.48</u>	<u>11.8°C</u>	<u>No</u>	<u>-</u>	<u>0.17gal/ft</u>	<u>7.25</u> <u>0.59gal/ft</u>
<u>1420</u>	<u>5.47</u>	<u>2.45</u>	<u>11.1°C</u>	<u>No</u>	<u>-</u>		<u>7.75</u> <u>0.69gal/ft</u>
							<u>8.25</u> <u>0.79gal/ft</u>
						<u>4"</u>	<u>8.25</u> <u>0.64gal/ft</u>
						<u>0.66gal/ft</u>	<u>10.25</u> <u>1.06gal/ft</u>
							<u>12.25</u> <u>1.63gal/ft</u>
						<u>6"</u>	<u>12.25</u> <u>1.41gal/ft</u>
						<u>1.5gal/ft</u>	

Post Sampling
SAMPLING

Decontamination Procedures Used
Solvent Used _____

☐ Detergent Wash, Water Rinse,
Solvent Rinse, Water Rinse

☐ Detergent Wash
Water Rinse ☒ Other
3 x D.I. H₂O
RINSE

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
<u>MW-06</u>	<u>TEL+30 YOL</u>	<u>40ml</u>	<u>No</u>	<u>ICE, HCl pH=2</u>	<u>AMBER GLASS (3)</u>	<u>1454</u>
<u>MW-06</u>	<u>TEL+30 SEME</u>	<u>1 GILLON</u>	<u>No</u>	<u>ICE</u>	<u>" (1)</u>	<u>1454</u>
<u>MW-06</u>	<u>CYANIDE</u>	<u>1L</u>	<u>No</u>	<u>ICE, NaOH pH=12</u>	<u>POLYETHYLENE</u>	<u>1454</u>
<u>MW-06</u>	<u>SULFIDE</u>	<u>1L</u>	<u>No</u>	<u>ICE, NaOH pH=9</u>	<u>"</u>	<u>1454</u>
				<u>2 NACETATE</u>		
<u>MW-06</u>	<u>METALS</u>	<u>1L</u>	<u>YES</u>	<u>ICE, HNO₃ pH=2</u>	<u>"</u>	<u>1454</u>

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)

GOOD FLOW

Signature

Date

2/14/90

No. of Bottles

7
Arthur D Little

Arthur D Little	Monitoring Well Sampling Data Sheet		Well No. <u>MW-07</u>						
			Client <u>EG&G/USATHAMA</u>						
			Project <u>AMTL-WATER TOWER</u>						
			Case No. <u>61453-50</u>						
Evacuation Method <u>PUMP (SUBMERSTIBLE)</u>		Date <u>2-9-90</u>	LOCATION 						
Sampling Method <u>BATLER</u>		Equipment Used (Calibrated ☒ Y/N) <u>HNU-PID, PH PAPER, COND. MET., THERM</u>							
Sampling Personnel <u>J. FORTNER</u> <u>P. CONN</u>		Initial Well PID (ppm) <u>0.6 ppm</u>							
WELL VOLUME (* use appropriate values in table for each code letter) V well <u>0.66</u> x [(<u>36.87</u> - <u>29.17</u>)] = Gallons of Water (well) <u>5.00</u>									
ANNULAR VOLUME (ASSUME 30% POROSITY) V annulus <u>1.06</u> x [(<u>36.87</u> - <u>29.17</u>)] = Gallons of Water (annulus) <u>8.16</u>									
WATER TO BE REMOVED Gallons of Water (well) <u>5.00</u> + Gallons of Water (annulus) <u>8.16</u>) x Removal Multiplier <u>5</u> = Total Gallons to be Removed <u>66.22</u> Actual Gallons Removed <u>70</u>									
MEASUREMENTS		Well	Annulus *						
		V well	dia	V annulus					
Well Purging	Time	pH	Conduct.	Temp.	Free CL ⁻ ☒ Y/N	Dissolved Oxygen	2"	6.5	0.46gal/ft
	<u>1540</u>	<u>6</u>	<u>0.22</u>	<u>15° C</u>	<u>No</u>	<u>-</u>	0.17gal/ft	7.25	0.59gal/ft
	<u>1545</u>	<u>6</u>	<u>0.24</u>	<u>15° C</u>	<u>No</u>	<u>-</u>		7.75	0.69gal/ft
	<u>1555</u>	<u>6</u>	<u>0.30</u>	<u>15° C</u>	<u>No</u>	<u>-</u>		8.25	0.79gal/ft
	<u>1615</u>	<u>7</u>	<u>0.30</u>	<u>15° C</u>	<u>No</u>	<u>-</u>	4"	8.25	0.64gal/ft
					<u>No</u>	<u>-</u>	0.66gal/ft	10.25	1.06gal/ft
Post Sampling						6"	12.25	1.63gal/ft	
						1.5gal/ft	12.25	1.41gal/ft	
SAMPLING									
Decontamination Procedures Used ☐ Solvent Used _____			☐ Detergent Wash, Water Rinse, Solvent Rinse, Water Rinse			☐ Detergent Wash Water Rinse		☒ Other <u>3x D.I. H₂O RINSE</u>	
Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time			
<u>MW-07</u>	<u>TC1+30 VOL</u>	<u>40ml</u>	<u>No</u>	<u>ICE, HCL pH 2</u>	<u>AMBER GLASS (3)</u>	<u>1700</u>			
<u>MW-07</u>	<u>TC1+30 SEME</u>	<u>1 GALLON</u>	<u>No</u>	<u>ICE</u>	<u>" (1)</u>	<u>1700</u>			
<u>MW-07</u>	<u>CYANIDE</u>	<u>1L</u>	<u>No</u>	<u>ICE, NaOH, pH 12</u>	<u>POLYETHYLENE</u>	<u>1700</u>			
<u>MW-07</u>	<u>SULFIDE</u>	<u>1L</u>	<u>No</u>	<u>ICE, NaOH, pH 12</u>	<u>"</u>	<u>1700</u>			
				<u>+ 2M ARSENATE</u>					
<u>MW-07</u>	<u>METALS</u>	<u>1L</u>	<u>YES</u>	<u>ICE, HNO₃, pH 2</u>	<u>"</u>	<u>1700</u>			
Notes (include data on floaters/sinkers with measuring device, well condition, etc.)									

 Signature Arthur D Little

 Date 2-9-90

 No. of Bottles 7

Arthur D Little

Arthur D Little	Monitoring Well Sampling Data Sheet		Well No. <u>MW-08</u>						
			Client <u>EG&G/USATHAMIA</u>						
			Project <u>ARTL-WATERLOW</u>						
			Case No. <u>61453-50</u>						
Evacuation Method <u>PUMP (SUBMERSIBLE)</u>		Date <u>2-12-90</u>		LOCATION 					
Sampling Method <u>BATLER</u>		Equipment Used (Calibrated ☒ Y/N) <u>HNU-PID, pH/COND/TEMP METER</u>							
Sampling Personnel <u>J. FORNER</u> <u>C. MARTEL</u>		Initial Well PID (ppm) <u>0.6 ppm</u>							
WELL VOLUME (* use appropriate values in table for each code letter) V well <u>0.66</u> Depth Screen Bottom <u>40.03</u> Depth Water <u>32.51</u> Gallons of Water (well) <u>5</u> $\times [(\text{Depth Screen Bottom} - \text{Depth Water})] =$									
ANNULAR VOLUME (ASSUME 30% POROSITY) V annulus <u>1.06</u> Depth Screen Bottom <u>40.03</u> Depth Bottom of Seal <u>32.51</u> Gallons of Water (annulus) <u>8</u> $\times [(\text{Depth Screen Bottom} - \text{Depth Bottom of Seal})] =$									
WATER TO BE REMOVED Gallons of Water (well) <u>5</u> Gallons of Water (annulus) <u>8</u> Removal Multiplier <u>5</u> Total Gallons to be Removed <u>65</u> Actual Gallons Removed <u>65</u> $[(\text{Gallons of Water (well)} + \text{Gallons of Water (annulus)})] \times \text{Removal Multiplier} =$									
MEASUREMENTS									
Well Purging									
Time	pH	Conduct.	Temp.	Free CL ⁻ ☒ Y/N	Dissolved Oxygen	Well	Annulus *		
<u>0909</u>	<u>6.77</u>	<u>0.77</u>	<u>13.6°C</u>	<u>NO</u>	<u>-</u>	2" 0.17gal/ft	6.5	0.46gal/ft	
<u>0916</u>	<u>6.44</u>	<u>0.27</u>	<u>14.6°C</u>	<u>NO</u>	<u>-</u>		7.25	0.59gal/ft	
<u>0930</u>	<u>6.51</u>	<u>0.42</u>	<u>13.3°C</u>	<u>NO</u>	<u>-</u>		7.75	0.69gal/ft	
<u>0937</u>	<u>6.43</u>	<u>0.85</u>	<u>13.6°C</u>	<u>NO</u>	<u>-</u>		8.25	0.79gal/ft	
Post Sampling						4" 0.66gal/ft	8.25	0.64gal/ft	
							10.25	1.06gal/ft	
							12.25	1.63gal/ft	
Post Sampling						6" 1.5gal/ft	12.25	1.41gal/ft	
SAMPLING									
Decontamination Procedures Used			☐ Detergent Wash, Water Rinse, Solvent Rinse, Water Rinse			☐ Detergent Wash, Water Rinse			☒ Other <u>3 x D.I. H₂O RINSE</u>
Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time			
<u>MW-08</u>	<u>TCL+30 Vol</u>	<u>40ml</u>	<u>NO</u>	<u>ICE, HCl pH<2</u>	<u>AMBERGLASS (3)</u>	<u>1920</u>			
<u>MW-08</u>	<u>TCL+30 SEME</u>	<u>1 GALLON</u>	<u>NO</u>	<u>ICE</u>	<u>AMBERGLASS (1)</u>	<u>1920</u>			
<u>MW-08</u>	<u>CYANIDE</u>	<u>1L</u>	<u>NO</u>	<u>ICE, NaOH pH>12</u>	<u>POLYETHYLENE</u>	<u>1920</u>			
<u>MW-08</u>	<u>SULFIDE</u>	<u>1L</u>	<u>NO</u>	<u>ICE, NaOH pH>12</u>	<u>"</u>	<u>1920</u>			
<u>MW-08</u>	<u>METALS</u>	<u>1L</u>	<u>YES</u>	<u>ICE, HNO₃ pH<2</u>	<u>"</u>	<u>1920</u>			
Notes (include data on floaters/sinkers with measuring device, well condition, etc.)									

Signature [Signature] Date 2/12/90 No. of Bottles 7

Arthur D Little

Arthur D Little	Monitoring Well Sampling Data Sheet		Well No. <u>MW-10</u>
			Client <u>EG&G/USOYAMA</u>
			Project <u>AMTL-WATERIDUN</u>
			Case No. <u>61453-50</u>
Evacuation Method <u>PUMP (SUBMERSTIBLE)</u>		Date <u>2-8-90</u>	LOCATION ↑ N
Sampling Method <u>BATLER</u>		Equipment Used (Calibrated ☒ Y/N) <u>HMN-PID, PH METER / COND. METER, THERM</u>	
Sampling Personnel <u>A. FORTNER</u> <u>P. CONN</u>		Initial Well PID (ppm) <u>0.6 ppm</u>	

WELL VOLUME (* use appropriate values in table for each code letter)

V well	Depth Screen Bottom	Depth Water	Gallons of Water (well)
<u>0.66</u>	<u>17.12</u>	<u>11.69</u>	<u>3.58</u>

$$\boxed{0.66} \times [(\boxed{17.12} - \boxed{11.69})] = \boxed{3.58}$$

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus	Depth Screen Bottom	Depth Bottom of Seal	Gallons of Water (annulus)
<u>1.06</u>	<u>17.12</u>	<u>11.69</u>	<u>5.75</u>

$$\boxed{1.06} \times [(\boxed{17.12} - \boxed{11.69})] = \boxed{5.75}$$

WATER TO BE REMOVED

Gallons of Water (well)	Gallons of Water (annulus)	Removal Multiplier	Total Gallons to be Removed	Actual Gallons Removed
<u>3.58</u>	<u>5.75</u>	<u>5</u>	<u>46.7</u>	<u>225</u>

$$[(\boxed{3.58} + \boxed{5.75})] \times \boxed{5} = \boxed{46.7} \quad \boxed{225}$$

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL ⁻ ☒ Y/N	Dissolved Oxygen	Well V well	Annulus * dia	V annulus
<u>1725</u>	<u>6</u>	<u>0.40</u>	<u>11</u>	<u>NO</u>	<u>-</u>	2" 0.17gal/ft	6.5	0.46gal/ft
<u>1733</u>	<u>6</u>	<u>0.65</u>	<u>13</u>	<u>NO</u>	<u>-</u>		7.25	0.59gal/ft
<u>1800</u>	<u>6</u>	<u>0.52</u>	<u>13</u>	<u>NO</u>	<u>-</u>		7.75	0.69gal/ft
<u>1830</u>	<u>6</u>	<u>0.49</u>	<u>13</u>	<u>NO</u>	<u>-</u>	4" 0.66gal/ft	8.25	0.64gal/ft
							10.25	1.06gal/ft
							12.25	1.63gal/ft
						6" 1.5gal/ft	12.25	1.41gal/ft

Post Sampling

SAMPLING

Decontamination Procedures Used _____
Solvent Used _____

☐ Detergent Wash, Water Rinse,
Solvent Rinse, Water Rinse

☐ Detergent Wash
Water Rinse ☒ Other
3x D.I. H₂O RINSE

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
<u>MW-10</u>	<u>TC1+30 Vol</u>	<u>40ml</u>	<u>NO</u>	<u>ICE, HCl pH 12</u>	<u>AMBER GLASS (3)</u>	<u>1100</u>
<u>MW-10</u>	<u>TC1+30 SEMS</u>	<u>1 GALLON</u>	<u>NO</u>	<u>ICE</u>	<u>" (1)</u>	<u>1100</u>
<u>MW-10</u>	<u>CYANIDE</u>	<u>1L</u>	<u>NO</u>	<u>ICE, HADN pH 12</u>	<u>POLYETHYLENE</u>	<u>1100</u>
<u>MW-10</u>	<u>SULFIDE</u>	<u>1L</u>	<u>NO</u>	<u>ICE, HADN pH 12</u>	<u>"</u>	<u>1100</u>
				<u>+ Zn Acetate</u>		
<u>MW-10</u>	<u>METALS</u>	<u>1L</u>	<u>YES</u>	<u>ICE, HNO₃ pH 12</u>	<u>"</u>	<u>1100</u>

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)

WATER IS RUSTY. WATER BEGAN CLEARING. 1733 WELL RAN DRY, ALLOWED
RECOVERY, BEGAN PURGING AGAIN @ 1800, RAN DRY @ 1835.

