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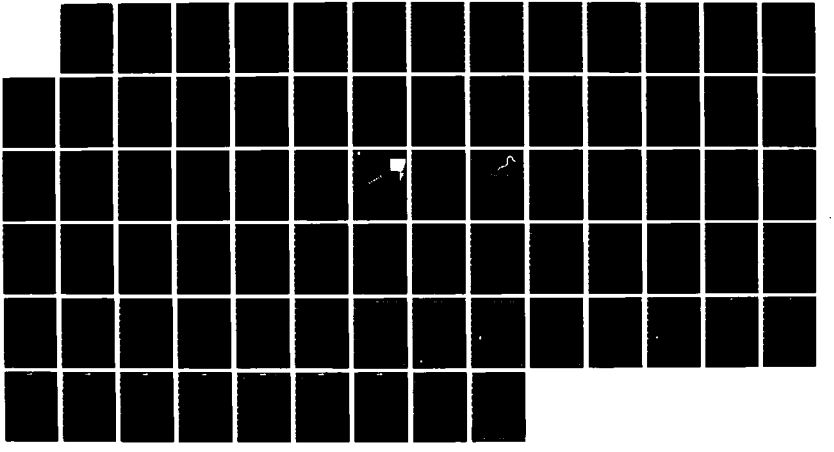

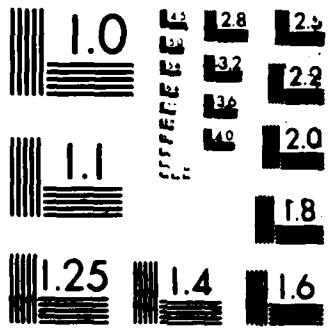
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FINAL REPORT

Remediation of PCB Contamination Woodbridge Research Facility Woodbridge, Virginia

Michael B. Foulke
Mark E. Starnes

Roy F. Weston, Inc.
4329 Memorial Drive, Suite C
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1 May 1986

Final Report for 27 September 1984
to 30 April 1986
Contract No. DACA87-82-C-0063

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Prepared for
U.S. ARMY TOXIC AND HAZARDOUS MATERIALS AGENCY
USATHAMA
Aberdeen Proving Ground, Maryland 21010

U.S. ARMY CORPS OF ENGINEERS
Huntsville District
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30 May 1986

LTC John C. McIlrath
Contracting Officer
U.S. Army Engineer Division
Attn: HNDPD-E/Ayo
P.O. Box 1600
Huntsville, Alabama 35807

Dear LTC McIlrath:

W.O. 2281-02-05
Letter No. WH5-029

Subject: Contract No. DACA87-82-C-0063
Task Order 5
Final Report
Remediation of PCB Contamination
Woodbridge Research Facility
Woodbridge, Virginia

Enclosed is Data Item A00A, Final Report for the Remediation of PCB Contamination, Woodbridge Research Facility, Woodbridge, Virginia. This submittal of three (3) copies is in accordance with DD Form 1423 of the referenced contract task order.

If you have any questions regarding the above, please do not hesitate to call me.

Sincerely,

ROY F. WESTON, INC.

for Larry G. Copeland, P.E.
Program Manager

LGC/jas
cc: USATHAMA - Aberdeen Proving Ground, MD (31 copies)

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19 ABSTRACT (Continue on reverse if necessary and identify by block number)

This report presents the results of the Remediation of Polychlorinated Biphenyl (PCB) contamination at the Woodbridge Research Facility, Woodbridge, Virginia. The report details site specific activities performed during the sampling, analysis, and subsequent removal and disposal of PCB contaminated soil and debris at the facility. The report provides the analytical results from analysis performed to identify the presence of PCB contamination in soils and water at two separate landfills (Landfill No. 1 and Landfill No. 2) at the facility.

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DISCLAIMERS

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EXECUTIVE SUMMARY

Roy F. Weston, Inc. (WESTON) was awarded Task Order 5 of Contract No. DACA87-82-C-0063 for the Remediation of PCB Contamination at the Woodbridge Research Facility (WRF), Woodbridge, Virginia, on 27 September 1984.

Contract procurement was through the Huntsville District, U.S. Army Corps of Engineers (COE). Following Task Order 5 award, the contract was administered by the Baltimore District, COE. Technical specifications for and the direction of the project were provided by the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA).

The project scope entailed the exhumation, transportation, and ultimate disposal of PCB-contaminated soil and debris from a disposal trench at Landfill No. 2 as well as the installation and sampling of six (6) groundwater monitoring wells at Landfill No. 1.

In January 1984, a WRF employee reported to his superior that approximately 70 capacitors and 20 transformers which potentially contained PCB oil were buried on site. In May 1984, an environmental assessment was performed to determine the extent of PCB contamination at WRF. In July 1984, a remedial action alternatives evaluation was performed to determine viable remediation programs for the mitigation of PCB contamination. Selection of the exhumation and off site disposal alternative resulted in the award of Task Order 5.

The project was executed in three phases:

Phase I - Site Preparation
Phase II - Exhumation, Removal and Disposal Operations
Phase III- Site Closure and Restoration

Phase I - Site Preparation

Immediately upon award of the Task Order, WESTON met with WRF, COE, and USATHAMA personnel to review the technical scope of work and modify as appropriate. Plans and Standing Operating Procedures, including the Management Plan, Technical Plan and Safety Plan, were prepared and submitted to COE, WRF, and USATHAMA. Field activities associated with the preparation of the site and the installation of the six (6) groundwater monitoring wells at Landfill No. 1 were initiated.

Phase II - Exhumation, Removal and Disposal Operations

Field operations involved the exhumation, removal, and disposal of the PCB-contaminated soil and debris from the disposal trench at Landfill No. 2. A total of 940.75 tons of PCB-contaminated material were removed and transported to the Chemical Waste Management, Inc. RCRA-permitted facility at Model City, New York, during the period 6 March 1985 through 17 April 1985.

Phase III - Site Closure and Restoration

Following testing of the soil on the sides and bottom of the excavated trench to determine the effectiveness of waste removal operations and upon approval of the Closure Plan by USATHAMA, site closure was executed. The trench was backfilled, graded, and seeded according to specifications contained in the Closure Plan.

SECTION 1

INTRODUCTION

1.1 BACKGROUND

Woodbridge Research Facility (WRF) is located approximately 25 miles southwest of Washington, D.C. between the Occoquan and Belmont Bays which drain into the Potomac River (Figure 1-1). The installation comprises approximately 580 acres of land.

As a satellite installation of Harry Diamond Laboratories, WRF's mission is to conduct electromagnetic pulse (EMP) testing and research. Testing is accomplished on site using four pulsers to simulate EMP produced by exo-atmospheric nuclear weapons detonation on communication and other military systems.

In January 1984, an employee of WRF reported to his superior that approximately 70 capacitors and 20 transformers which potentially contained polychlorinated biphenyl (PCB) oil were buried on site. An environmental assessment was conducted by Environmental Science and Engineering, Inc. (ES&E) at Landfill No. 1 and Landfill No. 2 on WRF (Figure 1-2). The results of the assessment indicated that PCB's were present in sediment at Landfill No. 1 in concentrations less than 5 micrograms per gram (ug/g) and in soils from the disposal trench at Landfill No. 2 at concentrations from 0.06 to 200 ug/g (ES&E Report, July 1984).

A system of six (6) monitoring wells was established by ES&E around Landfill No. 2. Groundwater samples were collected and analyzed for PCB's. Results indicated that no detectable PCB contamination was measured in groundwater downgradient from Landfill No. 2.

1.2 PROJECT SCOPE AND OBJECTIVES

A remedial action alternatives analysis was completed and it was determined that remedial actions would be implemented. The objectives of the remedial action project were:

- The installation of monitoring wells at Landfill No. 1 and the
- safe exhumation, loading, transporting and disposing of soil and debris contaminated by polychlorinated biphenyls (PCB's) at Landfill No. 2.

The program was accomplished in three phases:

- Phase I - Site Preparation
- Phase II - Exhumation, Removal and Disposal Operations
- Phase III - Site Closure and Restoration