Signature [Signature] Date 2-8-90 No. of Bottles 7

Arthur D Little

Arthur D Little	Monitoring Well Sampling Data Sheet		Well No. <u>MW-11</u>
			Client <u>EG&G/USATNADA</u>
			Project <u>ARTIL-WATERWAY</u>
			Case No. <u>61453-50</u>
Evacuation Method <u>PUMP (SUBMERSIBLE)</u>		Date <u>2-13-90</u>	LOCATION
Sampling Method <u>BAILER</u>		Equipment Used (Calibrated ☒ Y/N) <u>HNO-PIO, pH/COND./TEMP. METER</u>	
Sampling Personnel <u>J. FORTNER</u> <u>C. MARTEL</u>		Initial Well PID (ppm) <u>0.6 ppm</u>	

WELL VOLUME (* use appropriate values in table for each code letter)

V well	Depth Screen Bottom	Depth Water	Gallons of Water (well)
<u>0.66</u>	<u>14.86</u>	<u>4.29</u>	<u>7.0</u>

$\times [(\text{Depth Screen Bottom} - \text{Depth Water})] =$

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus	Depth Screen Bottom	Depth Bottom of Seal	Gallons of Water (annulus)
<u>1.06</u>	<u>14.86</u>	<u>4.29</u>	<u>11.2</u>

$\times [(\text{Depth Screen Bottom} - \text{Depth Bottom of Seal})] =$

WATER TO BE REMOVED

Gallons of Water (well)	Gallons of Water (annulus)	Removal Multiplier	Total Gallons to be Removed	Actual Gallons Removed
<u>7.0</u>	<u>11.2</u>	<u>5</u>	<u>91.0</u>	<u>21</u>

$[(\text{Gallons of Water (well)} + \text{Gallons of Water (annulus)})] \times \text{Removal Multiplier} =$

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL ⁻ ☒ Y/N	Dissolved Oxygen
<u>1530</u>	<u>5.41</u>	<u>1.05</u>	<u>9.9 °C</u>	<u>No</u>	<u>-</u>
<u>1612</u>	<u>5.45</u>	<u>0.40</u>	<u>12.6 °C</u>	<u>No</u>	<u>-</u>

Post Sampling

Well	Annulus *	
V well	dia	V annulus
2" 0.17gal/ft	6.5	0.46gal/ft
	7.25	0.59gal/ft
	7.75	0.69gal/ft
	8.25	0.79gal/ft
4" 0.66gal/ft	8.25	0.64gal/ft
	10.25	1.06gal/ft
	12.25	1.63gal/ft
6" 1.5gal/ft	12.25	1.41gal/ft

SAMPLING

Decontamination Procedures Used ☐ Solvent Used _____

☐ Detergent Wash, Water Rinse,
Solvent Rinse, Water Rinse

☐ Detergent Wash
Water Rinse ☒ Other
3x D.I. H₂O
RINSE

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
<u>MW-11</u>	<u>TC1+30 Vol</u>	<u>40ml</u>	<u>No</u>	<u>ICE, HCl pH=2</u>	<u>AMBER GLASS (3)</u>	<u>1735</u>
<u>MW-11</u>	<u>TC1+30 SEMS</u>	<u>1 GALLON</u>	<u>No</u>	<u>ICE</u>	<u>" (1)</u>	<u>1735</u>
<u>MW-11</u>	<u>CYANIDE</u>	<u>1L</u>	<u>No</u>	<u>ICE, NaOH, pH=12</u>	<u>POLYETHYLENE</u>	<u>1735</u>
<u>MW-11</u>	<u>SULFIDE</u>	<u>1L</u>	<u>No</u>	<u>ICE, NaOH, pH=9</u> <u>+ ZINC ACETATE</u>	<u>" "</u>	<u>1735</u>
<u>MW-11</u>	<u>METALS</u>	<u>1L</u>	<u>YES</u>	<u>ICE, HNO₃ pH=2</u>	<u>" "</u>	<u>1735</u>

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)

@ 1615 WELL RAN DRY, ENDED PURGING.

Signature [Signature]

Date 2-13-90

No. of Bottles 7

Arthur D Little

Arthur D Little	Monitoring Well Sampling Data Sheet		Well No. <u>MW-12</u>					
			Client <u>EG&G/USATNARA</u>					
			Project <u>AMSL-WATERIDOWN</u>					
			Case No. <u>61453-50</u>					
Evacuation Method <u>PUMP (SUBMERSIBLE)</u>		Date <u>2-12-90</u>		LOCATION 				
Sampling Method <u>BAILER</u>		Equipment Used (Calibrated ☒ Y/N) <u>HAN-PID, PH/TAMP/CONO. METERS</u>						
Sampling Personnel <u>T. FORTNER</u> <u>C. MARTEL</u>		Initial Well PID (ppm) <u>0.5 ppm</u>						
WELL VOLUME (* use appropriate values in table for each code letter) V well <u>0.66</u> x [(<u>37.33</u> - <u>31.69</u>)] = Gallons of Water (well) <u>3.7</u>								
ANNULAR VOLUME (ASSUME 30% POROSITY) V annulus <u>1.06</u> x [(<u>37.33</u> - <u>31.69</u>)] = Gallons of Water (annulus) <u>6</u>								
WATER TO BE REMOVED Gallons of Water (well) <u>3.7</u> + <u>6</u>) x <u>5</u> = Total Gallons to be Removed <u>48.5</u> Actual Gallons Removed <u>50</u>								
MEASUREMENTS								
Well Purging								
Time	pH	Conduct.	Temp.	Free CL ⁻ ☒ Y/N	Dissolved Oxygen	Well V well	Annulus * dia V annulus	
<u>1425</u>	<u>6.32</u>	<u>0.43</u>	<u>16.3°C</u>	<u>No</u>	-	<u>2"</u> <u>0.17gal/ft</u>	<u>6.5</u>	<u>0.46gal/ft</u>
<u>1433</u>	<u>6.07</u>	<u>0.33</u>	<u>16.8°C</u>	<u>No</u>	-		<u>7.25</u>	<u>0.59gal/ft</u>
<u>1442</u>	<u>6.18</u>	<u>0.32</u>	<u>16.4°C</u>	<u>No</u>	-		<u>7.75</u>	<u>0.69gal/ft</u>
<u>1455</u>	<u>6.25</u>	<u>0.32</u>	<u>10.6°C</u>	<u>No</u>	-		<u>8.25</u>	<u>0.79gal/ft</u>
						<u>4"</u> <u>0.66gal/ft</u>	<u>8.25</u>	<u>0.64gal/ft</u>
							<u>10.25</u>	<u>1.06gal/ft</u>
							<u>12.25</u>	<u>1.63gal/ft</u>
Post Sampling						<u>6"</u> <u>1.5gal/ft</u>	<u>12.25</u>	<u>1.41gal/ft</u>
SAMPLING								
Decontamination Procedures Used ☐ Detergent Wash, Water Rinse, Solvent Used _____ ☐ Detergent Wash, Water Rinse, Solvent Rinse, Water Rinse ☐ Detergent Wash, Water Rinse ☒ Other <u>3x D.I. H₂O Rinse</u>								
Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time		
<u>MW-12</u>	<u>TC1+30 YOL</u>	<u>40ml</u>	<u>No</u>	<u>ICE, HCl pH 2</u>	<u>AMBER GLASS (3)</u>	<u>2000</u>		
<u>MW-12</u>	<u>TC1+30 SEMC</u>	<u>10ml</u>	<u>No</u>	<u>ICE</u>	<u>" (1)</u>	<u>2000</u>		
<u>MW-12</u>	<u>CYANIDE</u>	<u>1L</u>	<u>No</u>	<u>ICE, NaOH pH 12</u>	<u>POLYETHYLENE</u>	<u>2000</u>		
<u>MW-12</u>	<u>SULFIDE</u>	<u>1L</u>	<u>No</u>	<u>ICE, NaOH pH 12</u>	<u>"</u>	<u>2000</u>		
<u>MW-12</u>	<u>METALS</u>	<u>1L</u>	<u>YES</u>	<u>ICE, HNO₃ pH 2</u>	<u>"</u>	<u>2000</u>		
Notes (include data on floaters/sinkers with measuring device, well condition, etc.) 								

 Signature [Signature]

 Date 2-12-90

 No. of Bottles 7

Arthur D Little

Arthur D Little	Monitoring Well Sampling Data Sheet		Well No. <u>MW-13</u>
			Client <u>EG&G/USATHAMA</u>
			Project <u>AMTL-WATERLOW</u>
			Case No. <u>61453-50</u>
Evacuation Method <u>PUMP (SUBMERSIBLE)</u>		Date <u>2-9-90</u>	LOCATION <u>ARSENAL ST.</u> ↑ MN-13 BLDG * 311 MN-14
Sampling Method <u>BATLER</u>		Equipment Used (Calibrated ☒ Y ☐ N) <u>HNU-PID, PH PAPER, COND. MET., THERM.</u>	
Sampling Personnel <u>J. FORTNER</u> <u>P. CONN</u>		Initial Well PID (ppm) <u>0.4 ppm</u>	

WELL VOLUME (* use appropriate values in table for each code letter)

V well	Depth Screen Bottom	Depth Water	Gallons of Water (well)
<u>0.66</u>	<u>20.64</u>	<u>11.72</u>	<u>5.89</u>

$$\boxed{0.66} \times [(\boxed{20.64} - \boxed{11.72})] = \boxed{5.89}$$

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus	Depth Screen Bottom	Depth Bottom of Seal	Gallons of Water (annulus)
<u>1.06</u>	<u>20.64</u>	<u>11.72</u>	<u>9.45</u>

$$\boxed{1.06} \times [(\boxed{20.64} - \boxed{11.72})] = \boxed{9.45}$$

WATER TO BE REMOVED

Gallons of Water (well)	Gallons of Water (annulus)	Removal Multiplier	Total Gallons to be Removed	Actual Gallons Removed
<u>5.89</u>	<u>9.45</u>	<u>5</u>	<u>77</u>	<u>80</u>

$$[(\boxed{5.89} + \boxed{9.45})] \times \boxed{5} = \boxed{77}$$

MEASUREMENTS

Well Purging

Time	pH	Conduct.	Temp.	Free CL ⁻	Dissolved Oxygen	Well	Annulus *	
						V well	dia	V annulus
<u>0845</u>	<u>5.5</u>	<u>0.28</u>	<u>12.5°C</u>	<u>NO</u>	<u>-</u>	<u>2"</u> <u>0.17gal/ft</u>	<u>6.5</u>	<u>0.46gal/ft</u>
<u>0901</u>	<u>5.5</u>	<u>2.08</u>	<u>13.5°C</u>	<u>NO</u>	<u>-</u>		<u>7.25</u>	<u>0.59gal/ft</u>
<u>0910</u>	<u>6</u>	<u>3.12</u>	<u>14.0°C</u>	<u>NO</u>	<u>-</u>		<u>7.75</u>	<u>0.69gal/ft</u>
<u>0919</u>	<u>6.5</u>	<u>3.05</u>	<u>14.0°C</u>	<u>NO</u>	<u>-</u>		<u>8.25</u>	<u>0.79gal/ft</u>
						<u>4"</u> <u>0.66gal/ft</u>	<u>8.25</u>	<u>0.64gal/ft</u>
							<u>10.25</u>	<u>1.06gal/ft</u>
							<u>12.25</u>	<u>1.63gal/ft</u>
						<u>6"</u> <u>1.5gal/ft</u>	<u>12.25</u>	<u>1.41gal/ft</u>

Post Sampling

SAMPLING

Decontamination Procedures Used ☐ Detergent Wash, Water Rinse, Solvent Used _____ ☐ Detergent Wash, Water Rinse, Solvent Rinse, Water Rinse ☒ Other 3x D.I. H₂O Rinse

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
<u>MW-13</u>	<u>TC1+30 Vol</u>	<u>40ml</u>	<u>NO</u>	<u>ICE, HCl, pH 2</u>	<u>AMBER GLASS (3)</u>	<u>1120</u>
<u>MW-13</u>	<u>TC1+30 SEMI</u>	<u>1 GALLON</u>	<u>NO</u>	<u>ICE</u>	<u>" (1)</u>	<u>1120</u>
<u>MW-13</u>	<u>CYANIDE</u>	<u>1L</u>	<u>NO</u>	<u>ICE, NaOH, pH 12</u>	<u>POLYETHYLENE</u>	<u>1120</u>
<u>MW-13</u>	<u>SULFIDE</u>	<u>1L</u>	<u>NO</u>	<u>ICE, NaOH, pH 12</u>	<u>"</u>	<u>1120</u>
				<u>+ Zn Acetate</u>		
<u>MW-13</u>	<u>METALS</u>	<u>1L</u>	<u>YES</u>	<u>ICE, HNO₃, pH 2</u>	<u>"</u>	<u>1120</u>

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)

WATER WAS INITIALLY CLOUDY BUT CLEARED UP DURING PURGING.

Signature [Signature] Date 2-9-90 No. of Bottles 7

Arthur D Little

Arthur D Little	Monitoring Well Sampling Data Sheet		Well No. <u>MW-14</u>
			Client <u>EG&G/USATNARA</u>
			Project <u>AMTL-WATER TOWN</u>
			Case No. <u>61453-50</u>
Evacuation Method <u>PUMP (SUBMERSEBLE)</u>		Date <u>2-9-90</u>	LOCATION <u>ARSENAL ST.</u> ~~XXXXXXXXXXXXXXXXXXXX~~ <u>MD-13</u> <u>BLDG. # 311</u> <u>MD-14</u>
Sampling Method <u>BAILER</u>		Equipment Used (Calibrated ☒ N) <u>HNO₃-PED, PH PAPER, CONO MET, THERM.</u>	
Sampling Personnel <u>J. FORTNER</u> <u>P. CONN</u>		Initial Well PID (ppm) <u>0.8 ppm</u>	

WELL VOLUME (* use appropriate values in table for each code letter)

V well	Depth Screen Bottom	Depth Water	Gallons of Water (well)
<u>0.66</u>	<u>24.25</u>	<u>15.43</u>	<u>5.82</u>

$$\text{V well} \times [(\text{Depth Screen Bottom} - \text{Depth Water})] = \text{Gallons of Water (well)}$$

ANNULAR VOLUME (ASSUME 30% POROSITY)

V annulus	Depth Screen Bottom	Depth Bottom of Seal	Gallons of Water (annulus)
<u>1.06</u>	<u>24.25</u>	<u>15.43</u>	<u>9.35</u>

$$\text{V annulus} \times [(\text{Depth Screen Bottom} - \text{Depth Bottom of Seal})] = \text{Gallons of Water (annulus)}$$

WATER TO BE REMOVED

Gallons of Water (well)	Gallons of Water (annulus)	Removal Multiplier	Total Gallons to be Removed	Actual Gallons Removed
<u>5.82</u>	<u>9.35</u>	<u>5</u>	<u>70</u>	<u>80</u>

$$[(\text{Gallons of Water (well)} + \text{Gallons of Water (annulus)})] \times \text{Removal Multiplier} = \text{Total Gallons to be Removed}$$

MEASUREMENTS
Well Purging

Time	pH	Conduct.	Temp.	Free CL ⁻ ☒ N	Dissolved Oxygen	Well V well	Annulus * dia V annulus
<u>1040</u>	<u>6</u>	<u>0.58</u>	<u>15°C</u>	<u>No</u>	<u>-</u>	<u>2"</u> <u>0.17gal/ft</u>	<u>6.5</u> <u>7.25</u> <u>7.75</u> <u>8.25</u> <u>0.46gal/ft</u> <u>0.59gal/ft</u> <u>0.69gal/ft</u> <u>0.79gal/ft</u>
<u>1059</u>	<u>6</u>	<u>0.67</u>	<u>17°C</u>	<u>No</u>	<u>-</u>		
<u>1203</u>	<u>6</u>	<u>0.62</u>	<u>19.5°C</u>	<u>No</u>	<u>-</u>	<u>4"</u> <u>0.66gal/ft</u>	<u>8.25</u> <u>10.25</u> <u>12.25</u> <u>0.64gal/ft</u> <u>1.06gal/ft</u> <u>1.63gal/ft</u>
<u>1345</u>	<u>6</u>	<u>0.64</u>	<u>21.0°C</u>	<u>No</u>	<u>-</u>	<u>6"</u> <u>1.5gal/ft</u>	<u>12.25</u> <u>1.41gal/ft</u>

Post Sampling
SAMPLING

 Decontamination Procedures Used _____
 Solvent Used _____

☐ Detergent Wash, Water Rinse,
 Solvent Rinse, Water Rinse

☐ Detergent Wash
 Water Rinse 3x D.I. H₂O
☒ Other
RINSE

Sample ID	Analysis	Volume (ml)	Filtered (Y/N)	Preservation	Container	Time
<u>MW-14</u>	<u>TC1+30 Vol.</u>	<u>40ml</u>	<u>No</u>	<u>ICE, HCl pH=2</u>	<u>AMBER GLASS (3)</u>	<u>1450</u>
<u>MW-14</u>	<u>TC1+30 SEMI</u>	<u>1 GALLON</u>	<u>No</u>	<u>ICE,</u>	<u>" (1)</u>	<u>1450</u>
<u>MW-14</u>	<u>RYAN DOE</u>	<u>1L</u>	<u>No</u>	<u>ICE, HADN pH=12</u>	<u>POLYETHYLENE</u>	<u>1450</u>
<u>MW-14</u>	<u>SULFIDE</u>	<u>1L</u>	<u>No</u>	<u>ICE NADN pH=9</u>	<u>"</u>	<u>1450</u>
				<u>+ ZINCLATE</u>		
<u>MW-14</u>	<u>METALS</u>	<u>1L</u>	<u>YES</u>	<u>ICE, HNO₃ pH=2</u>	<u>"</u>	<u>1450</u>

Notes (include data on floaters/sinkers with measuring device, well condition, etc.)

WATER WAS CLOUDY BUT CLEARED DURING PURGING. WELL NEVER
 RAN DRY, BUT PUMPED V.V. SLOW. FINISH PURGING AFTER 3 HOURS,
 WATER SEEMED VERY WARM. MUST BE NEAR STEAM LINE.

 Signature [Signature] Date 2-9-90 No. of Bottles 7
Arthur D Little

Arthur D Little		Soil Sample Log		Client <u>EG+G Inc</u>
				Project <u>AMT - WATER TREAT</u>
				Case No. <u>61953</u>
				Date <u>FEBRUARY 1970</u>
Sampling Method <u>Hand Auger</u>		Equipment Used		LOCATION
Geologist(s) <u>SCOT FOSTER</u>		<u>STAINLESS STEEL BARREL-TYPE</u> <u>AUGER (3")</u>		
Comments • <u>GRAH SAMPLES FROM AUGER BARREL FOR VOLATILE ORGANIC ANALYSIS</u> • <u>SAMPLE COMPOSITES FOR SEMINOLS, PCB'S, METALS, CYANIDE</u>				
Sample Number	Auger Hole ID	Total Organics (ppm)	GEOLOGIC DESCRIPTION Unified Soil Class ID, color (Munsell System), grain size, sorting, moisture, compaction, indication of contaminants (unusual odor or sheen), and general stratigraphic description	
01 SOL 01 01 SOL 01 DUP	01 SOL 01 01 SOL 01 DUPLICATE		ORGANIC RICH SILTY SAND (OL) WITH MINOR (5%) PEBBLES (UP TO 1" DIAM), COLOR 5YR 2/2	
02 SOL 01	02 SOL 01		METAL SHOP FLOOR DEBRIS INCLUDING METAL FILINGS, WOOD, CITY GRIME - 2 RADIOACTIVE CERAMIC BUTTONS FOUND	
03 SOL 01	03 SOL 01		DARK BROWN (5YR 2/2) GRAVELLY SAND WITH PEA STONE FILL @ 1-4" BLACK BROWN OIL GRAVEL/SAND @ 4-6" - NO OIL, NO INDICATION OF CONTAMINATION	
06 SOL 01	06 SOL 01		THICK ORGANIC/FAECES MATT TO 1", 1-4" DARK BROWN (5YR 2/2) ORGANIC RICH LOAM, 4-6" SOME GRAY GRAVELLY SAND WITH 5% PEBBLES UP TO 1/2" DIAMETER	
06 SOL 01	06 SOL 01		BROWN (5YR 2/2) ORGANIC RICH SANDY TOP SOIL TO 7" GRAY/BROWN/BLACK SANDY MATERIAL (CONTAMINATED?) TO 12" (3.2%), ABUNDANT PEBBLES (2") FROM 14-18"	
06 SOL 01 DUPLICATE	06 SOL 01 DUPLICATE		" SAME AS ABOVE "	
09 SOL 01	09 SOL 01		30-40% PEBBLE FILL MATERIAL PROXIMAL TO TRANSFORMER WITH OLIVE GRAY TO TAN SAND/GRAVEL MATRIX. HISTORY OF OIL LEAKS FROM TRANSFORMER	
09 SOL 02	09 SOL 02		30-40% PEBBLES WITH CONCRETE DEBRIS - FILL AROUND TRANSFORMER, GRAVEL/SAND MATRIX TAN TO RED BROWN (5YR 4/4 - 5YR 3/4), NO INDICATION OF CONTAMINATION	
12 SOL 01	12 SOL 01		0-6" GRAVELLY ORGANIC RICH DARK BROWN (5YR 2/2) MATERIAL, 6-15" POORLY GRAINED GRAVEL/SAND (GP) 5YR 4/4 TO 10YR 4/4 - POORLY GRAINED GRAVEL TO 15"	
13 SOL 01	13 SOL 01		TAN TO OLIVE BROWN (5Y 4/4) POORLY GRAINED SANDY/GRAVEL FROM 3-6" (GP), ORGANIC RICH TOP SOIL 0-3" - NO EVIDENCE OF CONTAMINATION	
14 SOL 01	14 SOL 01		UNIFORM POORLY GRAINED GRAVELLY SAND (GP) FROM SURFACE TO 15" - DARK BROWN (5YR 2/2) - EXHIBITED METALLIC OBJECTS INCL. NAILS IN SOIL BORING	
14 SOL 02	14 SOL 02		1-6" PEBBLY SANDY SOIL, 6-15" SANDY PEBBLY MATERIAL (GP) W/ 10-15% PEBBLES, 5YR 2/4 TO 5YR 3/2, 2' DIAM PIECE OF OXIDIZED IRON FOUND IN TOP 6" OF DEPTH	
15 SOL 01	15 SOL 01		ORGANIC RICH TOP SOIL (5YR 2/1) 0-3" w/ ABUND. PEBBLES 3-6" OLIVE TAN GRAVELLY SAND w/ UNCOMBUSTED COAL (20%), ABUNDANT COAL & OTHER DEBRIS > 6", NO COAL	
15 SOL 02	15 SOL 02		POORLY GRAINED GRAVELLY SAND (GP) WITH LUMPY FRAGMENTS AND 10-20% PEBBLES, DARK BROWN 5YR 3/2, 12" SUBSTR. ORGANIC MATT, LOCATED 25" FROM HIGHWAY	

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-15-90Client EG&G/USATHAMAProject AMTL-WATERTOWNCase No. 01453-50

TANK / SUMP DESCRIPTION

Sampling Access Description OPEN LID OF CISTERN, H₂O LEVEL @ TOP, DEPPED CONTAINERLeak Detection / Monitoring Present (Describe) NONETank Sump Dimensions (LxWxH) 30' x 50' x 10' max Total Volume *15,000 FL.³ % Full 100%Tank Sump Status: Active _____ Inactive ✓ Date Installed _____ Age _____Type Of Construction STEEL AND CONCRETEContent History CONTAINER REACTOR COOLING WATER

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NONE / CHEMICAL/RADIATION PROTECTIVE GLOVES

Air Quality Readings	Pre-Sampling	Time	Reading	Time	Reading
	During Sampling				
	During Sampling				
	During Sampling				
	Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) CHEMICAL/RADIATION RESISTANT GLOVES. NO EQUIPMENT

Decontamination Procedures Used

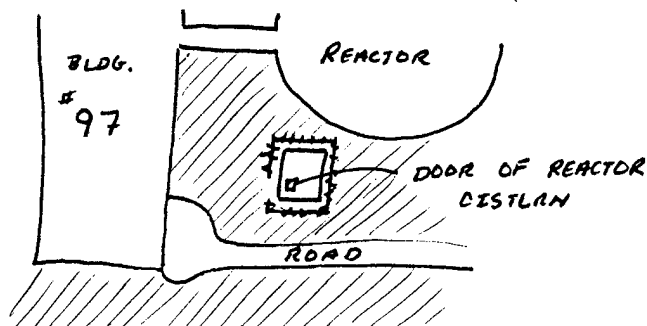
☐ Detergent Wash	☐ Solvent Rinse	☐ Detergent Wash	☐ Other
Water Rinse	Water Rinse	Water Rinse	
Solvent Rinse			
Water Rinse			

Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES ~~OTHER~~	TIME
<u>AGUAQUOI</u>	<u>DIPPING</u>	<u>1 GALLON</u>	<u>NO</u>	<u>HNO₃ pH=2 + Ice</u>	<u>RAD SAMPLE</u>	<u>1515</u>
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)

Signature [Signature] Date 2-15-90 No. Of Bottles 1Page 1 of 1**Arthur D Little**

Arthur D Little	Tank and Sump Sampling Data Sheet	Date <u>2-15-90</u>
		Client <u>AGG/USATHAMA</u>
		Project <u>AMIL-WAIBERTOWN</u>
		Case No. <u>61453-50</u>

TANK / SUMP DESCRIPTION

Sampling Access Description REMOVE RECTANGULAR STORM SEWER GRATE

Leak Detection / Monitoring Present (Describe) NOT APPLICABLE (N.A.)

Tank / Sump Dimensions (LxWxH) SEE MAP Total Volume N.A. % Full SLIGHT FLOW

Tank / Sump Status: Active ☒ Inactive ☐ Date Installed _____ Age _____

Type Of Construction BRICK AND CONCRETE

Content History STORM SEWER (SURFACE RUNOFF).

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NONE

	Pre-Sampling	Time	Reading	Time	Reading
Air Quality Readings	During Sampling	_____	_____	_____	_____
	During Sampling	_____	_____	_____	_____
	During Sampling	_____	_____	_____	_____
	During Sampling	_____	_____	_____	_____
	Post-Sampling	_____	_____	_____	_____

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) N / DEPPER N / CHEMICAL RESISTANT GLOVES

Decontamination Procedures Used

☐ Detergent Wash
Water Rinse
Solvent Rinse
Water Rinse

☐ Solvent Rinse
Water Rinse

☐ Detergent Wash
Water Rinse

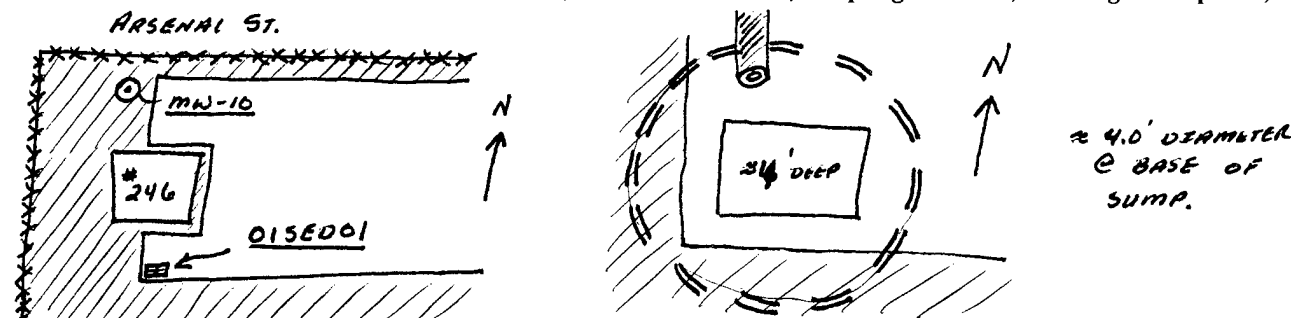
☒ Other

DEDICATED DEP
CUP

Solvent Used _____

SAMPLING		VOLUME	FILTERED	PRESERV.	ANALYSES	TIME
SAMPLE	METHOD	(ml)	(Y/N)		~~OTHER~~	
<u>015ED01</u>	<u>250/SCRAPE</u>	<u>40 ml (13)</u>	<u>NO</u>	<u>ICE</u>	<u>TCL+30 Vol.</u>	<u>1555</u>
" "	" "	<u>1 L</u>	<u>NO</u>	<u>ICE</u>	<u>TCL+30 SEMI-PER</u>	<u>1555</u>
" "	" "	<u>250 ml</u>	<u>NO</u>	<u>ICE</u>	<u>CYANIDE</u>	<u>1555</u>
" "	" "	<u>500 ml</u>	<u>NO</u>	<u>ICE</u>	<u>MEALS/ICM.</u>	<u>1555</u>

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)



Signature [Signature] Date 2-15-90 No. Of Bottles 6

Arthur D Little

Tank and Sump Sampling
Data Sheet

Date 2-15-90

Client EG&G/USATHAMA

Project AMTL-WATERTOWN

Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description REMOVE ROUNDED STORM SEWER GRATE

Leak Detection / Monitoring Present (Describe) NOT APPLICABLE (N.A.)

Tank / Sump Dimensions (LxWxH) SEE MAP Total Volume (N.A.) % Full STANDING WATER

Tank / Sump Status: Active ☒ Inactive ☐ Date Installed _____ Age _____

Type Of Construction BRICK AND CONCRETE

Content History STORM SEWER SURFACE RUN-OFF

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) N.A.

Air Quality Readings	Pre-Sampling	Time	Reading	Time	Reading
	During Sampling				
	During Sampling				
	During Sampling				
	Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) Used A DEPPEL/SCRAPER BUCKET AND CHEM. RESISTANT GLOVES.

Decontamination Procedures Used

Detergent Wash
Water Rinse
Solvent Rinse
Water RinseSolvent Rinse
Water RinseDetergent Wash
Water Rinse

Other

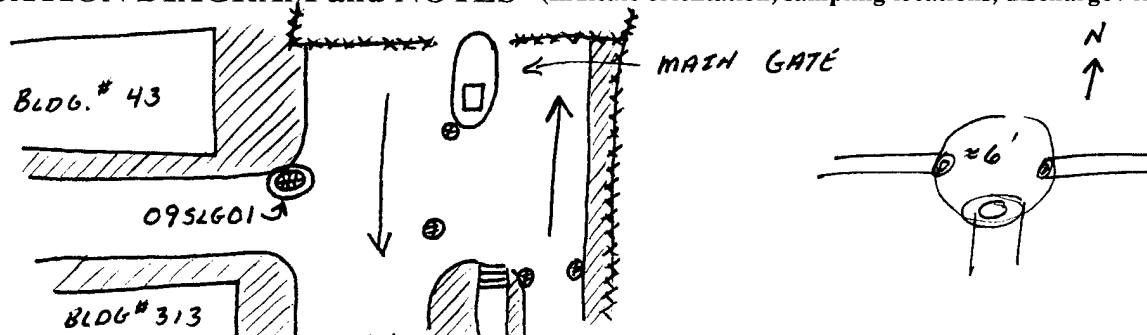
DEDICATED
SCRAPE BUCKET

Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES	TIME
0951601	DEP/SCRAPE	40 ml (x3)	No	ICE	TCL 130 Vol.	1635
" "	" "	1 L	No	ICE	TCL 130 SEMI, + PCB	1635
" "	" "	250 ml	No	ICE	CYANIDE	1635
" "	" "	500 ml	No	ICE	METALS/TCL	1635

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)

Signature *[Signature]*

Date 2/15/90

No. Of Bottles

6

Page 1 of 1

Arthur D Little

Arthur D Little

Tank and Sump Sampling
Data Sheet

Date 2-15-90

Client EG&G/USATHAMA

Project AMTL-WATERDOWN

Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description REMOVE CIRCULAR GRATE (MANHOLE).

Leak Detection / Monitoring Present (Describe) NOT APPLICABLE (N.A.)

Tank / Sump Dimensions (LxWxH) SEE MAP Total Volume N.A. % Full STANDARD WATER

Tank / Sump Status: Active ☒ Inactive ☐ Date Installed Age

Type Of Construction BRICK AND CEMENT

Content History STORM SEWER AND SURFACE RUN-OFF

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings	Pre-Sampling	Time	Reading	Time	Reading
	During Sampling				
	During Sampling				
	During Sampling				
	Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) DIPPER/BUCKET AND CHEM. RESISTANT GLOVES

Decontamination Procedures Used

Detergent Wash
Water Rinse
Solvent Rinse
Water RinseSolvent Rinse
Water RinseDetergent Wash
Water Rinse

Other

DEDICATED
BUCKET.Solvent Used

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES	TIME
125L601	DEP/SCRAPE	40 ml (13)	No	ICE	TCL+30 Vol	1615
" "	" "	1L	No	ICE	TCL+30 SEME, + PCB	1615
" "	" "	250 ml	No	ICE	CYANIDE	1615
" "	" "	500 ml	No	ICE	METALS/TCL	1615

LOCATION DIAGRAM and NOTES

(Indicate orientation, sampling locations, discharge / fill points)

• = OTHER MANHOLES

BLDG. # 60

125L601

118

DUMPSTER

117

LARGE OIL TANKS

N
↑

Signature

Date 2/15/90

No. Of Bottles

6

Page 1 of 1

Arthur D Little

Arthur D Little

Tank and Sump Sampling
Data Sheet

Date 2-20-90

Client EGIG/USATHAMA

Project AMTL-LA/ARTOWN

Case No. 61453-50

TANK / SUMP DESCRIPTION

ENTER THROUGH STORM CELLAR DOORS ON S.W. CORNER,
Sampling Access Description FOLLOW ACCESS WAY TO 1ST LEFT, CROSS PIPES, SUMP JUST AS YOU CROSS PIPES.