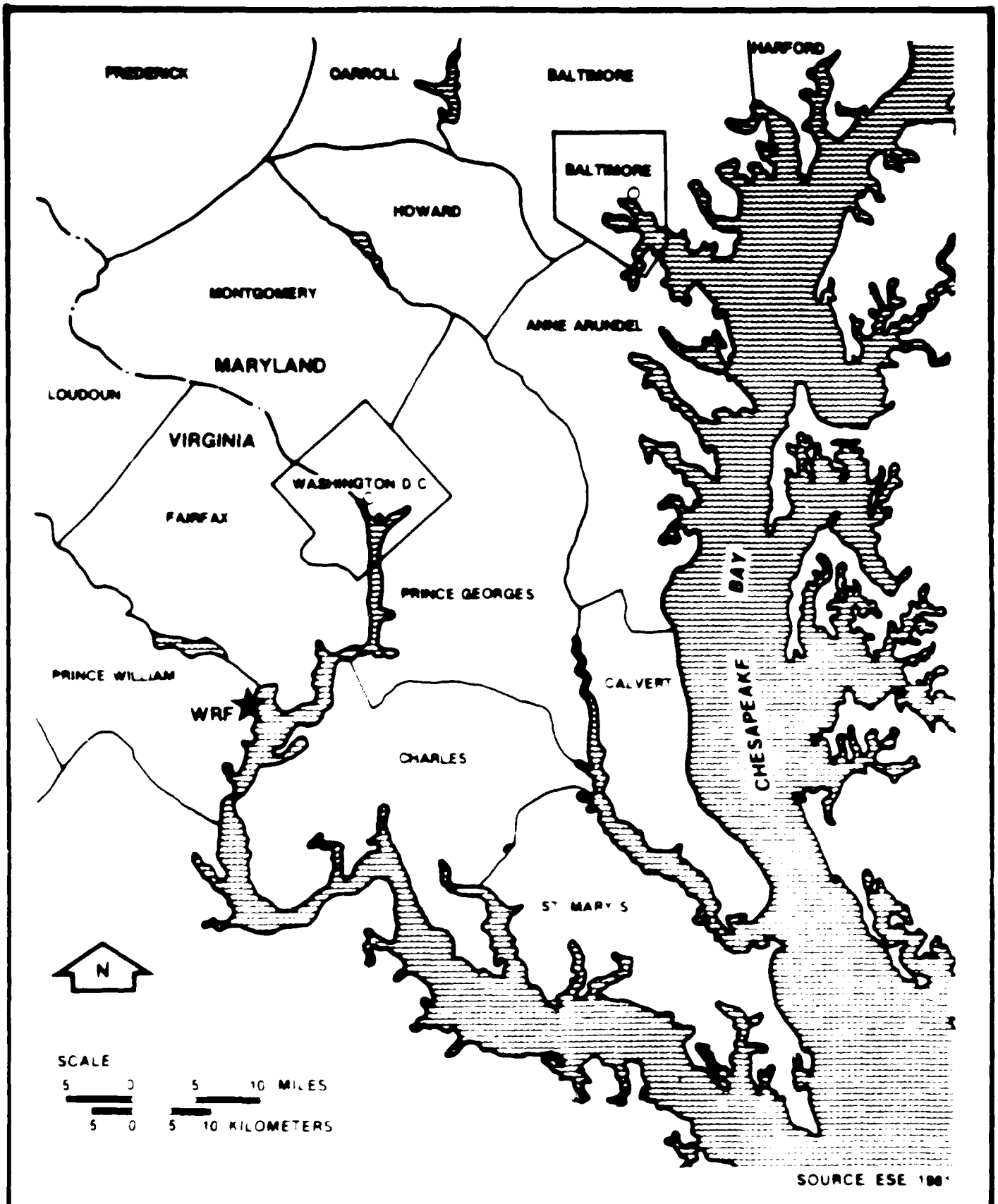


FIGURE 1-1

WOODBRIDGE RESEARCH FACILITY
LOCATION MAP

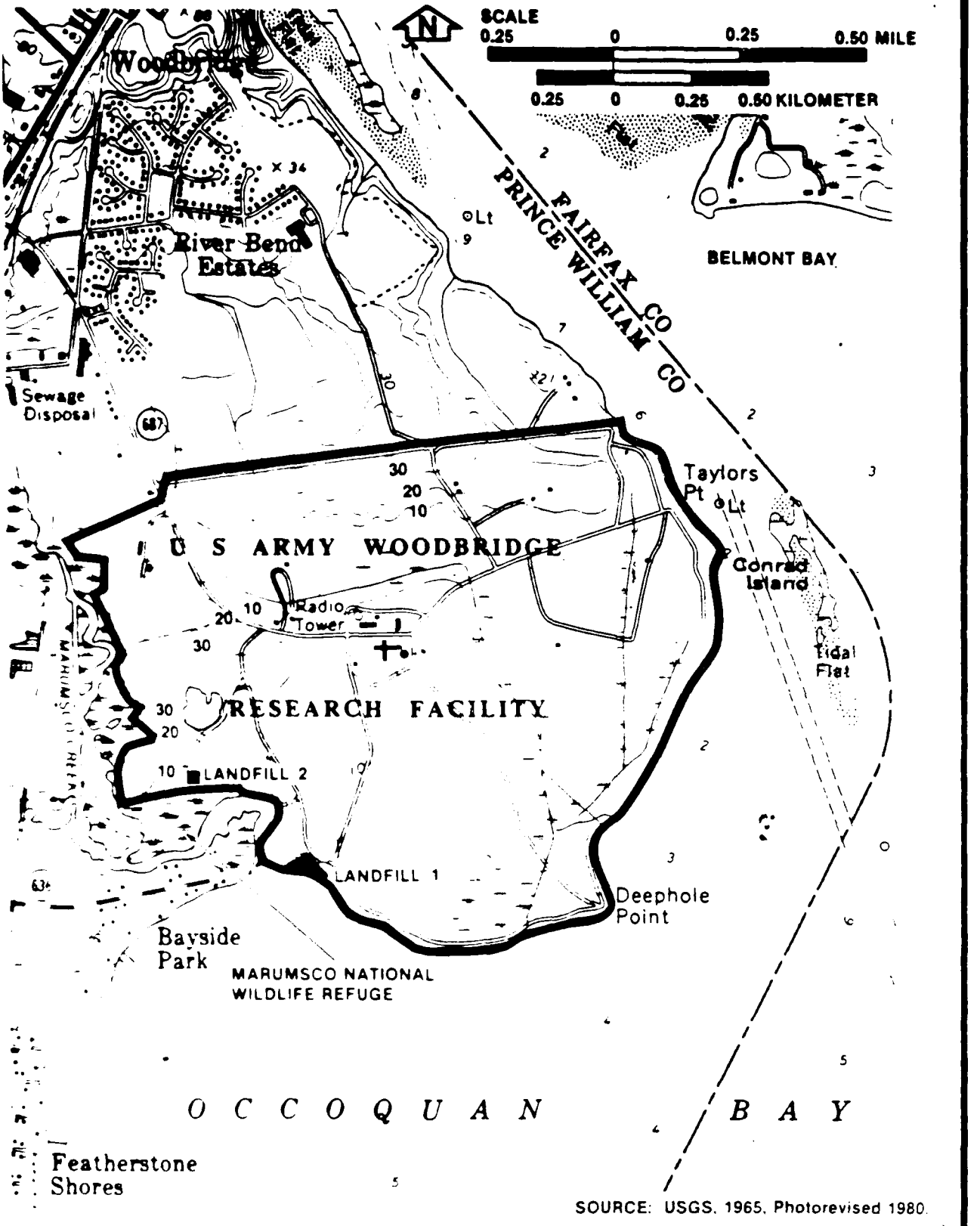


FIGURE 1-2

WOODBRIDGE RESEARCH FACILITY
SITE MAP

Activities associated with each of the remedial action phases included:

Phase I, Site Preparation

- Initial project meetings
- Pre-project site visits and hazard analysis
- Pre-project medical examination
- Mobilization of field personnel and equipment to the project site
- Site-specific safety training
- Preparation of the site for actual removal operations
- Preparation of Plans and Standard Operating Procedures, Management Plan, Technical Plan and Safety Plan
- Laboratory Analytical Methods Certification and Procurement
- Procurement of required permits

Phase II, Operations

- Installation of monitoring wells at Landfill No. 1
- Exhumation of soil and debris from Landfill No. 2
- Sampling and laboratory analysis of exhumed soil for possible PCB contamination
- Removal and disposal of contaminated soil and debris
- Implementation of Site Safety Plan
- Implementation of Site Technical Plan

Phase III, Site Closure

- Development of Site Closure Plan
- Sampling and analysis of soils in exhumed trench area to determine level to which contaminated material has been removed
- Removal and disposal of all PCB-contaminated materials within the work zone
- Backfilling, sloping, and contouring excavated area
- Capping the site
- Reclamation of work area
- Demobilization of field personnel and equipment
- Preparation of Final Report

The contaminant of concern in the disposal trench at Landfill No. 2 was polychlorinated biphenyls (PCB's) resulting from disposal and crushing of 6 transformers and 85 capacitors which were encountered and removed during excavation activities. PCB-contaminated dielectric fluid from these electrical units was released into the trench soils and debris when crushed by a bulldozer during the disposal process. The disposal trench measured approximately 150' long and 22' wide with an average depth of 5.75' below ground surface. Approximately 700 (i.e., out of 702.7 calculated) cubic yards (940.75 tons) of material were removed during the exhumation activity and disposed at the Chemical Waste Management secure hazardous waste landfill at Model City, New York.

SECTION 2

MONITOR WELL PROGRAM

A monitoring well installation program was initiated by WESTON at WRF on 29 January 1985. Six (6) well points were installed around Landfill No. 1. Figure 2-1 depicts the actual locations of the monitoring wells. These wells were drilled and constructed according to USATHAMA Geotechnical Requirements in order to assure recovery of representative water samples and accurate measurements of aquifer characteristics.

2.1 DRILLING METHODS

Utilizing a truck mounted rig, six (6) well points were drilled in Landfill No. 1. Six-inch ID hollow stem augers were used during the drilling of the six (6) wells so that a well screen and casing could be set inside the hollow stem.

2.2 SOIL SAMPLING DURING DRILLING

During the process of drilling the monitoring wells at Landfill No. 1, relatively undisturbed soil samples were collected with a split-spoon sampler in order to develop a soil profile. The samples were collected through the hollow stem augers at five-foot vertical intervals and/or at changes in the underlying soil profile.

All samples were collected, examined and described by the WESTON project geologist. The geologist described and classified all samples based on their color (Munsell Soil Color Charts), texture (Unified Soil Classification System (USCS)), estimated water content, and depth from land surface.

Each bore hole was fully logged as drilling progressed using the USCS system. The data in the log included the following:

- Site identification
- Well identification
- Percent recovery of samples
- USCS symbol and soil classification
- Munsell Color Numbers
- Plasticity
- Consistency/density
- Field moisture
- Texture/fabric/bedding
- Lithological boundaries
- Depth of first encountered water as well as any subsequent water bearing zones
- Changes in water level
- Total interval drilled, construction features, grouting, gravel
- Monitoring equipment results (Organic Vapor Analyzer and Explosion/ Oxygen Meter Readings)
- Record of time delays, problems encountered, core losses, etc.

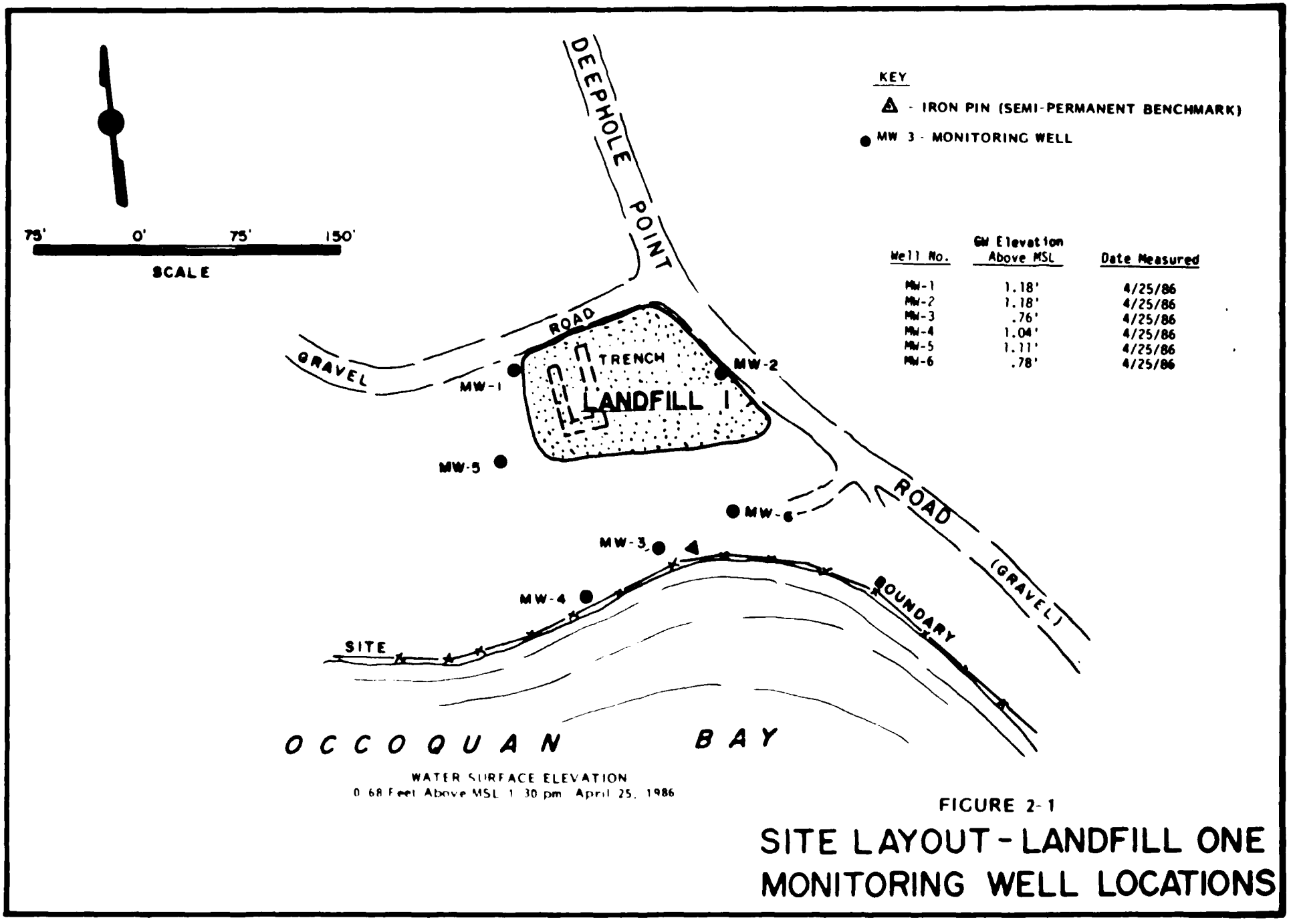


FIGURE 2-1

SITE LAYOUT - LANDFILL ONE
MONITORING WELL LOCATIONS

Representative soil samples from each split spoon were placed into half-pint glass jars with self-sealing screw type lids, and stored in individual compartments of sectional cardboard boxes. Each sample container was properly labeled to identify: sample location, date and time of collection, sampling personnel, and special comments. Collected samples were secured in sample storage chests by the field geologist.