Leak Detection / Monitoring Present (Describe) NOT APPLICABLE (N.A.)

Tank / Sump Dimensions (LxWxH) SEE MAP Total Volume JUST SLUDGE % Full 10%

Tank / Sump Status: Active ☒ Inactive ☐ Date Installed Age

Type Of Construction CONCRETE

Content History BUILDING #39 SUMP.

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings	Time		Reading	
	Pre-Sampling			
	During Sampling			
	During Sampling			
	Post-Sampling			

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) SCRAPPED SLUGE W/ GLOVED HAND AND GLASS BEAKER

Decontamination Procedures Used

☐ Detergent Wash
Water Rinse
Solvent Rinse
Water Rinse

☐ Solvent Rinse
Water Rinse

☐ Detergent Wash
Water Rinse

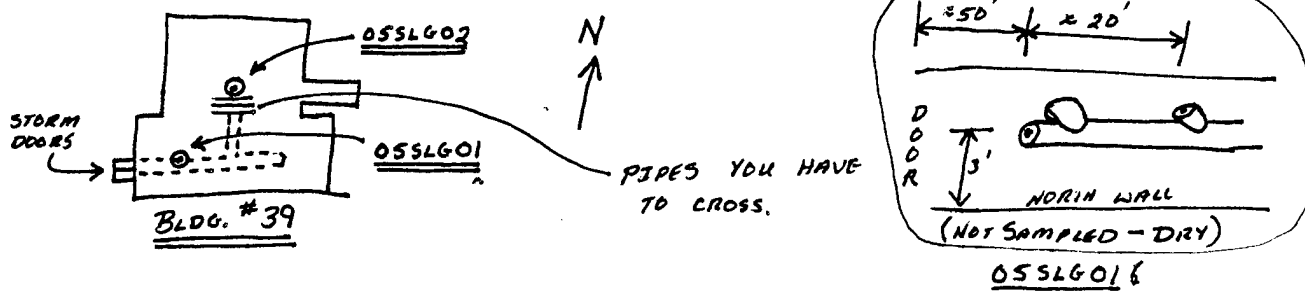
☒ Other
3x D.I. WATER
RINSE

Solvent Used

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES	TIME
05SLG02	GLASS BEAKER	40 ml (13)	NO	ICE	TCL 30 Vol.	1530
" "	" "	1 L	NO	ICE	TCL 30 SLUGS	1530
" "	" "	250 ml	NO	ICE	PCB	1530
" "	" "	500 ml	NO	ICE	CIANIDE	1530
" "	" "	" "	" "	" "	METALS/TCL	1530
" "	" "	" "	" "	" "	" "	" "
" "	" "	" "	" "	" "	" "	" "

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)

Signature Joseph J. Little

Date 2/20/90

No. Of Bottles 6

Page 1 of 1

Arthur D Little

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-20-90

Client LGIG/USATHAMA

Project AMSL-WATER TOWN

Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description REMOVE ROUND/SOLID MANHOLE

Leak Detection / Monitoring Present (Describe) NOT APPLICABLE (N.A.)

Tank / Sump Dimensions (LxWxH) 4' DIAM. 6' DEEP Total Volume N.A. % Full 4" STAND. H₂O

Tank / Sump Status: Active ✓ Inactive Date Installed Age

Type Of Construction BRICK AND CONCRETE

Content History SUMP EAST SIDE OF BUILDING #243.

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings	Time		Reading	
	Pre-Sampling			
	During Sampling			
	During Sampling			
	Post-Sampling			

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) STAINLESS STEEL BAELE W/ DEDICATED STRUNG + CHEM. RESESS. GUIDES

Decontamination Procedures Used



Detergent Wash
Water Rinse
Solvent Rinse
Water Rinse



Solvent Rinse
Water Rinse



Detergent Wash
Water Rinse



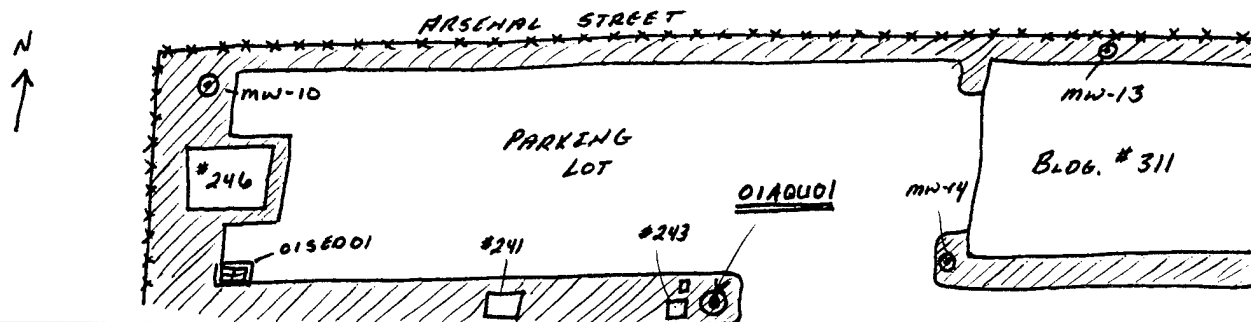
Other
3x D.I. WATER
RINSE

Solvent Used

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES ~~OTHER~~	TIME
<u>01AQU01</u>	<u>BAELER</u>	<u>40 ml (1.3)</u>	<u>NO</u>	<u>ICE, HCl pH < 2</u>	<u>TCL + 30 VOL.</u>	<u>1330</u>
<u>" "</u>	<u>" "</u>	<u>1 GALLON</u>	<u>NO</u>	<u>ICE</u>	<u>TCL + 30 SEMS.</u>	<u>1330</u>
<u>" "</u>	<u>" "</u>	<u>1 L</u>	<u>NO</u>	<u>ICE, NH₄OH pH > 12</u>	<u>CYANIDE</u>	<u>1330</u>
<u>" "</u>	<u>" "</u>	<u>1 L</u>	<u>NO</u>	<u>ICE, NaOH pH > 9</u>	<u>SULFIDE</u>	<u>1330</u>
<u>" "</u>	<u>" "</u>	<u>1 L</u>	<u>YES</u>	<u>+ Zn ACETATE</u>	<u>MTALS/TCL</u>	<u>1330</u>
<u>" "</u>	<u>" "</u>	<u>1 L</u>	<u>YES</u>	<u>ICE, HNO₃ pH < 2</u>	<u>MTALS/TCL</u>	<u>1330</u>

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)



Signature [Signature] Date 2/20/90 No. Of Bottles 7

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-20-90/2-22-90
Client EGIG/USATHAMA
Project AMTL-WAREHOUSE
Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description LOWERED BAELE THROUGH VENT STACKLeak Detection / Monitoring Present (Describe) TANKS MAINTAINED IN CONCRETE VAULT AS 2NDARY CONT.Tank Sump Dimensions (LxWxH) 12' x 27' x 30' LONG Total Volume APPROX. 10,000 g EACH % Full < 5% EACHTank Sump Status: Active _____ Inactive ✓ Date Installed _____ Age _____Type Of Construction STEEL TANKS IN CONCRETE VAULT AS SECONDARY CONTAINMENTContent History CONTAINED FUEL OIL.

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings	Pre-Sampling During Sampling During Sampling During Sampling Post-Sampling	Time	Reading	Time	Reading
		_____	_____	_____	_____
		_____	_____	_____	_____
		_____	_____	_____	_____
		_____	_____	_____	_____

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) 2-1" TEFLOM BAELEERS EACH (LABORATORY CLEANED PRE + POST SAMP)

Decontamination Procedures Used



Detergent Wash
Water Rinse
Solvent Rinse
Water Rinse



Solvent Rinse
Water Rinse



Detergent Wash
Water Rinse



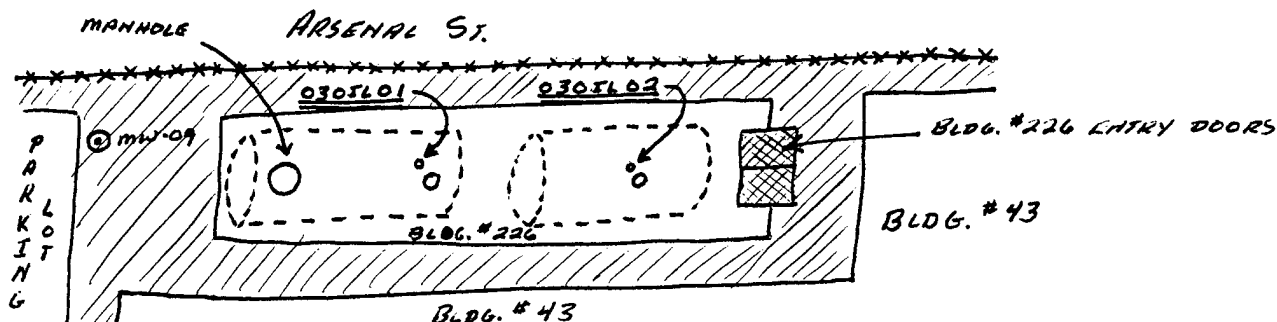
Other
3 x D.I. RINSE BEFORE,
HEXANE + DI RINSE
AFTER

Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES ~~OTHER~~	TIME
<u>0305L02</u>	<u>1" BAELE</u>	<u>40 ml (x3)</u>	<u>NO</u>	<u>ICE</u>	<u>TEL + 30 Vol.</u>	<u>1600 2/20/90</u>
<u>" "</u>	<u>" "</u>	<u>500 ml</u>	<u>NO</u>	<u>ICE</u>	<u>TEL + 30 SEME,</u>	<u>1600 2/20/90</u>
					<u>PCB, CYANINE,</u>	
					<u>SULFIDE,</u>	
					<u>PESTICIDE,</u>	
					<u>METALS</u>	
<u>0305L01</u>	<u>1" BAELE</u>	<u>40 ml (x3)</u>	<u>NO</u>	<u>ICE</u>	<u>SAME</u>	<u>1355 2/22/90</u>
<u>" "</u>	<u>" "</u>	<u>500 ml</u>	<u>NO</u>	<u>ICE</u>	<u>SAME</u>	<u>1355 2/22/90</u>

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)

Signature [Signature] Date 2/22/90 No. Of Bottles 4 + 4 = 8Page 1 of 1

Arthur D Little

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-20-90Client EGIG / USATHAMAProject AMTEL WATER TOWNCase No. 61453-50**TANK / SUMP DESCRIPTION**Sampling Access Description 2 - 2" HOLES DRILLED (PREVIOUSLY) THROUGH LAB FLOORLeak Detection / Monitoring Present (Describe) NONETank / Sump Dimensions (LxWxH) UNKNOWN Total Volume _____ % Full ~ 50 %Tank / Sump Status: Active _____ Inactive ✓ Date Installed _____ Age _____Type Of Construction UNKNOWNContent History UNKNOWN (CESTERN UNDER BLDG. # 313C)**HEALTH and SAFETY MONITORING**Equipment Used (Calibrated Y/N) NOT APPLICABLE

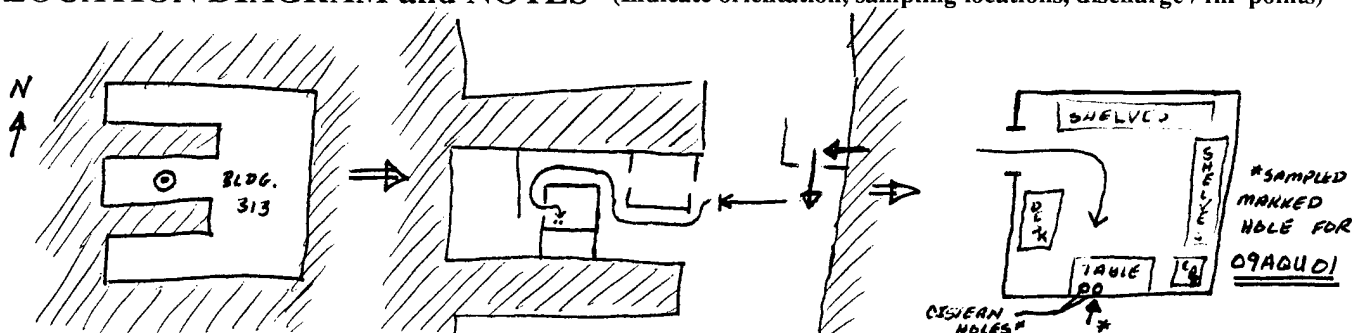
Air Quality Readings	Time		Reading	
	Pre-Sampling			
	During Sampling			
	During Sampling			
	Post-Sampling			

SAMPLING PROCEDUREEquipment Used (Calibrated Y/N) USED 1" DIAM. TEFLOM BAITER, CHEM. RESIST. GLOVES, DEDICATED SYRINGE.**Decontamination Procedures Used**Detergent Wash
Water Rinse
Solvent Rinse
Water RinseSolvent Rinse
Water RinseDetergent Wash
Water RinseOther
3 x D.E. H₂O RINSE

Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSIS	TIME
<u>09AQUO1</u>	<u>BAITER</u>	<u>40 ml (±3)</u>	<u>NO</u>	<u>ICE, HCl, pH 2</u>	<u>TCL + 30 Vol.</u>	<u>1415</u>
" "	" "	<u>1 GALLON</u>	<u>NO</u>	<u>ICE,</u>	<u>TCL + 30 SEME.</u>	<u>1415</u>
" "	" "	<u>1 L</u>	<u>NO</u>	<u>ICE, NaOH, pH > 12</u>	<u>CYANIDE</u>	<u>1415</u>
" "	" "	<u>1 L</u>	<u>NO</u>	<u>ICE, NaOH, pH > 9</u>	<u>SULFIDE</u>	<u>1415</u>
" "	" "			<u>ZINC ACETATE</u>		
" "	" "	<u>1 L</u>	<u>YES</u>	<u>ICE, HNO₃, pH < 2</u>	<u>ARSENIC / TCL</u>	<u>1415</u>

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)Signature [Signature]Date 2/20/90No. Of Bottles 7Page 1 of 1

Arthur D Little

Arthur D Little	Tank and Sump Sampling Data Sheet	Date <u>2-20-90</u>
		Client <u>EG&G/USATHAMA</u>
		Project <u>AMTL-WATERDOWN</u>
		Case No. <u>61453-50</u>

TANK / SUMP DESCRIPTION

Sampling Access Description 1" TEFION BALLER THROUGH VENT STACK.

Leak Detection / Monitoring Present (Describe) NONE

Tank / Sump Dimensions (LxWxH) UNKNOWN Total Volume (41,000) UNKNOWN % Full < 25%

Tank / Sump Status: Active _____ Inactive ✓ Date Installed ? Age ?

Type Of Construction STEEL (BASED ON VENT STACKS)

Content History (HEATING OIL?) TANK EAST SIDE OF BLDG. # 39

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings	Pre-Sampling	Time		Reading	
	During Sampling				
	During Sampling				
	During Sampling				
	Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) 1" DEAM. BALLER w/ DEPLETED STEEL, AND CHRM RESIST. GLOVES.