2.3 WELL INSTALLATION

Prior to drilling, all equipment was decontaminated by washing with potable water from the COE-approved water service (fire hydrant) located opposite the maintenance building on the WRF facility. Prior to decontamination of the drilling equipment, the potable water source was sampled and analyzed for the presence of PCB contamination. The collected sample was analyzed for PCB's by the USATHAMA approved laboratory (ES&E). Analytical results indicated that PCB contamination was not present in the potable water source. Construction of the wells follows the design shown in Figure 2-2. The materials and methods employed during well construction included the following:

a. A 2-inch diameter, stainless steel casing with threaded joints.

b. A 5-foot section of commercial 0.02-inch slot screen, stainless steel pipe was used as the bottom section of the casing extending 1-foot above the surface of the groundwater.

c. USATHAMA-approved siliceous pack material (Moric #4Q - graded sand) was used to pack the well screens.

d. Bentonite pellets were used to seal the siliceous pack.

e. Grout seals consisted of a 20:1 cement/bentonite slurry mix. All well installation was performed through in-place hollow stemmed augers. All wells were backfilled with the USATHAMA-approved sand pack placed around the screen, bentonite pellets overlying the sand pack, and pumpable cement/bentonite grout to the surface.

f. For monitoring wells 1 and 2, a 5-foot length of 4-inch inside diameter iron pipe was used as a safety oversleeve. Each oversleeve included a hinge cap, hasp, and lock.

g. For monitoring wells 3, 4, 5 and 6, stainless steel casing (riser pipe) was extended to a height above ground surface to prevent well flooding during extreme high tide conditions. Each riser pipe was secured by a threaded stainless steel, chain- attached cover.

h. A concrete mix of 1:2 concrete/sand and approved water was placed between the well riser pipe and outer casing to a depth of about 6 inches below ground surface.

i. All wells are guarded by four 6-foot long circular steel posts set 4 feet from the well and set 3 feet into the ground.

j. All wells were identified with a waterproof ink.

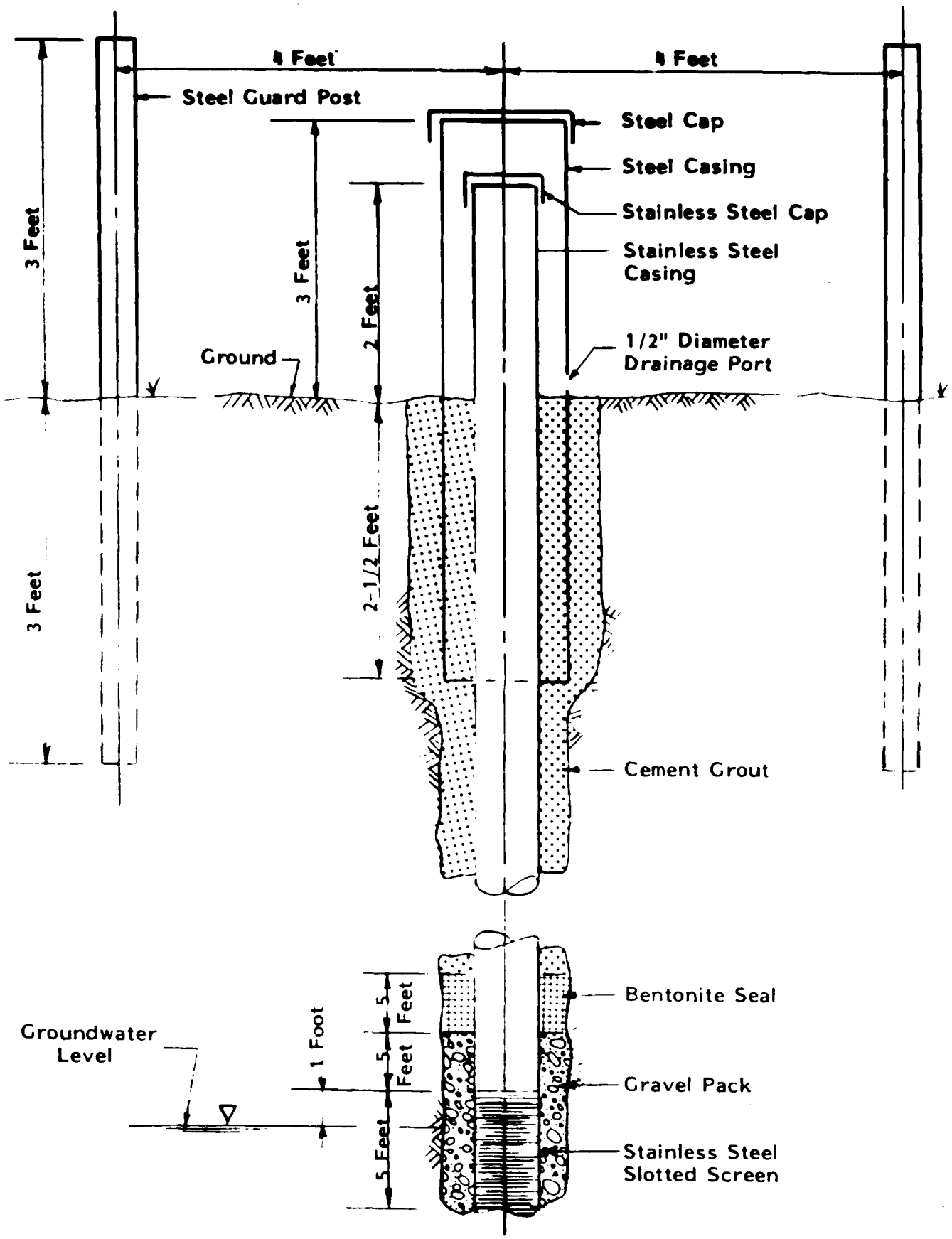


FIGURE 2-2

MONITOR WELL CONSTRUCTION

k. A measuring notch was filed on the inner casing of each well.

l. All disturbed drilling areas were regraded.

Appendix A provides the cross-sectional details of the construction of monitoring wells at Landfill No. 1.

To prevent the potential for PCB contaminant migration during well installation, drill cuttings were retained and stored in 55-gallon drums located adjacent to the drill hole. Upon completion of each bore hole, WESTON personnel covered and sealed drummed cuttings with properly fitting lids. Subsection 3.2.4 of this report addresses the final disposal of the drummed cuttings.

2.4 WELL DEVELOPMENT

In order to set the sand pack around the well, all wells were developed after the grouting had set. The following procedures were used for monitoring wells 1, 3, 4, 5 and 6 at Landfill No. 1:

a. A clean bottom pump was used to develop the wells.

b. Wells were discharged until the water was clear.

c. A minimum volume of five times the well casing volume was removed from each well.

d. All liquids collected during well development were placed into 55-gallon drums located adjacent to each well.

Due to slower recharge rates, the development of monitoring well No. 2 followed the same procedures outlined above with the exception that a hand-held Teflon bailer was used to remove the required well casing volume.

Section 5.4 of this report details the sampling, handling and disposal methods employed for liquids collected during well development.

2.5 WELL SURVEY

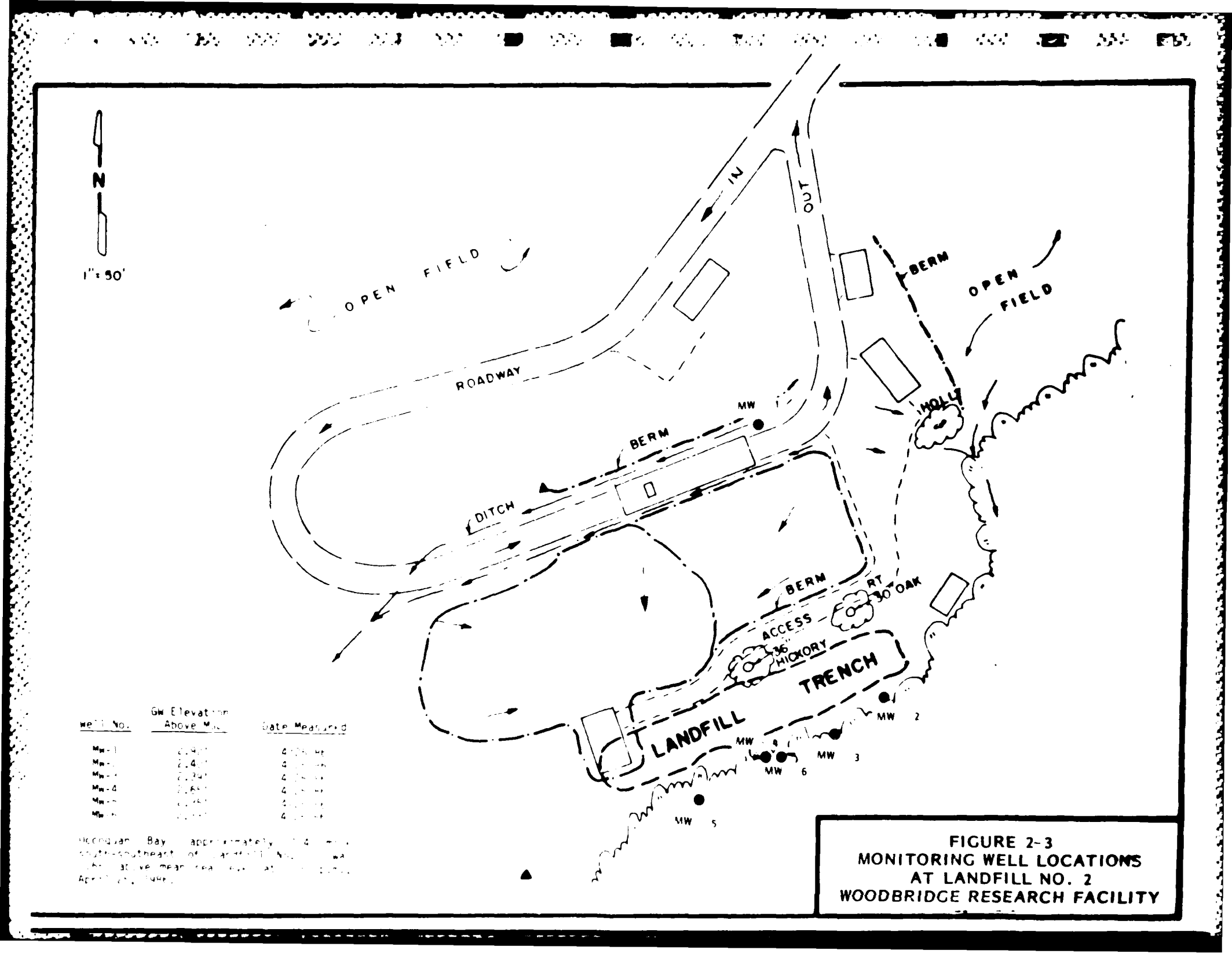
All wells were level surveyed by WESTON personnel to establish their respective locations according to UTM coordinates. Further, the elevations to the top of the measuring notch on each well casing were determined in feet above mean sea level. Well coordinates and elevations are shown in Table 2-1.

During the course of the PCB remediation project, WESTON also performed groundwater sampling and monitored groundwater elevations in six (6) monitoring wells which were installed by Environmental Science and Engineering, Inc. in Landfill No. 2. Monitoring well locations are depicted in Figure 2-3. Analytical results and groundwater level data are offered in Tables 5-3 and 5-4, respectively.

TABLE 2-1

ELEVATION OF WELLS AND WELL COORDINATES

Well No.	Landfill No.	TOC Elevation (ft above MSL)	Location (UTM Coordinates)
MW-1	1	9.64	N 4278023 E 304735
MW-2	1	27.65	N 4278352 E 304786
MW-3	1	5.09	N 4278324 E 304729
MW-4	1	4.77	N 4278394 E 304678
MW-5	1	6.11	N 4278382 E 304709
MW-6	1	6.63	N 4278316 E 304756
MW-1	2	14.88	N 4279726 E 304519
MW-2	2	9.98	N 4279685 E 304544
MW-3	2	9.68	N 4279682 E 304539
MW-4	2	9.84	N 4279677 E 304530
MW-5	2	10.31	N 4279669 E 304517
MW-6	2	10.06	N 4279667 E 304532



Well No.	GW Elevation Above MSL	Date Measured
MW-1	[illegible]	[illegible]
MW-2	2.4[illegible]	[illegible]
MW-3	[illegible]	[illegible]
MW-4	[illegible]	[illegible]
MW-5	[illegible]	[illegible]
MW-6	[illegible]	[illegible]

[illegible] Bay approximately [illegible] southeast of [illegible] above mean sea [illegible] April [illegible]

FIGURE 2-3
MONITORING WELL LOCATIONS
AT LANDFILL NO. 2
WOODBRIDGE RESEARCH FACILITY

SECTION 3

HAZARDOUS WASTE REMOVAL

Primary waste removal operations at WRF consisted of handling and disposing of PCB-contaminated soil and debris at Landfill No. 2. The removal and disposal activities were performed during a multi-phase operation consisting of:

- Excavation of soil and debris
- Sampling and analysis of exhumed soil and debris for PCB contamination
- Loading and transporting PCB-contaminated soil and debris
- Disposal of PCB-contaminated soil and debris in a secure landfill

3.1 SITE PREPARATION

WESTON field personnel arrived at WRF on the morning of 25 February 1985 and began preparing the Landfill No. 2 site for removal operations. Site preparation at Landfill No. 2 involved the following:

1. Upgraded existing access road east of site to accommodate the truck traffic. The road extended from the site entrance to the main asphalt paved road leading into the facility.

2. A gravel site access road was constructed within the work zone adjacent to the soil staging area to accommodate the truck traffic during loading operations.

3. Small trees and heavy undergrowth were cleared away from Landfill No. 2 to provide easy access during excavation operations.

4. A soil staging area consisting of berms and sectioned areas was constructed.

5. A drainage system and berm approximately 2 feet high were constructed around the periphery of the site to contain any contaminated runoff from the site.

6. A concrete decontamination pad was constructed along the site access road.

7. A concrete transformer/capacitor staging pad was constructed to the west of and adjacent to Landfill No. 2.

8. Site trailers consisting of one (1) command trailer, one (1) decontamination trailer, and one (1) laboratory trailer were positioned and installed.

9. A decontamination area was prepared and routes of access were delineated into and out of the prescribed hot zone by the Site Safety Officer.

10. All on-site wiring, plumbing, and carpentry were completed to allow for proper operation of all facilities located on site.

Site preparation was completed by 5 March 1985. During subsequent operations, it became necessary to regrade site access roads due to the heavy volume of truck and equipment traffic. Figure 3-1 depicts the final site layout following the completion of site preparation activities.

3.2 EXCAVATION OPERATIONS

The excavation of soil and debris was initiated at Landfill No. 2 on 6 March 1985. Operations consisted of exploratory trenching, excavation of surface overburden soils, and removal of subsurface soils and debris.

3.2.1 Exploratory Trench Operation

The removal of soil and debris at WRF commenced at the approximate mid point of Landfill No. 2. By utilizing a rubber tire backhoe with a 24-inch bucket (John Deere Model 410), an exploratory trench (approximately 18 feet wide) was dug completely across the landfill trench to an approximate depth of 6 feet. The purpose of this exploratory trench operation was to:

1. Provide an initial visual inspection of underlying material.
2. Locate the approximate lateral boundaries of Landfill No. 2.
3. Verify the possible existence of groundwater within Landfill No. 2.

During the excavation of the exploratory trench, various types of material were encountered and removed. These materials included steel cables, insulated electrical wire, concrete, metal scrap, plywood, tree stumps, etc. Three (3) metal capacitor units were also encountered and removed during this phase of operation. Prior to removal, each unit was visually inspected for structural integrity by a field technician. Once it was determined that safe removal could be accomplished, each unit was loaded into the backhoe bucket, removed from the trench, and deposited onto the concrete transformer/capacitor staging pad. If possible, information was obtained from each unit prior to resuming operations.

From the exploratory trench operation, approximate lateral and vertical boundary characteristics of the landfill were ascertained. During the exploratory phase, native soil was encountered and characterized as a stiff, reddish-orange clay/sand material. Soil co-mingled with landfill debris was characterized by a gray-black color indicative of decaying organic material.

A major concern at the point of the operations was the possibility of encountering groundwater conditions during excavation. However, results of the exploratory trench operation indicated that potential shallow groundwater conditions did not exist within Landfill No. 2 and therefore, would not pose a problem during any subsequent excavation operations.

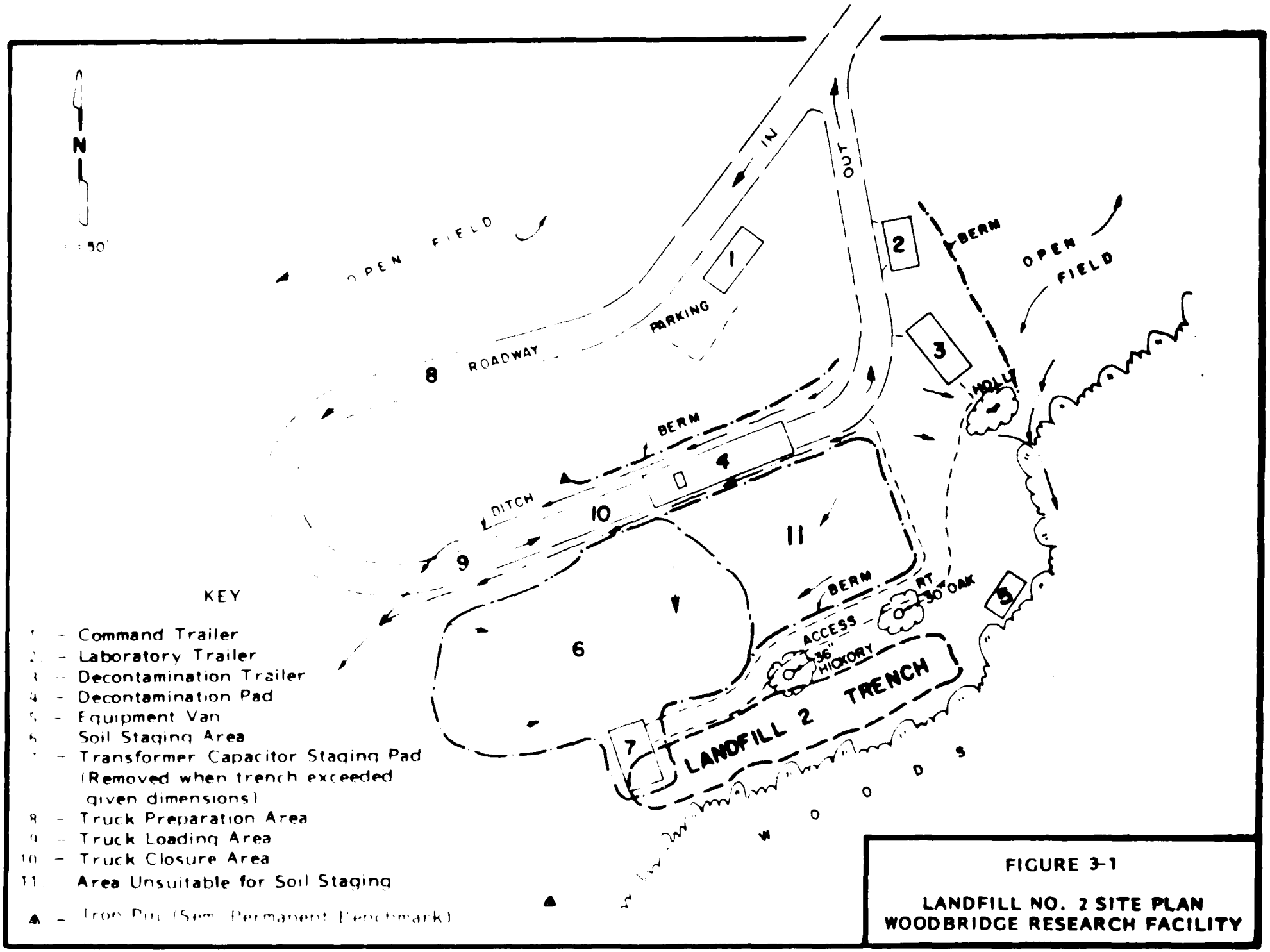


FIGURE 3-1

LANDFILL NO. 2 SITE PLAN
WOODBRIDGE RESEARCH FACILITY

3.2.2 Removal of Overburden Soils

Upon completion of the exploratory trench, a large diesel operated Hein-Warner Model C-14B trackhoe (1.5 yd^3 bucket) was utilized to excavate the remaining overburden soil. Working in an easterly direction, overburden soil and debris were removed to a depth of approximately 2 feet. Each excavator bucket of material was sampled for chemical analysis of the material by the field lab technician and subsequently loaded into an adjacent front-end loader. Two (2) excavator buckets of material were required to load the front-end loader to capacity. Once loaded, the front-end loader transported the soil and debris to the soil staging area located adjacent to Landfill No. 2 where the material was deposited into discrete piles. Approximately thirteen (13) excavator buckets of material were required to form each twenty (20) cubic-yard pile. Each pile of material was staked and numbered by the field technician to assure quality control during removal and sampling operations. Figure 3-2(a) depicts the locations within the trench in which overburden soils were excavated. Numbers 1-18 for each trench section correspond to the pile number.

During removal operations, a field notebook was kept by the field laboratory technician. This procedure provided quality control assurance to the initial locations within Landfill No. 2 from which each pile of material was removed. The field lab technician also recorded the locations at which transformer/capacitor units were encountered. During this phase, a total of 13 capacitor units were removed from the landfill and staged in the staging area.