Decontamination Procedures Used

☐ Detergent Wash	☐ Solvent Rinse	☐ Detergent Wash	☒ Other
Water Rinse	Water Rinse	Water Rinse	
Solvent Rinse			
Water Rinse			

3. D.I. H₂O Rinse

Solvent Used _____

SAMPLING		VOLUME	FILTERED	PRESERV.	ANALYSES	TIME
SAMPLE	METHOD	(ml)	(Y/N)			
<u>0501101</u>	<u>BALLER</u>	<u>40ml (x3)</u>	<u>No</u>	<u>ICE</u>	<u>ICL+30 Vol</u>	<u>1500</u>
<u>" "</u>	<u>" "</u>	<u>500ml</u>	<u>No</u>	<u>ICE</u>	<u>ICL+30 SEMB,</u>	<u>1500</u>
					<u>PCB/PEST,</u>	
					<u>CYANIDE,</u>	
					<u>SULFIDE,</u>	
					<u>METALS</u>	

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)

Signature [Signature] Date 2/20/90 No. Of Bottles 4

Arthur D Little	Tank and Sump Sampling Data Sheet	Date <u>2-22-90</u>
		Client <u>EG&G/USATHAMA</u>
		Project <u>AMIL-WATERTOWN</u>
		Case No. <u>61453-50</u>

TANK / SUMP DESCRIPTION

Sampling Access Description THROUGH BLDG. 226 VAULT DOORS + DOWN LADDER. MANHOLE OPEN @ OTHER END.

Leak Detection / Monitoring Present (Describe) BLDG. 226 IS CONCRETE (2NDARY CONT.) AROUND 2 TANKS.

Tank Sump Dimensions (LxWxH) 12' x 30' EACH Total Volume 2-10,000 GAL. % Full BOTH < 5%

Tank Sump Status: Active _____ Inactive X Date Installed _____ Age _____

Type Of Construction VAULT = CONCRETE, TANKS = STEEL.

Content History VAULT HOUSES THE 2 TANKS, SLUDGE 035L601 COLLECTED FROM VAULT FLOOR.

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) 3 PEOPLE: 1 @ GROUND LEVEL 1 SAMPLER IN SCBA (30 MIN) AND FLASHLIGHT.

Air Quality Readings

	Time	Reading	Time	Reading
Pre-Sampling	<u>1350</u>	<u>21 ppm</u>		
During Sampling				
During Sampling				
During Sampling				
Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) SCBA (30 MIN.), FLASH LIGHT, CHEM RESET. GLOVE, GLASS BEAKER

Decontamination Procedures Used

☐ Detergent Wash	☐ Solvent Rinse	☐ Detergent Wash	☒ Other
Water Rinse	Water Rinse	Water Rinse	
Solvent Rinse			
Water Rinse			<u>3x D.I. H₂O RINSE</u>

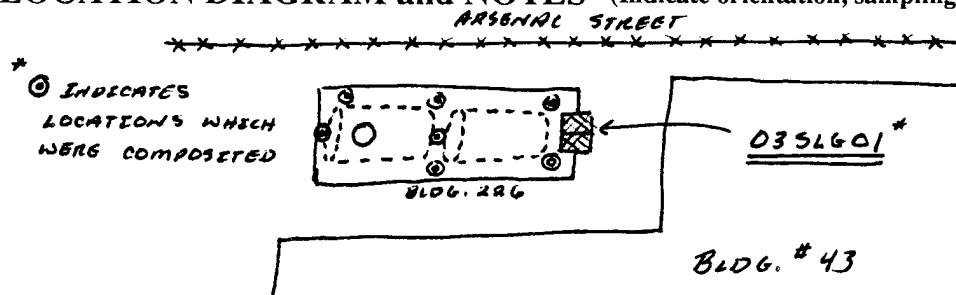
Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES	TIME
<u>035L601</u>	<u>GLASS BEAKER</u>	<u>40 ml (x2)</u>	<u>NO</u>	<u>ICE</u>	<u>OTHER</u>	<u>1355</u>
	<u>(SCRAPE FLOOR)</u>	<u>500 ml</u>	<u>NO</u>	<u>ICE</u>	<u>TC1 + 30 Vol.,</u>	<u>1355</u>
					<u>PCB/PEBT,</u>	
					<u>CYANIDE,</u>	
					<u>SULFIDE</u>	

LOCATION DIAGRAM and NOTES

(Indicate orientation, sampling locations, discharge / fill points)



Signature [Signature] Date 2/22/90 No. Of Bottles 3

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-22-90
 Client EG+G/USATHAMA
 Project AMSL-WATERTOWN
 Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description 2.0' DEEP (DRY) SUMP LOCATED IN BASEMENT OF BLDG. 36.

Leak Detection / Monitoring Present (Describe) NOT APPLICABLE

Tank / Sump Dimensions (LxWxH) 1'x1'x2' Total Volume 2 CUBIC FT. % Full 0%

Tank / Sump Status: Active _____ Inactive X Date Installed _____ Age _____

Type Of Construction CONCRETE SUMP w/ SUMP PUMP INSTALLED.

Content History SUMP BLDG. 36.

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings	Pre-Sampling	Time	Reading	Time	Reading
	During Sampling				
	During Sampling				
	During Sampling				
	Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) DEDICATED TEFLOON BEAKER, WOODEN SCOOP, LATEX GLOVES

Decontamination Procedures Used

☐ Detergent Wash
☐ Water Rinse
☐ Solvent Rinse
☐ Water Rinse
☐ Detergent Wash
☐ Water Rinse
☒ Other
3x D.I. H₂O RINSE

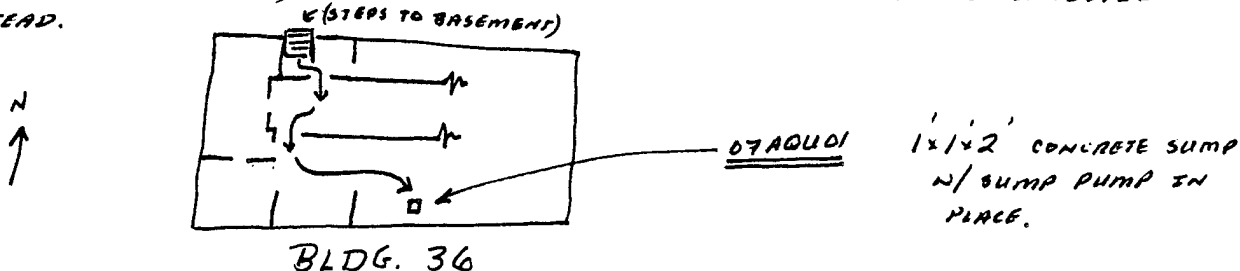
Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES	TIME
<u>07AQU01</u>	<u>SCOOP</u>	<u>40ml (1/3)</u>	<u>NO</u>	<u>ICE</u>	<u>TC1+30 Vol.</u>	<u>1445</u>
<u>" "</u>	<u>" "</u>	<u>12</u>	<u>NO</u>	<u>ICE</u>	<u>TC1+30 SEMS,</u>	<u>1445</u>
<u>" "</u>	<u>" "</u>	<u>250ml</u>	<u>NO</u>	<u>ICE</u>	<u>PCB/PEST</u>	<u>1445</u>
<u>" "</u>	<u>" "</u>	<u>500ml</u>	<u>NO</u>	<u>ICE</u>	<u>CYANIDE</u>	<u>1445</u>
					<u>METALS/TC1</u>	<u>1445</u>

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)

BECAUSE SUMP WAS DRY, EG+G REQUESTED THAT A SEDIMENT SAMPLE BE COLLECTED INSTEAD.



Signature [Signature] Date 2/22/90 No. Of Bottles 6

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Arthur D Little

Tank and Sump Sampling
Data Sheet

Date 2-22/23-90

Client EGIG/USATHAMA

Project AMTL-WATER TOWN

Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description REMOVE STORM SEWER MANHOLELeak Detection / Monitoring Present (Describe) NOT APPLICABLETank / Sump Dimensions (LxWxH) SEE BELOW Total Volume _____ % Full STANDING H₂OTank / Sump Status: Active ☒ Inactive _____ Date Installed _____ Age _____Type Of Construction BRICK AND CONCRETEContent History STORM SEWER SURFACE RUN-OFF

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings	Pre-Sampling	Time	Reading	Time	Reading
	During Sampling				
	During Sampling				
	During Sampling				
	Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) FROM SURFACE USING STAINLESS STEEL DEPPER + CHEM. RESIST. GLOVES

Decontamination Procedures Used

Detergent Wash
Water Rinse
Solvent Rinse
Water RinseSolvent Rinse
Water RinseDetergent Wash
Water RinseOther
3x D.I. WATER
RINSE

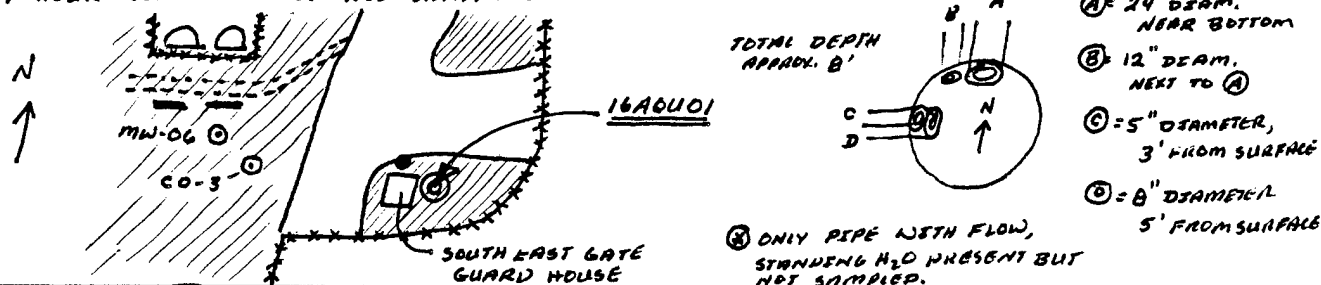
Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES ~~OTHER~~	TIME
16AQUO1	S.S. DEPPER	40 ml (+3)	NO	ICE, NO ₂ PH=2	TC1+3D Vol	2143 (2/22/90)
" "	" "	1 GALLON	NO	ICE	TC1+3D SEMI	1738
" "	" "	1L	NO	ICE, 100% PH=12	CYANIDE	1738
" "	" "	1L	NO	ICE, HNO ₃ PH=9, +2N ACETIC	SULFIDE	1738
" "	" "	1L	NO	ICE, HNO ₃ PH=2	METALS/TC1	1738

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)

24 HOUR COMPOSITE OF ALL SAMPLES EXCEPT VDA'S.

Signature [Signature]Date 2/23/90No. Of Bottles 7Page 1 of 1

Arthur D Little

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-22/23-90
Client EG+G/USATHAMA
Project AMTL - WATER TOWN
Case No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description REMOVE STORM SEWER MANHOLE
Leak Detection / Monitoring Present (Describe) NOT APPLICABLE
Tank / Sump Dimensions (LxWxH) SEE BELOW Total Volume _____ % Full GOOD FLOW + STORM H₂O
Tank / Sump Status: Active X Inactive _____ Date Installed _____ Age _____
Type Of Construction BRICK AND CONCRETE
Content History STORM SEWER

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings	Pre-Sampling	Time	Reading	Time	Reading
	During Sampling				
	During Sampling				
	During Sampling				
	Post-Sampling				

SAMPLING PROCEDURE

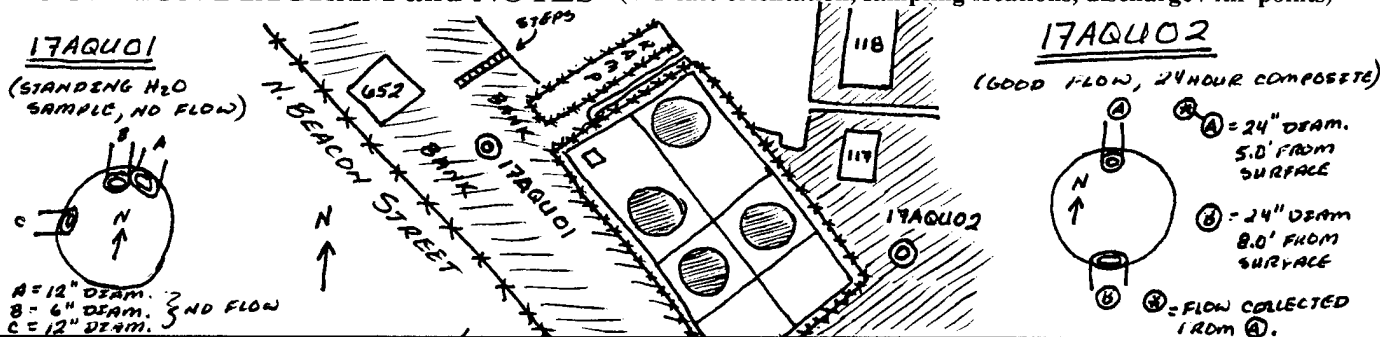
Equipment Used (Calibrated Y/N) FROM SURFACE USING STAINLESS STEEL DEPPER + CHEM. RESIST. GLOVES.
Decontamination Procedures Used
☐ Detergent Wash Water Rinse
☐ Solvent Rinse Water Rinse
☐ Detergent Wash Water Rinse
☒ Other 3x D.I. H₂O RINSE

Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES	TIME
<u>17AQUO2</u>	<u>S.S. DEPPER</u>	<u>40 ml (13)</u>	<u>NO</u>	<u>ICE, HCL pH 2</u>	<u>TC1+30 Vol.</u>	<u>2215 (2/23/90)</u>
" "	" "	<u>1 GALLON</u>	<u>NO</u>	<u>ICE</u>	<u>TC1+30 SUMF.</u>	<u>1804 (2/23/90)</u>
" "	" "	<u>1 L</u>	<u>NO</u>	<u>ICE, NaOH, N=12</u>	<u>CYANIDE</u>	<u>1804 (2/23/90)</u>
" "	" "	<u>1 L</u>	<u>NO</u>	<u>ICE, NaOH, N=12</u>	<u>SULFIDE</u>	<u>1804 (2/23/90)</u>
" "	" "	<u>1 L</u>	<u>NO</u>	<u>ICE, NaOH, N=12</u>	<u>PHOSPHATE</u>	<u>1804 (2/23/90)</u>
" "	" "	<u>1 L</u>	<u>NO</u>	<u>ICE, HNO₃ pH 2</u>	<u>METALS/TC1</u>	<u>1804 (2/23/90)</u>
<u>17AQUO1</u>	<u>SAME</u>	<u>SAME</u>	<u>SAME</u>	<u>SAME</u>	<u>SAME</u>	<u>1824 (2/23/90)</u>

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)



Signature [Signature] Date 2/23/90 No. Of Bottles 7 + 7 = 14

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-22/23-90Client EGIG/USATHAMMAProject AMTL-WATERTOWNCase No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description REMOVE STORM SEWER MANHOLELeak Detection / Monitoring Present (Describe) NOT APPLICABLETank / Sump Dimensions (LxWxH) SEE BELOW Total Volume _____ % Full FLOW T STAND. H₂OTank / Sump Status: Active X Inactive _____ Date Installed _____ Age _____Type Of Construction BRICK AND CONCRETEContent History STORM SEWER (POSSIBLY SEPTIC/SANITARY SEWER)

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings	Pre-Sampling	Time	Reading	Time	Reading
	During Sampling				
	During Sampling				
	During Sampling				
	Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) FROM SURFACE, USING STAINLESS STEEL DEPPER, CHEM. RESIST. GLOVES

Decontamination Procedures Used

☐ Detergent Wash
Water Rinse
Solvent Rinse
Water Rinse☐ Solvent Rinse
Water Rinse☐ Detergent Wash
Water Rinse☒ Other3x D.I. H₂O RINSE

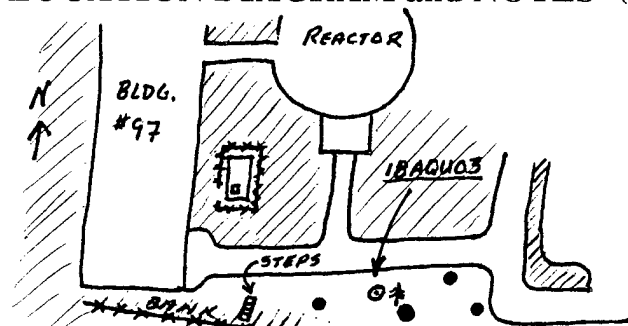
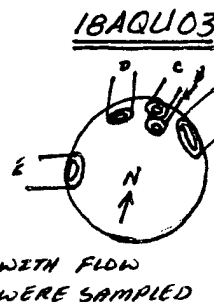
Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES	TIME
<u>18AQU03</u>	<u>S.S. DEPPER</u>	<u>40 ml (x3)</u>	<u>NO</u>	<u>ICE, HCl, pH=2</u>	<u>TC1+30 Vol</u>	<u>2230 (2/22/90)</u>
<u>" "</u>	<u>" "</u>	<u>10 ml (x1)</u>	<u>NO</u>	<u>ICE</u>	<u>TC1+30 SEMI</u>	<u>1836 (2/23/90)</u>
<u>" "</u>	<u>" "</u>	<u>1.0</u>	<u>NO</u>	<u>ICE, NaOH, pH=12</u>	<u>CYANIDE</u>	<u>1836 (2/23/90)</u>
<u>" "</u>	<u>" "</u>	<u>1.0</u>	<u>NO</u>	<u>ICE, NaOH, pH=12, +Zn ACETATE</u>	<u>SULFIDE</u>	<u>1836 (2/23/90)</u>
<u>" "</u>	<u>" "</u>	<u>1.0</u>	<u>NO</u>	<u>ICE, HNO₃, pH=2</u>	<u>METALS/TC1</u>	<u>1836 (2/23/90)</u>

LOCATION DIAGRAM and NOTES

(Indicate orientation, sampling locations, discharge / fill points)

* = TREE
• = OTHER
MANHOLES

④ = 12" DIAM. APPROX. 9.0' FROM SURFACE (F.S.)
⑤ = 6" DIAMETER APPROX. 6.0' F.S.
⑥ = 6" DIAM., APPROX. 4.0' (F.S.)
⑦ = 30" DIAMETER, APPROX. 10.0' F.S.
⑧ = 12" DIAMETER, APPROX. 3.0' F.S.