A total of eight (8) overburden soil piles were created during this phase of the excavation operation. Each pile of material was sampled by the field laboratory technician during the removal procedures and analyzed for PCB contamination at the off-site laboratory. Section 5, SAMPLING AND ANALYSIS, provides a detailed description of soil sampling during removal operations.

3.2.3 Landfill Excavation

Once excavation of overburden soils was complete, the removal of remaining suspect PCB-contaminated soil began. Utilizing the trackhoe, excavation of suspected PCB-contaminated soil and debris commenced at the eastern boundary of Landfill No. 2. Proceeding in a westerly direction, soil and debris were removed from the landfill to an average depth of 5.75 feet. This depth was defined by the existence of a native undisturbed soil horizon underlying the landfill. Lateral boundaries of excavation were also defined by the existence of the native material. Excavation operations continued from the top of the working face downward until all suspect contaminated material had been removed. This resulted in a trench with an approximate size of 22 feet wide by 5.75 feet deep by 150 feet long. Each excavator bucket of material was sampled and loaded into the front-end loader. Two (2) excavator buckets of material were required to fill the loader to capacity. Figure 3-2(b) depicts the locations within the trench in which materials were removed from a depth of two feet below ground surface to the bottom of the trenches. Numbers (9-47) for each trench section correspond to the pile numbers.

Soil and debris were transferred to the soil staging area by the front-end loader and deposited into discrete piles. A material tracking procedure was implemented for transfer of soil and debris from the trench to the soil

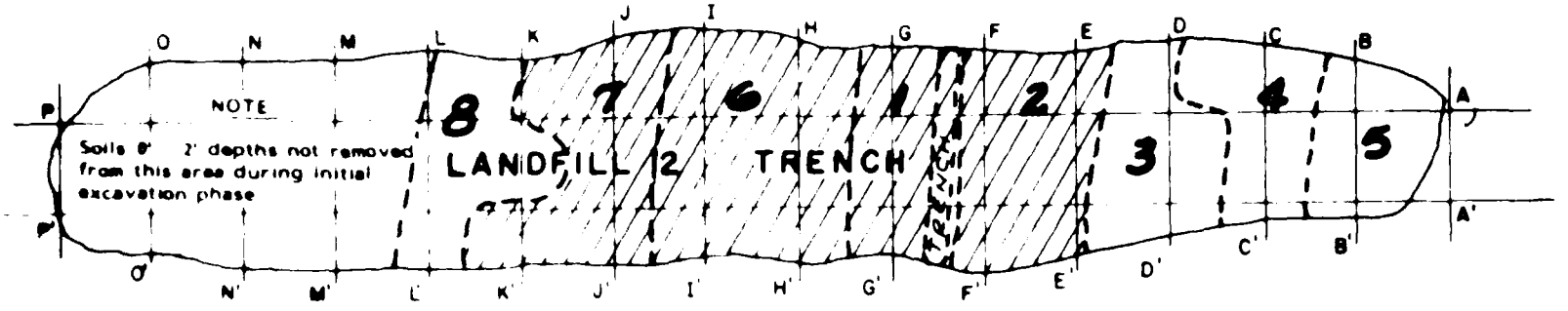


FIGURE 3-2(a)

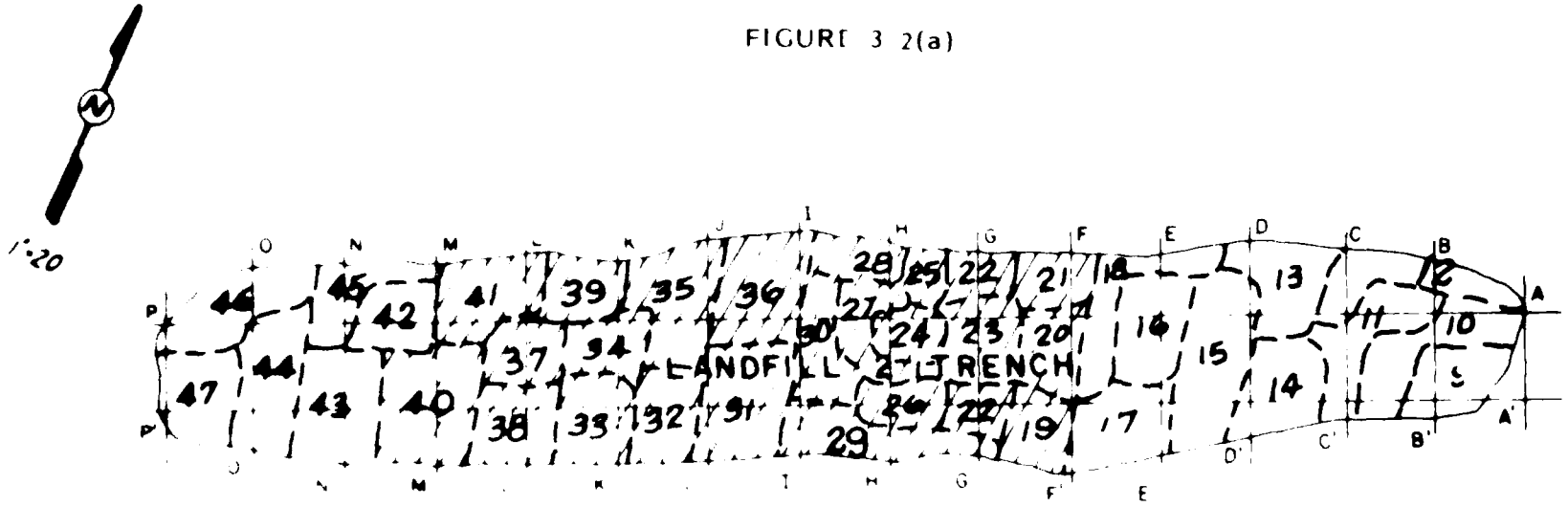


FIGURE 3-2(b)

1. Soils in piles 1 thru 8 are from depths 0' - 2'
2. Soils in piles 9 thru 16 are from depths 2' to trench bottom
3. Soils in piles 17 thru 47 are from depths 0' to trench bottom

LEGEND

Transformers and Capacitors Encountered in this Area

FIGURE 3-2

LANDFILL 2 SOIL PILE LOCATIONS
WOODBRIDGE RESEARCH FACILITY

staging area. Each pile of material was staked and numbered by the field technician to assure quality control. During removal operations, a field notebook was kept by the field laboratory technician. Each pile of material was documented and recorded into the field notebook. This procedure assured that each pile of material represented a specific location within the landfill. The method of documentation also provided quality control during the sampling procedures. Excavation of soil and debris at Landfill No. 2 continued in a westerly direction until native soil (characterized by an undisturbed red-orange clay/sand material) was encountered. At the western boundary of the landfill, the native soil existed at a depth of approximately [illegible] feet below the ground surface.

[illegible] March [illegible], all material had been removed from the disposal trench [illegible] approximately 1.5 feet beyond that of observable [illegible] turbed native soil. Trench soils co-mingled with [illegible], and debris were characterized by a gray-black color [illegible] material. Native soil along the walls and [illegible] was characterized by medium-grained sand and clay [illegible].

[illegible] excavation operation at Landfill No. 2, forty-seven (47) [illegible] were generated and stockpiled in the soil staging area. [illegible] approximately 14.5 cubic yards of material (13 excavator [illegible] yard buckets).

[illegible] staging, soil and debris piles were covered with [illegible] polyethylene sheets. This procedure limited the [illegible] run-off water from the soil staging area.

[illegible] and debris at Landfill No. 2, eighty-five (85) [illegible] transformers were encountered and removed. The [illegible] measured 18" x 24" x 5" and weighed approximately [illegible] transformer units measured 12" in diameter and [illegible] approximately 150 pounds.

[illegible] unit was inspected by a field technician for [illegible] it was determined that safe removal could be [illegible] capacitor unit was deposited directly into the [illegible] technician. Each unit was transferred by the [illegible] concrete staging pad and deposited. If possible, [illegible] from each unit prior to resuming excavation [illegible].

[illegible] capacitor units removed during excavation operations [illegible] units were structurally sound and not leaking. [illegible] transformer units removed during the operations [illegible] leaked and were empty of any fluids.

[illegible] Material removal

[illegible] removed following the construction of each monitoring well [illegible] 5-gallon plastic barrels and 55-gallon steel drums and

left adjacent to the well site. During loading operations of hazardous materials, 27 containers (15 from Landfill No. 1 and 12 from Landfill No. 2), in which visqueen; disposable protective clothing; and drillers mud had been stored, were emptied into a pile within the soil staging area. The deposited material was later utilized to fill transport vehicles to capacity. The estimated quantity of well construction material removed is 6.5 tons.

Plastic containers were loaded onto the transport vehicles and disposed as bulk hazardous material at the Model City, New York, facility. Steel drums were decontaminated utilizing a high pressure water rinse, Alconox detergent wash, followed by a second high pressure water rinse. The steel drums were subsequently offered to and accepted by WRF for re-use.

3.3 LOADING OF HAZARDOUS MATERIALS

3.3.1 Preliminary Operations

On Monday, 1 April 1985, nine (9) semi-dump trucks arrived at WRF's main gate. WESTON personnel arrived that morning and immediately began preparation for loading the nine (9) units. Measurements were made of each truck to determine the maximum allowable loads each could transport. The site leader, along with a field technician, measured and recorded outer-bridge lengths for each semi-dump truck. Measurements were made by determining the overall length from the center of the front-wheel base of the cab to the center of the rear wheel base of the trailer. A transporter identification number was recorded for each truck. The rear license plate number located on the trailer body was used for this purpose. From the outer-bridge measurements, allowable weights were determined from the Commonwealth of Virginia Department of Transportation Form shown in Figure 3-3. All drivers were assembled by the site leader and informed of the general operating procedures which would be in effect once they were on site. Each driver reported to the guard house at the main entrance gate and signed in.

After each driver had signed in, the nine trucks left WRF and proceeded to Occoquan Quarry located across town. With the cooperation of quarry personnel, each truck was processed through the quarry scales and an empty weight was obtained for each semi-dump truck. Subsequent to being weighed, the trucks returned to WRF where they were prepared for loading. This procedure was repeated the following morning for the remaining eleven (11) trucks which had arrived at the main entrance. A total of twenty (20) trucks were utilized for transporting the soil and debris excavated at Landfill No. 2. Once all of the twenty (20) trucks had been processed, this procedure was no longer required.

Prior to loading PCB-contaminated soil and debris into staged dump trucks, two (2) scaffold units were erected. The scaffold units eliminated unnecessary climbing on the trucks and expedited truck preparation. One set of scaffold was erected prior to the loading zone. This unit was utilized by field personnel as an aid in the visqueen lining operations of each truck. The second set of scaffold was erected within the loading zone. This unit was employed by field personnel as an aid in the visual observation of loading procedures.