Signature _____

Date _____

No. Of Bottles _____

Page ____ of ____

Arthur D Little

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-22/23-90
Client EGIG/USATHAMA
Project AMTL WATER TOWN
Case No. 61453 50

TANK / SUMP DESCRIPTION

Sampling Access Description REMOVE STORM SEWER MANHOLE 1BAQUO2/1BAQUO4
Leak Detection / Monitoring Present (Describe) NOT APPLICABLE
Tank / Sump Dimensions (LxWxH) SEE BELOW Total Volume _____ % Full FLOW / LOW FLOW
Tank / Sump Status: Active X Inactive _____ Date Installed _____ Age _____
Type Of Construction BRICK AND CONCRETE
Content History STORM SEWER

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings	Pre-Sampling	Time	Reading	Time	Reading
	During Sampling				
	During Sampling				
	During Sampling				
	Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) FROM SURFACE, USING STAINLESS STEEL BEAPPL, CHEM. RESIST. GLOVES

Decontamination Procedures Used

☐ Detergent Wash Water Rinse Solvent Rinse Water Rinse
☐ Solvent Rinse Water Rinse
☐ Detergent Wash Water Rinse
☒ Other
3x D.I. H₂O RINSE

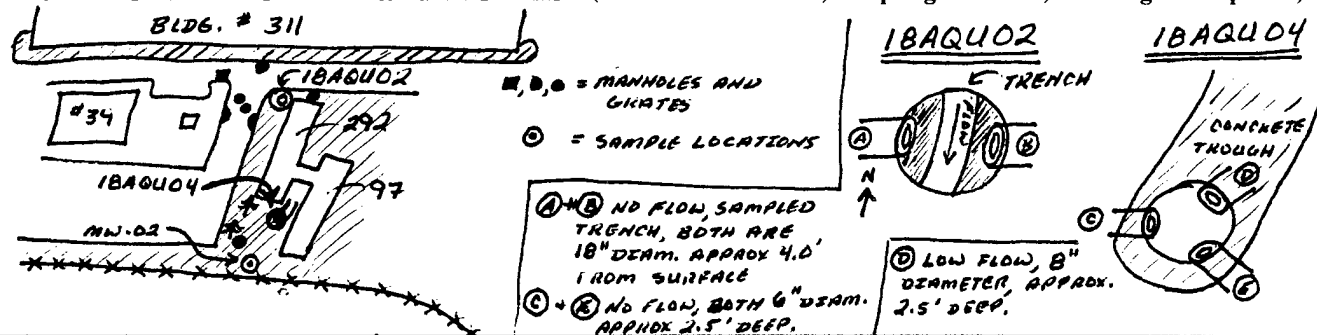
Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES	TIME
<u>1BAQUO2</u>	<u>S.S. DEPPER</u>	<u>40ml (3x)</u>	<u>NO</u>	<u>ICE, HCl pH 4.2</u>	<u>TC1+3D VOL</u>	<u>2250 (2/22/90)</u>
<u>" "</u>	<u>" "</u>	<u>1 GAUON</u>	<u>NO</u>	<u>ICE,</u>	<u>TC1+3D SEME</u>	<u>1435 (2/23/90)</u>
<u>" "</u>	<u>" "</u>	<u>1.8</u>	<u>NO</u>	<u>ICE, NaOH pH 12</u>	<u>CYANIDE B</u>	<u>1435 (2/23/90)</u>
<u>" "</u>	<u>" "</u>	<u>1.8</u>	<u>NO</u>	<u>ICE, NaOH pH 12</u>	<u>SULFIDE</u>	<u>1435 (2/23/90)</u>
<u>" "</u>	<u>" "</u>	<u>1.8</u>	<u>NO</u>	<u>ICE, NaOH pH 12</u>	<u>METALS/TC1</u>	<u>1435 (2/23/90)</u>
<u>1BAQUO4</u>	<u>SAME</u>	<u>SAME</u>	<u>SAME</u>	<u>SAME</u>	<u>SAME</u>	<u>VDA=2307 (2/22/90)</u> <u>RCST=1836 (2/23/90)</u>

LOCATION DIAGRAM and NOTES

(Indicate orientation, sampling locations, discharge / fill points)



Signature [Signature] Date 2/23/90 No. Of Bottles 7 + 7 = 14

Arthur D Little

Tank and Sump Sampling Data Sheet

Date 2-22/23-90Client LGIC/USOTHAMAProject AMTL WATER TOWNCase No. 61453-50

TANK / SUMP DESCRIPTION

Sampling Access Description REMOVE STORM SEWER GRATELeak Detection / Monitoring Present (Describe) NOT APPLICABLETank / Sump Dimensions (LxWxH) SEE BELOW Total Volume _____ % Full FLOWTank / Sump Status: Active X Inactive _____ Date Installed _____ Age _____Type Of Construction BRICK AND CONCRETEContent History STORM SEWER SURFACE RUN-OFF

HEALTH and SAFETY MONITORING

Equipment Used (Calibrated Y/N) NOT APPLICABLE

Air Quality Readings	Pre-Sampling	Time	Reading	Time	Reading
	During Sampling				
	During Sampling				
	During Sampling				
	Post-Sampling				

SAMPLING PROCEDURE

Equipment Used (Calibrated Y/N) FROM SURFACE, USING STAINLESS STEEL DIPPER + CHEM. RESIST GLOVES

Decontamination Procedures Used

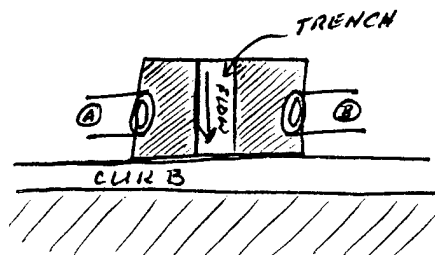
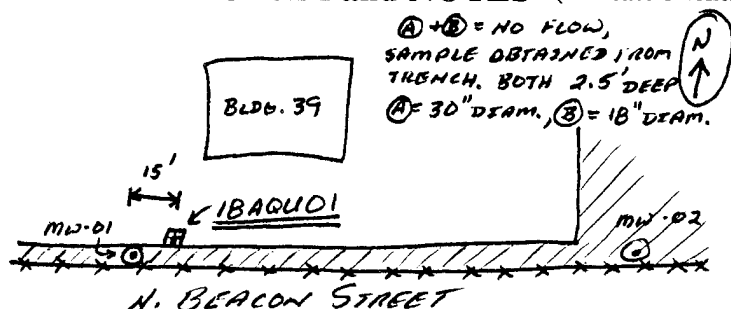
☐ Detergent Wash
Water Rinse
Solvent Rinse
Water Rinse☐ Solvent Rinse
Water Rinse☐ Detergent Wash
Water Rinse☒ Other
3x D.I. WATER
RINSE

Solvent Used _____

SAMPLING

SAMPLE	METHOD	VOLUME (ml)	FILTERED (Y/N)	PRESERV.	ANALYSES	TIME
<u>IBAQUD1</u>	<u>S.S. DIPPER</u>	<u>40 ml (13)</u>	<u>NO</u>	<u>IEE, HCL, PH=2</u>	<u>TEL+30 Vol</u>	<u>2320 (2/22/90)</u>
<u>" "</u>	<u>" "</u>	<u>1.0 L</u>	<u>NO</u>	<u>IEE</u>	<u>TEL+30 SEMS</u>	<u>1902 (2/23/90)</u>
<u>" "</u>	<u>" "</u>	<u>1.0</u>	<u>NO</u>	<u>IEE, NACHMAN 712</u>	<u>CYANIDE</u>	<u>1902 (2/23/90)</u>
<u>" "</u>	<u>" "</u>	<u>1.0</u>	<u>NO</u>	<u>IEE, NACHMAN 712</u>	<u>SULFIDE</u>	<u>1902 (2/23/90)</u>
<u>" "</u>	<u>" "</u>	<u>1.0</u>	<u>NO</u>	<u>2N ACETATE</u>		
<u>" "</u>	<u>" "</u>	<u>1.0</u>	<u>NO</u>	<u>IEE, HNB, PH=2</u>	<u>MEANS/TEL</u>	<u>1902 (2/23/90)</u>

LOCATION DIAGRAM and NOTES (Indicate orientation, sampling locations, discharge / fill points)

Signature [Signature]Date 2/23/90 No. Of Bottles 7Page 1 of 1**Arthur D Little**

Memorandum

Date: February 9, 1990

To: C. Washburn

From: R. Lambe

Loc: 15F/214

Ext: 5498

Subject: AMTL Watertown Samples

I have been informed by my field crew that zinc acetate was added to the water samples for MW-01, MW-02, and MW-10 (collected on February 8) to be analyzed for metals by mistake. Please destroy these samples (metals fraction only). I am having new samples collected for metals today, February 9, for MW-01, MW-02, and MW-10. If you have any further questions, please call me at Ext. 5498.

Arthur D Little

Memorandum

Date: March 2, 1990

To: C. Washburn
cc: S. Spellenberg

From: K. Thrun
Loc: 15F/202
Ext: 2311

Subject: EG&G Idaho, AMTL Watertown

As discussed with you and Steve Spellenberg, metals analysis was inadvertently omitted from the chain-of-custody sheets for the following samples:

030IL01
03SLG01
03OIL02
050IL01 (if labeled 05OIL02, this sample should correctly be
labeled 05OIL01)

Please add.

Memorandum

Date: February 16, 1990

To: C. Washburn

From: R. Lambe

Loc: 15F/214

Ext: 5498

Subject: AMTL Watertown Samples

I have been informed by my field crew that equipment blanks were collected today for the soil sampling activity, four days after the last complete day of soil sampling. The field crew duplicated soil sampling procedures at sample locations 01sol01 and 06sub01 and conducted normal decontamination procedures of all sampling equipment after each sample. Equipment blanks were collected following decontamination procedures and labelled 01sol01BL and 06sub01BL. No soil samples were actually collected during this procedure. If you have any further questions, please call me at extension 5498.

Arthur D Little

Memorandum

Date: April 25, 1990
To: Files
From: Robert Lambe, AMTL Project Manager
Subject: Chain-of-Custody Forms for AMTL Project

It has come to my attention that three chain-of-custody forms completed by Scot Foster of Arthur D. Little were signed in the "Sampler(s) (Signature)" space and not in the "Relinquished by: (Signature)" space as required. These forms are:

2/9/90 02S0L01, 06AQU01, 17S0L01, 17SUB01, 17SUB02 (two pages)
2/12/90 03S0L01, 06S0L01, 09S0L01, 09S0L02, 13S0L01,
15S0L01, 17S0I02, 17SUB03 (two pages)
2/16/90 0S0L01TB, 0S0L01BL, 06SUB01BL (one page)

Each of the sample containers (coolers) holding these samples was personally delivered by Scot Foster on the evening of the collection day to the limited access, secure facilities of Arthur D. Little at Acorn Park in Cambridge. The samples were logged in by the laboratory as follows:

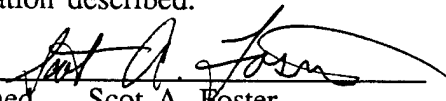
Samples Taken/Delivered

2/9/90
2/12/90
2/16/90

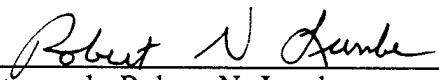
Samples Received by Laboratory

2/12/90
2/13/90
2/16/90

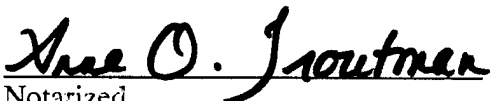
I, Scott Foster, do attest that the above statement is an accurate description of the situation described.


Signed Scot A. Foster

4/25/90
Date


Witnessed Robert N. Lambe,
Project Manager

4-25-90
Date


Notarized

4/25/90
Date

NOTARY PUBLIC

COMMONWEALTH OF MASSACHUSETTS

COUNTY OF MIDDLESEX

Arthur D Little

SAMPLERS: (Signature)

Signature _____

SEE PLANT NO
REMARKS
NOTE: METALS SAMPLES
DISCARDED

STA. NO.		DATE	TIME	COMP.	GRAB	STATION LOCATION	CON-TAINERS	TCL + 30	CYLINDERS	MARKS / COMMENTS	REMARKS
NOTE: METALS SAMPLES DISCARDED											
MW-02		2/8/90	4:35 PM	✓	✓	MW-02	3	✓	✓	ADL TAC #3: 2846, 2847, 2879 ICE, pH=2	
"		"	"	✓	✓	"	1	✓	✓	2880	ICE
"		"	"	✓	✓	"	1	✓	✓	" : 2850	ICE, NaOH pH>12
"		"	"	✓	✓	"	1	✓	✓	" : 2851	Zephrene Ice, NaOH pH>9
"		"	"	✓	✓	"	1	✓	✓	" : 2852	ICE, HND, pH=2
MW-01		2/8/90	6:00 PM	✓	✓	MW-01	3	✓	✓	" : 2810, 2819, 2820	ICE, HCL pH=2
"		"	"	✓	✓	"	1	✓	✓	2821	ICE
"		"	"	✓	✓	"	1	✓	✓	" : 2822	ICE, NaOH pH>12
"		"	"	✓	✓	"	1	✓	✓	" : 2823	Zephrene Ice, NaOH pH>9
"		"	"	✓	✓	"	1	✓	✓	" : 2824	ICE, HND, pH=2
MW-10		2/8/90	7:00 AM	✓	✓	MW-10	3	✓	✓	" : 2825, 2826, 2827	ICE, HCL pH=2
"		"	"	✓	✓	"	1	✓	✓	2828	ICE
"		"	"	✓	✓	"	1	✓	✓	" : 2829	ICE, NaOH pH>12
"		"	"	✓	✓	"	1	✓	✓	" : 2830	Zephrene Ice, NaOH pH>9
"		"	"	✓	✓	"	1	✓	✓	" : 2831	ICE, HND, pH=2
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)		Date / Time		Received by: (Signature)	
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)		Date / Time		Received by: (Signature)	
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)		Date / Time		Received by: (Signature)	

2/9/90 12:00

2/9/90 8:15 AM

2/9/90 11:45

W.H. Sill DA

Copy Wall

2/9/90 11:45

Original Accompanies Shipments; Copy to Coordinator Field Files

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

Distribution: Original Accompanies Shipment Copy to Coordinator Field Files

Cooler Number.