COMMONWEALTH OF VIRGINIA
NOTICE TO TRUCKERS
WEIGHT LIMITATIONS

Single axle weight 20,000 pounds

Tandem axle weight 34,000 pounds

Per inch of the tire width in contact with road surface 650 pounds

The total gross vehicle weight and any two or more consecutive axles shall not exceed the value in the following table

DISTANCE IN FEET BETWEEN ANY TWO OR MORE CONSECUTIVE AXLES	MAXIMUM WEIGHT IN POUNDS BETWEEN THE EXTREMES OF ANY TWO OR MORE CONSECUTIVE AXLES				
	2 AXLES	3 AXLES	4 AXLES	5 AXLES	6 AXLES
4	34,000				
5	34,000				
6	34,000				
7	34,000				
8	34,000	34,000			
9	38,000	42,500			
10	40,000	43,500			
11		44,000			
12		88,000	50,000		
13		46,500	50,500		
14		46,500	51,500		
15		47,000	52,000		
16		48,000	52,500	58,000	
17		48,500	53,500	58,500	
18		49,500	58,000	59,000	
19		50,000	54,500	60,000	
20		51,000	55,500	60,500	66,000
21		51,500	56,000	61,000	66,500
22		52,500	56,500	61,500	67,000
23		53,000	57,500	62,500	68,000
24		54,000	58,000	63,000	68,500
25		54,500	58,500	63,500	69,000
26		55,000	59,500	64,000	69,500
27		56,000	60,000	65,000	70,000
28		57,000	60,500	65,500	71,000
29		57,500	61,500	66,000	71,500
30		58,500	62,000	66,500	72,000
31		59,000	62,500	67,500	72,500
32		60,000	63,500	68,000	73,000
33			64,000	68,500	74,000
34			64,500	69,000	74,500
35			65,500	70,000	75,000
36			66,000	70,500	75,500
37			66,500	71,000	76,000
38			67,000	72,000	77,000
39			68,000	72,500	77,500
40			68,500	73,000	78,000
41			69,500	73,500	78,500
42			70,000	74,000	79,000
43			70,500	75,000	80,000
44			71,500	75,500	
45			72,000	76,000	
46			72,500	76,500	
47			73,500	77,500	
48			74,000	78,000	
49			74,500	78,500	
50			75,500	79,000	
51			76,000	80,000	

FIGURE 3-3

3.3.2 Loading Operations

The large trackhoe was utilized to load each dump truck with material. During loading operations, a front-end loader was used as an aid in keeping material within reach of the trackhoe's bucket.

The preparation and loading sequence for each truck was as follows:

1. Trucks arrived and were staged at the entrance road to the site. Prior to entering the work zone, the truck tarp was removed and secured on the driver's side of the trailer. Each driver donned his respirator and waited for a signal to move to the truck preparation area.

2. From the staging area, the trucks proceeded along the access road to the truck preparation area. This areas was located on the gravel road loop away from the soil staging area. For truck preparation, a roll of visqueen was obtained from an adjacent stockpile by the field technician. The visqueen liner was unrolled and cut to fit into the truck's dump body. The liner was placed into the dump body and stapled to the sideboards by the field technician. The liner was inspected to ensure that integrity would be maintained during loading. The field technician exited the dump body and the truck was signaled to proceed to the loading zone.

   In addition to the above procedures, the Vehicle Condition Report shown in Figure 3-4 was completed by the driver and the field technician and retained in the WESTON project records.

3. Upon a signal to enter the loading zone, the truck was positioned for loading. One technician was positioned on each side of the dump body atop the erected scaffold unit. Each truck received approximately 10-12 excavator buckets of material. During loading, the field technician signaled the trackhoe operator as to the placement of loads into the dump trailer. Subsequent to loading, the truck was prepared for transportation. The visqueen liner was removed from the sideboards of the trailer body and folded in over the contaminated soil and debris. The tarp was placed over the top of the trailer body and secured by the field technicians. The driver was signaled to exit the loading area and proceed to the decontamination area.

4. From the loading area, the truck proceeded to the decontamination area. The truck was staged on the 12' x 60' concrete decontamination pad located near the exit from the work zone.

   Using a high pressure washer, the trailer body and tires were cleaned of any visual unconfined material which may have accumulated during loading operations. After decontamination procedures were completed, a visual inspection of all truck surfaces was made by the field technician. When the truck was found to be adequately clean, the driver was signaled to move out of the decontamination area to final staging prior to off-site transport.

VEHICLE CONDITION REPORT

INSURED

LOCATION

COMPANY VEHICLE NO | MILEAGE READING

ITEM	✓ IF OK	REPAIRS NEEDED	REPAIRS COMPLETE	ITEM	✓ IF OK	REPAIRS NEEDED	REPAIRS COMPLETE
Glass				Air lines, hoses & connections			
Hazard Flasher & Direction Signals				Brakes – Service			
Horn				Cooling System Belts, Hoses			
Air Gauge				Hydraulic Cylinder & Lines			
Low Air Pressure Warning Device				Exhaust system			
Mirrors				Fuel system – Caps			
Oil Pressure				Suspension other than springs			
Parking Brakes				Air Tank Drain			
Tractor Protection Valve				Steering			
Windshield wipers blades				Tires and Wheels			
Fire extinguishers				Front, Intermediate rear axle			
Fuses – Electrical				Clutch			
AMP – volt gauge							
Temp gauge				Clearance and marker			
Reflectors & Flags				Head			
Tach Gauge				Stop			
Heater & Defroster				Tail			
First Aid kits (buses)				Reflectors			
Cleanliness				Hazard Flasher & Direction Signals			

DRIVER (Signature) | DATE

MECHANIC (Signature) | DATE

FIGURE 3-4

5. Upon arrival in the final staging area near the site exit, the driver exited the truck cab and made a visual inspection of the trailer body. All truck air lines, hydraulic line and tarp security were checked by the driver. As required by U.S. Department of Transportation regulations, placarding of the trailer body with 6" square PCB labels was performed. The field technician applied the labels to all four sides of the trailer body. The driver was then signaled to exit the immediate site area. Trucks were staged in cleared fields several hundred yards from the immediate site area.

6. Following the loading operations and prior to exiting the WRF, the hazardous waste transportation manifest documents were executed by WESTON, signed by the Harry Diamond Laboratories representative, and given to the driver of each vehicle. Once manifesting was completed, the trucks were accompanied by WESTON personnel to Occoquan Quarries (Vulcan Graham, Virginia Quarries) for weighing. This procedure ensured that no trucks exceeded the maximum weight limits allowed by the State of Virginia Department of Transportation. If a truck was overweight, it was returned to the site and the load was reduced to conform to legal requirements. If the truck was found to be grossly underweight, it would likewise return to the site for additional material. Once the correct weights were achieved, the trucks left the quarry and proceeded directly to the Interstate scales located on I-95 for a second weighing.

   The site leader and a field technician met each truck at the Interstate scales upon arrival. With the cooperation of State of Virginia Department of Transportation personnel located at the scales, each truck was weighed and a weight ticket obtained. After each truck was weighed, the driver proceeded to a rest area located adjacent to the scales and waited for further instructions. Subsequent to the last truck being weighed for a day's operation, the site leader and field technician retained the weight tickets and joined the trucks at the rest area. At that time, manifest documents were completed by recording the total quantity of material being transported by the vehicle into the appropriate space on the document. The total quantity was computed by subtracting the truck's respective empty weight from the gross weight previously obtained at the Interstate scales. Once each manifest document had been properly completed and a copy retained for the generator of the material, the trucks were allowed to exit the rest area and proceed directly to the disposal site in Model City, New York, along the approved transportation route.

SECTION 4

HAZARDOUS WASTE TRANSPORTATION AND DISPOSAL

4.1 MANIFESTING SYSTEM

All wastes removed from the site were manifested in accordance with Federal Regulations 40 CFR 262.20-262.23 and Virginia Hazardous Waste Management Regulations, Section 7.06. The hazardous waste manifesting system provided a written record of the name of the hazardous waste generator, date of shipment, shipment contents, name of transporter, and certification of receipt from the disposal facility.

Figure 4-1 is an example of a completed manifest utilized during the project. Blank manifest forms were provided by Chemical Waste Management, Inc., Model City, New York, the hazardous waste disposal facility.

Blank manifests consisted of eight (8) copies. Following completion of the required information at the project site, an authorized agent of the WRF signed the manifest as "Generator" and the driver of the vehicle signed as "Transporter."

The entire manifest document was retained by the driver prior to exiting the site. Subsequent to final completion of the document at the state scales located on I-95, the eighth copy, marked "Copy 8 - Generator," was removed and retained by WESTON personnel. "Copy 8" was subsequently given to the COE representative with a Xerox copy of the document retained by WESTON for filing purposes. The remaining seven copies accompanied the material shipment to the disposal facility.

4.2 TRANSPORTATION

Exhumed soil and debris were transported by Dart Trucking Company, Inc. (DART) of Canfield, Ohio, a permitted hazardous waste transporter, to the disposal facility at Model City, New York.

4.2.1 Subcontractor

Dart served as the transportation subcontractor for the project. Dart is an approved hazardous waste transporter as defined by 40 CFR 263.10-263.11 and the Commonwealth of Virginia, Hazardous Waste Management Regulations, Section 7.04. Dart holds EPA identification No. OHD009865825 and is authorized to transport hazardous wastes by the Commonwealth of Virginia under Permit No. OHD0098658257 and by the State of New York under Permit No. OH-047.

During the period 1 April 1985 through 17 April 1985, Dart hauled 940.75 tons of waste soil and debris from the project site at WRF to the disposal site at Model City, New York. Dart also hauled 32 drums containing 85 capacitor units and 3 drums containing 6 transformers from the project site to the disposal facility.

FIGURE 4-1

40-14-1 (10/84)

STATE OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF SOLID AND HAZARDOUS WASTE

HAZARDOUS WASTE MANIFEST

Please print or type.

P.O. Box 12820, Albany, New York 12212

Form Approved. OMB No. 2050-0404. Expires 7-31-88

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator's US EPA No.	Manifest Document No.	2. Page 1 of 1	Information in the shaded areas is not required by Federal Law.
	VAP0000083 9			

3. Generator's Name and Mailing Address: Harry Diamond Laboratories
Woodbridge Research Facility
Woodbridge, Virginia 22191

4. Generator's Phone: (703) 490-2660

5. Transporter 1 (Company Name)	6. US EPA ID Number
Dart Trucking Co.	OHD009865825
7. Transporter 2 (Company Name)	8. US EPA ID Number
9. Designated Facility Name and Site Address	10. US EPA ID Number
Chemical Waste Management, Inc. 1550 Balmer Road Model City, New York 14107	NYD049836679

11. US DOT Description (Including Proper Shipping Name, Hazard Class and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. Waste Ploychlorinated Biphenyls ORM-E UN2315	001	DT		P
b.				
c.				
d.				

SAMPLE

J. Additional Descriptions for Materials Listed Above

a. PCB Dirt & Debris

b.

c.

d.

K. Handling Codes for Wastes Listed Above

a. L

b.

c.

d.

15. Special Handling Instructions and Additional Information

Work Order No.
Code

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations and state laws and regulations.