2 of 2

Arthur D. Little, Inc.

CHAIN OF CUSTODY RECORD

Page

of

PROJ. NO.		PROJECT NAME		Analyses				Remarks		SAMPLE CONDITION UPON RECEIPT	
61453		AMTL - WATERTOWN, MA.		ANALYSES TOL - 30 Volatiles METALS / TEL METALS CYANIDE							
SAMPLERS: (Signature)		DATE		TIME		STATION LOCATION		PRESERVATION			
CO-3	2-14-90	2:44	PM	✓	✓	✓	CO-3	Ice, HCl, pH 2	3	ADL TAG #3: 0847, 0848, 0849	O.K.
"	"	"	"	✓	✓	✓	"	Ice, NaOH, pH 12	✓	" 0851	
"	"	"	"	✓	✓	✓	"	Ice, NaOH, pH 9	✓	" 0852	
"	"	"	"	✓	✓	✓	"	Ice, HNO ₃ , pH 2	✓	" 0853	
MW-06	2-14-90	2:57	PM	✓	✓	✓	MW-06	Ice, HCl, pH 2	3	" 0854, 0855, 0856	
"	"	"	"	✓	✓	✓	"	Ice, NaOH, pH 12	✓	" 0858	
"	"	"	"	✓	✓	✓	"	Ice, NaOH, pH 9	✓	" 0859	
"	"	"	"	✓	✓	✓	"	Ice, HNO ₃ , pH 2	✓	" 0860	
TRIP BLANK	2-14-90	3:50	PM	✓	✓	✓	TRIP BLANK	Ice	3	" 0861, 0862, 0863	
"	"	"	"	✓	✓	✓	"	Ice	XV	" 0865	
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Date / Time		Shipped to:			
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Date / Time					
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Date / Time					

Distribution: Original Accompanies Shipment; Yellow Copy to Case Manager; Pink Copy for Field Files

 Arthur D. Little, Inc. 25 Acorn Park, Cambridge, MA 02140 (617) 864-5770
 Telex 921436 Tel-Fax (617) 661-1622

 *Letter denotes sample matrix
 W - Water S - Soil LW - Liquid Waste SW - Solid Waste

CHAIN OF CUSTODY RECORD

[illegible]

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CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME	Analyses				Remarks	SAMPLE CONDITION UPON RECEIPT
SAMPLE/STATION NUMBER	DATE	TIME	STATION LOCATION	PRESERVATION	Analyses	Remarks	SAMPLE CONDITION UPON RECEIPT
CO-2	2-13-90	10:50	CO-2 (DUPLICATE)	Ice, HCl pH=2	✓	ADL Tag #: 0802, 0803, 0804	
"	"	"	"	Ice	✓	: 0805	
"	"	"	"	Ice, NaOH pH=12	✓	: 0806	
"	"	"	"	Ice, Zn Acetate	✓	: 0807	
"	"	"	"	Ice, HNO ₃ pH=2	✓	: 0808	
MW-04	2-13-90	2:42	MW-04 (DUPLICATE)	Ice, HCl pH=2	✓	: 0809, 0810, 0811	
"	"	"	"	Ice	✓	: 0812	
"	"	"	"	Ice, NaOH pH=12	✓	: 0813	
"	"	"	"	Ice, Zn Acetate	✓	: 0814	
"	"	"	"	Ice, HNO ₃ pH=2	✓	: 0815	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Shipped to:
Arthur D. Little, Inc.	2/14/90 745	W. H. Smith	2/14/90 945	
Arthur D. Little, Inc.	2/13/90 6:30 pm	Arthur D. Little, Inc.		

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Cooler Numb. 2

of 1

Arthur Little, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJ. NO.		PROJECT NAME		Analyses		Remarks		SAMPLE CONDITION UPON RECEIPT	
61453		AMTL - WATERTOWN, MA.		TCL + 305 Semi Volatiles		TCL + 305 Semi Volatiles			
SAMPLERS: (Signature)		DATE		TIME		STATION LOCATION		PRESERVATION	
MW-05	2/13/90	5:35 PM	MW-05	✓	✓	Ice, HCl pH=2	3	ADL Tac #1: 0816, 0817, 0818	
"	"	"	"	✓	✓	Ice	✓	: 0819	
"	"	"	"	✓	✓	Ice, NaOH pH=12	✓	: 0820	
"	"	"	"	✓	✓	Ice, NaOH pH=9	✓	: 0821	
"	"	"	"	✓	✓	Ice, HNO ₃ pH=2	✓	: 0822	
MW-11	2/13/90	5:35 PM	MW-11	✓	✓	Ice, HCl pH=2	3	: 0823, 0824, 0825	
"	"	"	"	✓	✓	Ice	✓	: 0826	
"	"	"	"	✓	✓	Ice, NaOH pH=12	✓	: 0827	
"	"	"	"	✓	✓	Ice, NaOH pH=9	✓	: 0828	
"	"	"	"	✓	✓	Ice, HNO ₃ pH=2	✓	: 0829	
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Shipped to:			
Relinquished by: (Signature)		Date / Time		Received by: (Signature)					
Relinquished by: (Signature)		Date / Time		Received for Laboratory by: (Signature)		Date / Time		Carrier:	
2/13/90		945		With: SIDA QA		2/13/90		4/14/90	

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*Letter denotes sample matrix

W - Water

S - Soil

LW - Liquid Waste

SW - Solid Waste

CHAIN OF CUSTODY RECORD

PROJ. NO.		PROJECT NAME		ANALYSES		REMARKS		SAMPLE CONDITION UPON RECEIPT	
61453		AMTL - WATERTOWN, MA.		TCL + 30 Volatiles TCL + 30 Semivolatiles TCL + 30 SVs TCL + 30 SVs TCL + 30 SVs					
SAMPLERS: (Signature)		DATE		TIME		STATION LOCATION		PRESERVATION	
MW-03	2-12-90	6:23 PM	"	"	"	"	"	ICE, HCL, pH < 2	3
"	"	"	"	"	"	"	"	ICE	"
"	"	"	"	"	"	"	"	ICE, NaOH, pH > 12	"
"	"	"	"	"	"	"	"	ICE, NaOH, pH > 9	"
"	"	"	"	"	"	"	"	ICE, NaOH, pH < 2	"
MW-09	2-12-90	6:50 PM	"	"	"	"	"	ICE, HCL, pH < 2	3
"	"	"	"	"	"	"	"	ICE	"
"	"	"	"	"	"	"	"	ICE, pH < 2, pH > 12	"
"	"	"	"	"	"	"	"	ICE, pH < 2, pH > 9	"
"	"	"	"	"	"	"	"	ICE, NaOH, pH < 2	"
Relinquished by: (Signature) Date/Time Received by: (Signature) Date/Time Relinquished by: (Signature) Date/Time Received by: (Signature) Date/Time Relinquished by: (Signature) Date/Time Received by: (Signature) Date/Time									

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CHAIN OF CUSTODY RECORD

PROJ. NO. 61453		PROJECT NAME		ANALYSES		REMARKS		SAMPLE CONDITION UPON RECEIPT	
SAMPLERS: (Signature) <i>Don J. Little</i>		PROJECT NAME		ANALYSES		REMARKS		SAMPLE CONDITION UPON RECEIPT	
SAMPLE/STATION NUMBER	DATE	TIME	STATION LOCATION	PRESERVATION	ANALYSES	REMARKS	SAMPLE CONDITION UPON RECEIPT		
MW-08	2-12-90	7:20 PM	MW-08	Ice, HCl, pH 2	✓	APL Inc. # 0760, 0761, 0762			
"	"	"	"	Ice	✓	0763			
"	"	"	"	Ice, NaOH, pH 12	✓	0764			
"	"	"	"	Ice, NaOH, pH 12	✓	0765			
"	"	"	"	Ice, NaOH, pH 12	✓	0766			
MW-04	2-12-90	6:02 PM	MW-04	Ice, HCl, pH 2	✓	0767, 0768, 0769			
"	"	"	"	Ice	✓	0770			
"	"	"	"	Ice, NaOH, pH 12	✓	0771			
"	"	"	"	Ice, NaOH, pH 12	✓	0772			
"	"	"	"	Ice, NaOH, pH 12	✓	0773			

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Shipped to:
<i>Don J. Little</i>	2/13/90 1330	<i>William J. O'Neil</i>	2/13/90 1330	
<i>Don J. Little</i>	2/12/90 09:15 PM	<i>William J. O'Neil</i>	2/12/90 09:15 PM	

Cooler Number: 2 of 2

Arthur Little, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJ. NO.	PROJECT NAME		Analyses				Remarks		SAMPLE CONDITION UPON RECEIPT
G1453	MML - WATER TOWN, MA								
SAMPLERS: (Signature) <i>Don J. Little</i>									
SAMPLE/STATION NUMBER	DATE	TIME	* C O M P	* C R A B	STATION LOCATION	PRESERVATION	ANALYSES	REMARKS	
MW-14	2-9-90	2:50	✓	✓	MW-14	TCC, HCL pH 12	✓	ADL TAG #3: 2933, 2933, 2935	
MW-14	2-9-90	"	✓	✓	MW-14	TCC	✓	" : 2928	
MW-14	2-9-90	"	✓	✓	MW-14	NaOH, TCC	✓	" : 2929	
MW-14	2-9-90	"	✓	✓	MW-14	TCC	✓	" : 2930	
MW-14	2-9-90	"	✓	✓	MW-14	NaOH, pH 12	✓	" : 2931	
MW-13	2-9-90	11:20	✓	✓	MW-13	TCC, HCL pH 12	✓	" : 2925, 2926, 2927	
MW-13	2-9-90	"	✓	✓	MW-13	TCC	✓	" : 2924	
MW-13	2-9-90	"	✓	✓	MW-13	TCC, NaOH pH 12	✓	" : 2923 Cyanide container compressed	
MW-13	2-9-90	"	✓	✓	MW-13	TCC, NaOH pH 12	✓	" : 2922	
MW-13	2-9-90	"	✓	✓	MW-13	TCC, HNO ₃ pH 2	✓	" : 2921	
MW-07	2-9-90	3:00	✓	✓	MW-07	TCC, HCL pH 12	✓	" : 2956, 2957, 2959	
MW-07	2-9-90	"	✓	✓	MW-07	TCC	✓	" : 2955	
MW-07	2-9-90	"	✓	✓	MW-07	TCC, NaOH pH 12	✓	" : 2954	
MW-07	2-9-90	"	✓	✓	MW-07	TCC, NaOH pH 12	✓	" : 2953	
MW-07	2-9-90	"	✓	✓	MW-07	TCC, HNO ₃ pH 2	✓	" : 2915	
Relinquished by: (Signature)			Date/Time		Received by: (Signature)		Date/Time		Shipped to:
Relinquished by: (Signature)			2/12/90 1030		Received by: (Signature) <i>Will Silb QA</i>		2/12/90 1030		
Relinquished by: (Signature) <i>Don J. Little</i>			2/9/90 5:30		Received for Laboratory by: (Signature) <i>Optelville</i>		2/12/90 1030		Carrier:

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*Letter denotes sample matrix
 W - Water S - Soil LW - Liquid Waste SW - Solid Waste

PROJ. NO.		PROJECT NAME		Analyses		Remarks		SAMPLE CONDITION UPON RECEIPT	
61453		Amtl - WARETOWN, MA.		ICL 30 VOCARIES		CYANIDE		METHS / ICL METHS	
SAMPLERS: (Signature)		Date/Time		STATION LOCATION		PRESERVATION			
MW-01	2-9-90 11:35	✓	MW-01	ICL, HNO ₃ , pH 2	✓	MOL TAG #5: 2943			
MW-02	2-9-90 12:33	✓	MW-02	ICL, HNO ₃ , pH 2	✓	" " : 2914			
MW-03	2-9-90 11:00	✓	MW-03	ICL, HNO ₃ , pH 2	✓	" " : 2944			
MW-04	2-9-90 10:45	✓	W-04						
MW-07	2-9-90 5:00	✓	MW-07	ICL, HNO ₃ , pH 2	✓	: 2956, 2957, 2958			
MW-07	2-9-90 5:00	✓	MW-07	ICL	✓	: 2955			
MW-07	2-9-90 5:00	✓	MW-07	ICL, NaOH, pH 2	✓	: 2959			
MW-07	2-9-90 5:00	✓	MW-07	ICL, NaOH, pH 2	✓	: 2953			
MW-07	2-9-90 5:00	✓	MW-07	ICL, HNO ₃ , pH 2	✓	: 2915			
Relinquished by: (Signature)		Date/Time		Received by: (Signature)		Shipped to:			
Relinquished by: (Signature)		Date/Time		Received by: (Signature)					
Relinquished by: (Signature)		Date/Time		Received for Laboratory by: (Signature)		Carrier:			

CHAIN OF CUSTODY RECORD

[illegible]

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(617) 864-5770

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CHAIN OF CUSTODY RECORD

PROJ. NO.		PROJECT NAME		Analyses				Remarks		SAMPLE CONDITION UPON RECEIPT	
61453		AMTL - WAREHOUSING, MA.		ICE, 30 LBS CRYSTALS SALT 0.5 TCL METALS							
SAMPLERS: (Signature)											
SAMPLE/STATION NUMBER	DATE	TIME	STATION LOCATION	PRESERVATION	✓	✓	✓	✓	✓	✓	✓
1BAQU01	2-22-90	2320	WAREHOUSE SOUTH OF BLDG 39	ICE, HCL pH < 2	✓						
"	2-23-90	1902	"	ICE, NaOH pH > 12		✓					ADL TAG #: 0938, 0939, 0940
"	"	1902	"	ICE, NaOH pH > 9		✓					: 2971
"	"	1902	"	ICE, HNO ₃ pH < 2		✓					: 2972
"	"	1902	"	ICE, HNO ₃ pH < 2		✓					: 2973
1BAQU02	2-22-90	2250	WAREHOUSE SOUTH OF BLDG. 100	ICE, HCL pH < 2	✓						: 2974, 2975, 2976
"	2-23-90	1435	"	ICE, NaOH pH > 12		✓					: 2978
"	"	1435	"	ICE, NaOH pH > 9		✓					: 2979
"	"	1435	"	ICE, HNO ₃ pH < 2		✓					: 2980
1BAQU03	2-22-90	2230	CATCH BASIN N.E. CORNER OF BLDG 39	ICE, HCL pH < 2	✓						: 2981, 2982, 2983
"	2-23-90	1418	"	ICE, NaOH pH > 12		✓					: 2985
"	"	1418	"	ICE, NaOH pH > 9		✓					: 2986
"	"	1418	"	ICE, HNO ₃ pH < 2		✓					: 2987
1BAQU04	2-22-90	2307	CATCH BASIN BETWEEN BLDG 242 & BLDG 97	ICE, HCL pH < 2	✓						: 2988, 2989, 2990
"	2-23-90	636	"	ICE, NaOH pH > 12		✓					: 2992
"	"	636	"	ICE, NaOH pH > 9		✓					: 2993
Relinquished by: (Signature)				Received by: (Signature)				Shipped to:			
2-23-90 1044				2-23-90 1044				Empty			
Relinquished by: (Signature)				Received by: (Signature)				Carrier:			
2-23-90 1950				2-23-90 1950				2/26/90 0900			