Printed/Typed Name	Signature	DATE Mo. Day Year
John Ganz		

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	DATE Mo. Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	DATE Mo. Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19

Printed/Typed Name	Signature	DATE Mo. Day Year

NYA 2355129

EPA Form 8700-22 (3-84)

COPY 1—Disposer State—Mailed by TSD Facility

GENERATOR

TRANSPORTER

FACILITY

In case of emergency or spill immediately call the National Response Center (800) 424-8802 and the N Y Department of Transportation (518) 457-7362

4.2.2 Transportation Route

The transportation route specified in WESTON's Technical Plan was followed as closely as possible to ensure maximum personnel safety and expedite transportation of the hazardous waste. A modification was required in the original transportation route due to the necessity of having to weigh the individual trucks off site. This necessity also resulted in the trucks having to pass through the southbound I-95 weigh station in order to return to the northbound I-95 weigh station for weight tickets (weight tickets could not be provided at the southbound scales). This route also prevented travel through the more heavily populated areas of Woodbridge, Virginia. The transportation route is depicted on Figure 4-2 and is described as follows:

Trucks, accompanied by WESTON personnel, exited WRF through the main gate onto Dawson Beach Road (Virginia State Road 687) and proceeded to Highway 1 and then proceeded north on Highway 1 to the intersection of Virginia State Road 123; then turned left on State Road 123 and proceeded west across Interstate 95 to Occoquan Quarry where each was subsequently weighed. Once weights were obtained, the trucks proceeded east on State Road 123 back towards Interstate 95; at the intersection of Interstate 95 they proceeded south, approximately 5 miles, towards the Virginia Department of Transportation weigh station; after passing through the southbound weigh station, the trucks continued south on Interstate 95 to the next available exit (Dumfries exit); each truck exited Interstate 95 at that location, turned left and proceeded across the overpass over Interstate 95; then turned left back onto Interstate 95 and proceeded north towards the Virginia Department of Transportation weigh station; then passed through the northbound weigh station where weigh tickets were obtained for each truck and were staged in the rear parking area located behind the northbound weigh station; upon completion of manifests, each truck exited the weigh station and proceeded north on Interstate 95 around the City of Washington, D.C., and continued on towards Baltimore, Maryland. At Baltimore, they proceeded north on Interstate 695 (the Baltimore Beltway) to the west of the city until the intersection of Interstate 83; taking Interstate 83 north, they proceeded north to Interstate 76 (the Pennsylvania Turnpike). Entering the Turnpike at Exit 18, they proceeded east, across the Susquehanna River and departed the Turnpike at Exit 19 (Interstate 283); they proceeded north on Interstate 283 and intersected Interstate 83 north. They continued on Interstate 83 to the junction with Interstate 81; taking Interstate 81 north, they proceeded north to Syracuse, New York, until they intersected Interstate 481. Taking Interstate 481, they proceeded east around the city of Syracuse to the junction of Interstate 90 (the New York Thruway). Entering at Exit 34A, they proceeded west to Interstate 290. Taking Interstate 290 west, they proceeded to Interstate 190 north. They traveled 15 miles and exited at New York Route 265 and turned left. Proceeding to the second traffic light, they turned right onto New York Route 104 and proceeded east to New York Route 18 East; after traveling approximately 5 miles and turning right onto Balmer Road, they proceeded to the gates of the CWM facility.

4.2.3 Incidents

During the transportation operation of the project, which involved 49 trucks traveling a total in excess of 35,000 loaded miles, no incidents involving spillage of hazardous material or vehicular accidents occurred.

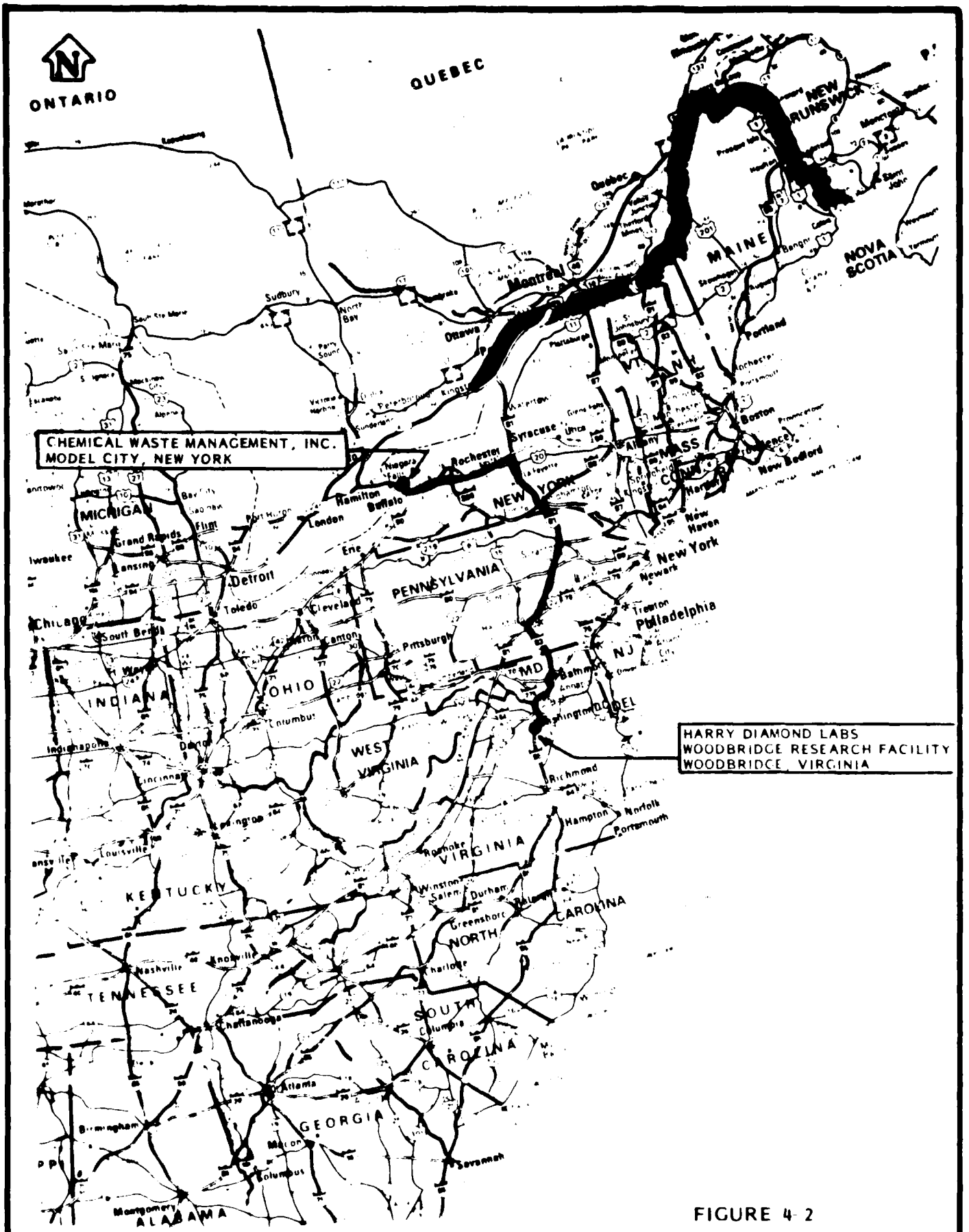


FIGURE 4-2

HAZARDOUS WASTE
TRANSPORTATION ROUTE

SOURCE:
RAND MCNALLY
ROAD ATLAS (1984)

4.3 DISPOSAL

4.3.1 Subcontractor

All exhumed wastes from the project site were delivered to Chemical Waste Management, a RCRA permitted hazardous waste treatment, storage, disposal (TSD) facility located in Model City, New York. Chemical Waste Management operates under EPA Permit No. NYD049836679.

4.3.2 Documentation

Fully executed original and carbon copies of each manifest document were forwarded to individual agencies as required by RCRA and State of New York Hazardous Waste Regulations by Chemical Waste Management, Inc. Copy 1 - Disposer State was forwarded to the State of New York, Department of Environmental Conservation. Copy 2 - Generator State was similarly forwarded to the Commonwealth of Virginia, State Board of Public Health, Division of Solid and Hazardous Waste. Copy 3 - Generator was sent to the Harry Diamond Laboratories, Woodbridge Research Facility. Copy 4 - TSD Facility and Copy 5 - Transporter were retained by Chemical Waste Management, Inc. and Dart Trucking Company, respectively, where they will be on file for three years as required by federal and state regulations. Copy 6 - Disposer State and Copy 7 - Generator State were forwarded to the States of New York and Virginia by Harry Diamond Laboratories. The Xerox copies of Copy 8 and copies of weigh tickets from the scales at the Model City, New York, disposal facility were utilized as the basis for WESTON billings for Phase II activities. Table 4-1 provides the tabulated information for all vehicles which transported wastes from WRF.

Within Table 4-1, departure weights and arrival weights are provided for each manifested vehicle. The departure weight corresponds to the weights obtained from the Virginia Department of Transportation weighing facility located on southbound Interstate 95. The purpose for obtaining this weight was to ensure that each loaded vehicle was within the Notice to Truckers Weight Limitations for the Commonwealth of Virginia (Figure 3-3). Arrival weights correspond to the weights determined for each loaded vehicle at the TSD facility located in Model City, New York.

Table 4-1 also provides the differences (tons) between departure weights and arrival weights for each vehicle. These differences may be a result of the calibration of scales, the use of separate scales, and/or differences in methods used to obtain the weights.

TABLE 4-1

TRUCK WEIGHTS BY MANIFEST DOCUMENT NUMBER

Manifest Document No.	State Manifest Number	Date	Departure Weight (Lbs)	(Tons)	CWM W.O. #	Arrival Weight (Lbs)	(Tons)	Diff (Tons)
100 01	226509-3	4/1	28750	14.38	96333	28800	14.40	
100 02	226510-2	4/1	40300	20.15	96331	39240	19.62	-0.53
100 03	226511-1	4/1	28980	14.49	96334	28520	14.26	-0.23
100 04	226512-9	4 1	35300	17.65	96332	34260	17.13	-0.52
100 05	226513-8	4 1	35000	17.50	96336	34580	17.29	-0.21
100 06	226514-7	4 1	41540	20.77	96333	41300	20.65	-0.12
100 07	226515-6	4 1	36920	18.46	96335	36320	18.16	-0.30
100 08	226516-5	4 1	45780	22.89	96336	45200	22.60	-0.29
100 09	226518-3	4 1	43440	21.72	96339	43640	21.82	0.10
100 10	204101-1	4 2	33700	16.85	96350	33620	16.81	-0.04
100 11	204102-9	4 2	44060	22.03	96351	44060	22.03	0.00
100 12	204103-8	4 2	42080	21.04	96352	42120	21.06	0.02
100 13	204104-7	4 2	36160	18.08	96353	36140	18.07	-0.01
100 14	204105-6	4 2	43160	21.58	96354	43440	21.72	0.14
100 15	204106-5	4 2	44700	22.35	96355	44120	22.06	-0.29
100 16	204107-4	4 2	44160	22.08	96356	43980	21.99	-0.09
100 17	204108-3	4 2	46840	23.42	96357	46720	23.36	-0.06
100 18	204109-2	4 2	44[illegible]	[illegible]	96358	44[illegible]	[illegible]	[illegible]
100 19	204110-6	4 2	43[illegible]	[illegible]	96359	43[illegible]	[illegible]	[illegible]
100 20	204111-5	4 2	43[illegible]	[illegible]	96360	43[illegible]	[illegible]	[illegible]
100 21	204112-4	4 2	43[illegible]	[illegible]	96361	43[illegible]	[illegible]	[illegible]
100 22	204113-3	4 2	41600	20.80	96362	41[illegible]	[illegible]	[illegible]
100 23	204114-2	4 2	40000	20.00	96363	40[illegible]	[illegible]	[illegible]
100 24	204096-6	4 3	40920	20.46	96364	41460	20.73	0.27
100 25	204094-6	4 3	41920	20.96	96365	41[illegible]	[illegible]	[illegible]
100 26	204097-5	4 3	42520	21.26	96366	41440	20.72	-0.54