CHAIN OF CUSTODY RECORD

PROJ. NO.		PROJECT NAME		Analyses		Remarks		SAMPLE CONDITION UPON RECEIPT	
61453		AMTL - WATERDOWN, MA.		CYANIDE / TCL METALS					
SAMPLERS: (Signature)		Date		TIME		STATION LOCATION		PRESERVATION	
16AQU01	2-22-90	2143	✓	END OF TAILCOTT AVE	Ice, HCL pH=2	3			ADL TAG #: 1995, 1996, 1997
"	2-23-90	1738	✓	"	Ice, NaOH pH=12	1	1/3 fill		: 1999
"	"	1738	✓	"	Ice, 24 HOURS	1	1/3 fill		: 2000
"	"	1738	✓	"	Ice, NaOH pH=9	1	1/3 fill		: 0923
17AQU01	2-23-90	1824	✓	MANHOLE EAST OF BLDG. 452	Ice, HCL pH=2	3	1/2 heads pace		: 0924, 0925, 0926
"	2-23-90	1824	✓	"	Ice, NaOH pH=12	1			: 0928
"	"	1824	✓	"	Ice, 24 HOURS	1			: 0929
"	"	1824	✓	"	Ice, NaOH pH=9	1			: 0930
17AQU02	2-23-90	2215	✓	MANHOLE EAST OF BLDG. 117	Ice, HCL pH=2	3			: 0931, 0932, 0933
"	2-23-90	1804	✓	"	Ice, NaOH pH=12	1			: 0935
"	"	1804	✓	"	Ice, 24 HOURS	1			: 0936
"	"	1804	✓	"	Ice, NaOH pH=9	1			: 0937

Relinquished by: (Signature)		Date/Time		Received by: (Signature)		Date/Time		Shipped to:	
[Signature]		2-23-90 1044		Kevin Kuechler					
Kevin Kuechler		2-23-90 1935		[Signature]		2/26/90 0900		Carrier:	

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 W - Water S - Soil LW - Liquid Waste SW - Solid Waste

CHAIN OF CUSTODY RECORD

PROJ. NO.		PROJECT NAME		NO. OF CONTAINERS		ANALYSIS				REMARKS	
61453		AMTL - WATERTOWN, MA.				TCL+30 Volatile Organics PCBs Crystalline Metals / TCL Metals					
STA. NO.	DATE	TIME	COMP	GRAB	STATION LOCATION						
0150101	2-8-90	11:25 AM	✓	✓	WEST SIDE OF BUILDING 243	✓				ADL #s: 2770, 2771, 2772	COOL 4°F
"	"	11:25	✓		"	✓	✓			" : 2773	"
"	"	"	✓		"			✓		" : 2774	"
"	"	"	✓		"			✓		" : 2775	"
0250101	2-8-90			✓	STEEL FLOOR BUILDING 311	✓				" : 2776, 2777, 2778	"
"	"		✓		"	✓	✓			" : 2779	"
"	"		✓		"			✓		" : 2780	"
"	"		✓		"			✓		" : 2781	"
0650101	2-8-90	12:36	✓	✓	SOUTH OF BUILDING 100	✓				" : 2782, 2783, 2784	"
"	"	12:36	✓		"	✓	✓			" : 2785	"
"	"	"	✓		"			✓		" : 2786	"
"	"	"	✓		"			✓		" : 2787	"
1250101	2-8-90	2:56		✓	GRASS AREA SOUTH OF Bldg. 80	✓				" : 2788, 2789, 2790	"
"	"	"	✓		"	✓	✓			" : 2791	"
"	"	"	✓		"			✓		" : 2792	"
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Date / Time		Relinquished by: (Signature)		Date / Time	
Adel A. Foster											
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Date / Time		Relinquished by: (Signature)		Date / Time	
		2/9/90 1130		Wm. Silt PA							
Relinquished by: (Signature)		Date / Time		Received for Laboratory by: (Signature)		Date / Time		Remarks			
				Wm. Silt PA		2/9/90 1130					

CHAIN OF CUSTODY RECORD

PROJ. NO.		PROJECT NAME		STATION LOCATION		NO. OF CONTAINERS	TCL + 30 Vol. Org.				CYANOIDE / TCL METALS				REMARKS
STA. NO.	DATE	TIME	COMP	GRAB	TCL + 30 Vol. Org.		PCBs	TCL + 30 Vol. Org.	CYANOIDE	TCL METALS					
61453	AMTL - WATERTOWN, MA.						1							ADL #s: 2793	COOL 40°C
14SUB01	2-8-90	2:56	✓		✓	GRASS AREA SOUTH OF BLDG. 60	3	✓						" " 2794, 2795, 2796	"
"	"	"	✓		✓	SOUTHEAST CORNER, UNIT 14	1		✓					" " 2797	"
"	"	"	✓		✓	"	1			✓				" " 2798	"
"	"	"	✓		✓	"	1			✓				" " 2799	"
14SUB02	2-8-90	2:00	✓		✓	NORTHEAST CORNER, UNIT 14	3	✓						" " 2800, 2801, 2802	"
"	"	"	✓		✓	"	1		✓					" " 2803	"
"	"	"	✓		✓	"	1			✓				" " 2804	"
"	"	"	✓		✓	"	1			✓				" " 2805	"
14SUB01	2-8-90		✓		✓	SOUTHEAST CORNER, UNIT 15	3	✓						" " 2806, 2807, 2808	"
"	"		✓		✓	"	1		✓					" " 2809	"
"	"		✓		✓	"	1			✓				" " 2810	"
"	"		✓		✓	"	1			✓				" " 2811	"
15SUB02	2-8-90	4:30	✓		✓	NORTHWEST CORNER, UNIT 15	3	✓						" " 2812, 2813, 2814	"
"	"	4:30	✓		✓	"	1		✓					" " 2815	"
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)		Date / Time		Received by: (Signature)					
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)		Date / Time		Received by: (Signature)					
Relinquished by: (Signature)		Date / Time		Received by: (Signature)		Relinquished by: (Signature)		Date / Time		Received by: (Signature)					

CHAIN OF CUSTODY RECORD

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CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME	ANALYSES				REMARKS	SAMPLE CONDITION UPON RECEIPT
PROJ. NO.	PROJECT NAME	ANALYSES				REMARKS	SAMPLE CONDITION UPON RECEIPT
61453	AMTL - WATERTOWN	ANALYSES				REMARKS	SAMPLE CONDITION UPON RECEIPT
SAMPLERS: (Signature)		ANALYSES				REMARKS	SAMPLE CONDITION UPON RECEIPT
DATE		TIME	STATION LOCATION	PRESERVATION	ANALYSES	REMARKS	SAMPLE CONDITION UPON RECEIPT
17 Sub 01	2/9/90	2:10	PAK - SOUTH OF N. BENSON ST.	ICE	✓		
"	"	"	"	"	✓		
"	"	"	"	"	✓		
"	"	"	"	"	✓		
17 Sub 02	2/9/90	3:00	PAK - SOUTH OF N. BENSON ST.	ICE	✓		
"	"	"	"	"	✓		
"	"	"	"	"	✓		
"	"	"	"	"	✓		
RELINQUISHED BY: (Signature)		DATE / TIME	RECEIVED BY: (Signature)	SHIPPED TO:			
RELINQUISHED BY: (Signature)		DATE / TIME	RECEIVED BY: (Signature)	SHIPPED TO:			
RELINQUISHED BY: (Signature)		DATE / TIME	RECEIVED BY: (Signature)	SHIPPED TO:			

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*Letter denotes sample matrix
W - Water S - Soil LW -

CHAIN OF CUSTODY RECORD

PROJ. NO.		PROJECT NAME		NO. OF CONTAINERS						REMARKS			
61453		AMTL - WATERTOWN											
SAMPLERS: (Signature) <i>Det. A. Foster</i>													
STA. NO.	DATE	TIME	COMP	GRAB	STATION LOCATION								
03 Sol 01	2/12/90	9:12	✓		NW SIDE Bldg 43								
06 Sol 01	2/12/90	11:34	✓		NE SIDE Bldg 100								
09 Sol 01	2/12/90	9:53	✓		W. SIDE Bldg 313								
09 Sol 02	2/12/90	10:30	✓		E. SIDE Bldg 313								
13 Sol 01	2/12/90	12:25	✓		S. SIDE Bldg 131								
15 Sol 01	2/12/90	1:50	✓		NW OF PROPELLANT STORAGE AREA	✓							
"	"	"	✓		"								
"	"	"	✓		"								
"	"	"	✓		"								
"	"	"	✓		"								
17 Sol 02	2/12/90	3:05	✓		PARK - SOUTH SIDE OF NORTH BEACON STREET	✓							
"	"	"	✓		"								
"	"	"	✓		"								
"	"	"	✓		"								
"	"	"	✓		"								
Relinquished by: (Signature)						Date / Time		Received by: (Signature)		Date / Time		Received by: (Signature)	
Relinquished by: (Signature)						Date / Time		Received by: (Signature)		Date / Time		Received by: (Signature)	
Relinquished by: (Signature)						Date / Time		Received by: (Signature)		Date / Time		Received by: (Signature)	

Cooler Number: _____ of _____

Arthur Little, Inc.

CHAIN OF CUSTODY RECORD

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PROJ. NO.	PROJECT NAME				Analyses				Remarks				SAMPLE CONDITION UPON RECEIPT						
SAMPLE STATION NUMBER	DATE	TIME	STATION LOCATION	PRESERVATION	GC	GC/MS	GC/MS/MS	GC/MS/MS/MS	GC/MS/MS/MS/MS	GC/MS/MS/MS/MS/MS	GC/MS/MS/MS/MS/MS/MS	GC/MS/MS/MS/MS/MS/MS/MS	GC/MS/MS/MS/MS/MS/MS/MS/MS						
61453	AMTL - WATER TOWN, MA																		
SAMPLERS: (Signature) <i>Art D. Little</i>																			
02-SL-01	2/9/90	9:42	INSIDE Bldg 311	ICE	✓	✓	✓	✓	✓	✓	✓	✓	ONE SAMPLE BOTTLE FOR BOTH PCB'S AND BENTHIC INVERTEBRATES						
"	"	"	"	"	✓	✓	✓	✓	✓	✓	✓	✓	EXPECT HIGH METAL CONTENT INCL. Fe, Cr, Ni - SAMPLE SCREENING NEEDED						
"	"	"	"	"	✓	✓	✓	✓	✓	✓	✓	✓	— STAT —						
06AQU 01	2/9/90	10:45	Bldg 100 - UNDERGR. TANK	HCL	✓	✓	✓	✓	✓	✓	✓	✓							
"	"	"	"	ICE	✓	✓	✓	✓	✓	✓	✓	✓							
"	"	"	"	NaOH, ICE	✓	✓	✓	✓	✓	✓	✓	✓							
"	"	"	"	HNO ₃ , ICE	✓	✓	✓	✓	✓	✓	✓	✓							
"	"	"	"	NaOH ACETATE	✓	✓	✓	✓	✓	✓	✓	✓							
17SL 01	2/9/90	3:45	PACK SOUTH OF Bldg 100	ICE	✓	✓	✓	✓	✓	✓	✓	✓							
"	"	"	"	"	✓	✓	✓	✓	✓	✓	✓	✓							
"	"	"	"	"	✓	✓	✓	✓	✓	✓	✓	✓							
"	"	"	"	"	✓	✓	✓	✓	✓	✓	✓	✓							
Relinquished by: (Signature)					Date/Time					Received by: (Signature)					Date/Time				
Relinquished by: (Signature)					Date/Time					Received by: (Signature)					Date/Time				
Relinquished by: (Signature)					Date/Time					Received by: (Signature)					Date/Time				

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 W - Water S - Soil LW - Liquid Waste SW - Solid Waste

CHAIN OF CUSTODY RECORD

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Cooler Number: 1 of 1

Arthur D. Little, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

PROJ. NO.		PROJECT NAME		Analyses				Remarks				SAMPLE CONDITION UPON RECEIPT			
61453-00		AMTL Waterbury, MA		TCL+30 Volatiles PCB's Semivolatiles Cyanide Metals/TCL Metals											
SAMPLE / STATION NUMBER	DATE	TIME	* C O M P	* G R A B	STATION LOCATION	PRESERVATION									
01SEDO1	2/15/90			✓	Storm Sewers, Station 12	Ice	3	✓	✓						
"	2/15/90			✓	"	"		✓	✓						
"	2/15/90			✓	"	"			✓						
"	2/15/90			✓	"	"			✓						
09SLG01	2/15/90			✓	Storm Sewer Line 12 and Tailcut	Ice	3	✓	✓						
"	2/15/90			✓	"	"		✓	✓						
"	2/15/90			✓	"	"			✓						
"	2/15/90			✓	"	"			✓						
12SLG01	2/15/90			✓	Storm Drain Unit 12	Ice	3	✓	✓						
"	2/15/90			✓	"	"		✓	✓						
"	2/15/90			✓	"	"			✓						
"	2/15/90			✓	"	"			✓						

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Shipped to:
Relinquished by: (Signature)	2/16/90 10:50	Received by: (Signature)	2/16/90 10:50	
Relinquished by: (Signature)	2/15/90 17:00	Received for Laboratory by: (Signature)	2/16/90 10:50	

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Cooler Num _____ of _____

CHAIN OF CUSTODY RECORD

PROJ. NO.		PROJECT NAME		Analyses		Remarks		SAMPLE CONDITION UPON RECEIPT	
64513		ANTL - WATERBOWN							
SAMPLERS: (Signature) <i>Scott A. Foss</i>									
SAMPLE/STATION NUMBER	DATE	TIME	* C O M P	* G R A B	STATION LOCATION	PRESERVATION	TL + 30 volatile organics	TL + 30 semi-volatile organics	CYNIDE
050101 TB	2/16/90	1:30			050101 TB	ICE	✓		
050101 BL	2/16/90	12:00		✓	050101 BL	"	✓		
0130101 BL			✓		0130101 BL	"	✓		
0130101 BL			✓			"			
0130101 BL			✓			"			
0650101 BL	2/16/90	1:00	✓	✓	0650101 BL	"	✓		
			✓			"			
			✓			"			
			✓			"			
* all trip blanks have small bubbles									
* no chain of custody seal on cooler									
Shipped to:									
Relinquished by: (Signature)		Date/Time		Received by: (Signature)		Date/Time		Carrier:	
Relinquished by: (Signature)		2/16/90 1615		Willie Sult OA		2/16/90 1615			
Relinquished by: (Signature)		Date/Time		Received for Laboratory by: (Signature)		Date/Time			

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W - Water

S - Soil

LW - Liquid Waste

SW - Solid Waste

PROJ. NO.		PROJECT NAME		Analyses				Remarks		SAMPLE CONDITION UPON RECEIPT
61453		AMTL - Warrington, MA.		TOL 30 Volatiles PCB Cytotoxic Metals / TCL Metals Sulfide Pesticide						
SAMPLERS: (Signature)		(Signature)								
SAMPLE/ STATION NUMBER	DATE	TIME	* G * C * O * M * P	* G * R * A * B	STATION LOCATION	PRESERVATION				
055 LG 02	2/19/90	1530	✓	✓	SEWER CLEANOUT E. SIDE BLDG. 39	ICE	3	✓	✓	ADL TAG #: 0887, 0888, 0889
"	"	"	✓	✓	"	ICE		✓		: 0890
"	"	"	✓	✓	"	ICE		✓		: 0891
"	"	"	✓	✓	"	ICE		✓		: 0892
01AQU 01	2/20/90	1330	✓	✓	SUMP, EAST SIDE BLDG. 243	ICE, HCL pH=2	3	✓	✓	ADL TAG #: 0866, 0867, 0868
"	"	"	✓	✓	"	ICE		✓		: 0869
"	"	"	✓	✓	"	ICE, NaOH, pH=12		✓		: 0870
"	"	"	✓	✓	"	ICE, NaOH, pH=12		✓		: 0871
"	"	"	✓	✓	"	ICE, NaOH, pH=9		✓		: 0872
030 EL 02	2/20/90	1530	✓	✓	EAST TANK BUILDING 240	ICE	3	✓	✓	ADL TAG #: 0899, 0900, 0901
"	"	"	✓	✓	"	ICE		✓	✓	: 0902
							1VQA 01AQU01 is missing			

Relinquished by: (Signature)		Date/Time		Received by: (Signature)		Date/Time		Shipped to:	
(Signature)		2/21/90 1530		WIL - SILL CH		2/21/90 1530			
(Signature)		2/20/90 1550		(Signature)		2/20/90 1550			

Carrier: _____

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W - Water

LW - Liquid Waste

SW - Solid Waste

CHAIN OF CUSTODY RECORD

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