TABLE 4-1 (continued)
TRUCK WEIGHTS BY MANIFEST DOCUMENT NUMBER

Manifest Document No.	State Manifest Number	Date	Departure Weight (Lbs)	(Tons)	CWM W.O. #	Arrival Weight (Lbs)	(Tons)	Diff (Tons)
100 27	204098-4	4/3	35880	17.94	96367	35540	17	-0.17
100 28	204099-3	4 3	38500	19.25	96368	37500	18.75	-0.50
100 29	204100-2	4/4	43480	21.74	9644	42820	21.41	-0.33
100 30	203864-4	4 4	38780	19.39	96444	38780	19.39	0.0
100	203865-3	4 4	42040	21.02	96445	42	21	
100	203866	4 4	42760	21	9644	42	21	
100	203	4 4	4036	20	9644	4	20	
100 34	203867	4 4	4964	24.82	9644	4964	24	
100	203868	4 4	41	20.54	9644	41	20.5	
100 36		4 4	4	20.7	964	4144		
100		4 4	4			4		
		4 4						
		4 4						
		4 4			

5.2.1 Soil Sampling Procedures

Prior to the discovery of any transformers/capacitors in the disposal area, single composite samples were formed for each pile of material removed. The composite sample was accumulated from individual grab samples which were taken from each excavator bucket which contained exhumed trench material. A hand-held spade was used to take a grab sample from the center of each excavator bucket prior to the load being deposited into the receiving front-end loader for transport to the soil staging area. Each grab sample was placed into an aluminum foil-lined metal pan. Thirteen (13) discrete grab samples from each of the 1.5 cubic-yard excavator buckets produced one composite sample representing a specific pile. Once the composite sample was obtained for a particular pile, the metal pan was covered with a foil-lined plastic lid and labeled to ensure that each individual composite sample corresponded with the specific pile it represented.

In order to provide as much data as possible for soils adjacent to transformers/capacitors, two distinct composite samples were formed for each pile of material removed. Two (2) grab samples were taken from each 1.5 cubic-yard excavator bucket prior to depositing the load into the receiving front-end loader. Two (2) grab samples were taken with hand-held spades from the center of each excavator bucket and deposited into two (2) foil-lined metal pans. Each metal pan received thirteen (13) discrete grab samples to produce representative composite samples. Each pan was covered with a foil-lined plastic lid and labeled to ensure that each individual composite sample represented a particular pile.

At the end of each day, all samples collected were transferred from the work area to the on-site laboratory trailer by the field laboratory technician. All sampling equipment (hand-held spades and pans) were decontaminated using a detergent and water wash, potable water rinse, hexane rinse, and distilled water rinse to prevent cross contamination. Each composite sample was homogenized by the field laboratory technician using clean hand-held spades. The homogenized composite mixture was placed into wide mouth, amber glass containers with screw-type Teflon-lined caps. Each sample container was labeled and appropriate field logs were completed. Each sample container was packed and shipped to the ES&E Laboratory, Gainesville, Florida.

5.2.2 Laboratory Results for Excavated Soils

Analyses for PCB isomers 1016 and 1260 were performed in accordance with EPA certified analytical procedures (USATHAMA Method 9T) and protocols. No PCB isomers 1242 and 1254 were detected and reported to WESTON. The analytical results for soil and debris exhumed at Landfill No. 2 are provided in Table 5-1. Total PCB's represent the sum of all PCB isomers. Where PCB's were not detected for a given isomer, the quantity of zero was added into the total.

The analytical results contained in Table 5-1 indicate that the highest PCB concentrations were located in an area of the trench where most of the debris and all of the transformers and capacitors were situated. Analyses of the excavated trench soils indicate that PCB isomers 1016 and 1260 were not

TABLE 5-1

ANALYTICAL RESULTS FOR
PCB CONCENTRATIONS IN SOIL PILES (ug/g)

WOODBRIDGE RESEARCH FACILITY
WOODBRIDGE, VIRGINIA

PILE/SAMPLE NUMBER	1016	1242	1254	1260	TOTAL
P001	ND	20	1	ND	20*
P002	ND	20	3	ND	20*
P003	ND	7	2	ND	9
P004	ND	ND	ND	ND	0
P005	ND	ND	ND	ND	0
P006	ND	200	3000	ND	3000*
P007	ND	30	80	ND	100*
P008	ND	ND	5	ND	5
P009	ND	ND	ND	ND	0
P010	ND	ND	ND	ND	0
P011	ND	ND	ND	ND	0
P012	ND	ND	ND	ND	0
P013	ND	ND	ND	ND	0
P014	ND	1	ND	ND	1
P015	ND	4	ND	ND	4
P016	ND	7	ND	ND	7
P017	ND	1	ND	ND	1
P018	ND	4	ND	ND	4
P019	ND	20	ND	ND	20
P019 Duplicate	ND	3	ND	ND	3
P020	ND	9	ND	ND	9

TABLE 5-1 (continued)

ANALYTICAL RESULTS FOR
PCB CONCENTRATIONS IN SOIL PILES (ug/g)

WOODBRIDGE RESEARCH FACILITY
WOODBRIDGE, VIRGINIA

PILE/SAMPLE NUMBER	1016	1242	1254	1260	TOTAL
P020 Duplicate	ND	6	ND	ND	6
P021	ND	10	ND	ND	10
P021 Duplicate	ND	8	ND	ND	8
P022	ND	30	ND	ND	30
P022 Duplicate	ND	10	ND	ND	10
P023	ND	7	ND	ND	7
P023 Duplicate	ND	10	ND	ND	10
P024	ND	10	10	ND	20
P024 Duplicate	ND	8	5	ND	10*
P025	ND	100	7	ND	100*
P025 Duplicate	ND	30	4	ND	30*
P026	ND	100	40	ND	100*
P026 Duplicate	ND	400	20	ND	400*
P027	ND	300	20	ND	300*
P027 Duplicate	ND	400	30	ND	400*
P028	ND	80	9	ND	90*
P028 Duplicate	ND	100	10	ND	100*
P029	ND	200	20	ND	200*
P029 Duplicate	ND	100	60	ND	200*
D030	ND	200	30	ND	200*
P030 Duplicate	ND	100	20	ND	100*

TABLE 5-1 (continued)

ANALYTICAL RESULTS FOR
PCB CONCENTRATIONS IN SOIL PILES (ug/g)

WOODBRIDGE RESEARCH FACILITY
WOODBRIDGE, VIRGINIA

PILE/SAMPLE NUMBER	1016	1242	1254	1260	TOTAL
P031	ND	200	10	ND	200*
P031 Duplicate	ND	70	30	ND	100
P032	ND	20	30	ND	50
P032 Duplicate	ND	10	70	ND	80
P033	ND	10	20	ND	30
P033 Duplicate	ND	10	20	ND	30
P034	ND	60	30	ND	90
P034 Duplicate	ND	300	30	ND	300*
P035	ND	10	20	ND	30
P035 Duplicate	ND	20	30	ND	50
P036	ND	10	30	ND	40
P036 Duplicate	ND	20	20	ND	40
P037	ND	40	50	ND	90
P037 Duplicate	ND	20	30	ND	50
P038	ND	10	10	ND	20
P038 Duplicate	ND	10	20	ND	30
P039	ND	10	40	ND	50
P039 Duplicate	ND	10	10	ND	20
P040	ND	7	10	ND	20*
P040 Duplicate	ND	7	10	ND	20*
P041	ND	10	10	ND	20

TABLE 5-1 (continued)

ANALYTICAL RESULTS FOR
PCB CONCENTRATIONS IN SOIL PILES (ug/g)

WOODBRIDGE RESEARCH FACILITY
WOODBRIDGE, VIRGINIA

PILE/SAMPLE NUMBER	1016	1242	1254	1260	TOTAL
P041 Duplicate	ND	6	6	ND	10*
P042	ND	9	9	ND	20*
P042 Duplicate	BROKEN DURING SHIPMENT - ANALYSIS NOT PERFORMED				
P043	ND	4	7	ND	10*
P043 Duplicate	ND	10	40	ND	50
P044	ND	5	20	ND	30*
P044 Duplicate	ND	5	10	ND	20*
P045	ND	4	5	ND	9
P045 Duplicate	ND	5	8	ND	10*
P046	ND	9	20	ND	30*
P046 Duplicate	ND	8	10	ND	20*
P047	ND	2	4	ND	6
P047 Duplicate	BROKEN DURING SHIPMENT - ANALYSIS NOT PERFORMED				

* Total PCB quantities rounded to one significant digit due to level of certification performed.

ND = Non-detected. Less than detection limit of .6 ug/g

Note: Procedures for obtaining duplicate samples and significance of results are explained in Section 5.2.1, Soil Sampling Procedures, page 5-2 of Final Report.

TABLE 5-2

USATHAMA CERTIFICATION STATUS

COMPOUND	METHOD	MATRIX	TESTED RANGE	DETECTION LIMIT	UNITS*	CERTIFICATION LEVEL
PCB-1016	9T	SO	0.56 - 5.48	0.6	UGG	SQ
PCB-1260	9T	SO	0.54 - 10.80	0.6	UGG	SQ
PCB-1242	9T	SO	Not certified	0.6	UGG	-
PCB-1254	9T	SO	Not certified	0.6	UGG	-
PCB-1016	2F	Water	0.17 - 6.62	0.4	UGL	SQ
PCB-1260	2F	Water	0.16 - 6.40	0.3	UGL	SQ

*UGL = Micrograms per liter
UGG = Micrograms per gram

SO = Soil/Sediment
SQ = Semiquantitative

detected within the certified range for the USATHAMA analytical protocol. However, PCB isomers 1242 and 1254 were detected. Table 5-2 identifies USATHAMA certification parameters for the analyses performed.

Pursuant to the request of USATHAMA, all soil piles containing detectable PCB concentrations (greater than 0.6 ug/g total PCB) were removed from the site and disposed at the Chemical Waste Managment, Inc. hazardous waste landfill facility at Model City, New York.

5.3 GROUNDWATER SAMPLING

Groundwater sampling was performed at all well points adjacent to Landfill No. 1 and Landfill No. 2. Samples were obtained from Landfill No. 1 on 20 March 1985, 14 June 1985, and 5 September 1985. Samples were collected from Landfill No. 2 on 13 June 1985. Sampling was performed by the field laboratory technician. Results of groundwater analysis from samples collected at Landfill No. 1 and No. 2 are provided in Table 5-3. Groundwater elevations and depths from top of riser are provided in Table 5-4 for dates sampled.

Each well point was purged prior to sampling to ensure that a representative sample was collected. Well point purging and sampling was accomplished by using a standard, hand-held Teflon bailer. Monitor well sampling consisted of the following procedures:

- Prior to purging, the depth to water from the notch measuring point in the well point casing was measured and recorded.
- Measurements of the depth from the top of the water level to the bottom of the well were made and recorded.
- The volume of standing water in the well point was calculated.
- Based on the standing water volume, the volume of water to be purged was calculated.
- Well points were purged by bailing. At least five times the calculated volume of standing water in the well point was removed.
- Sampling equipment was decontaminated by scrubbing with Alconox detergent and rinsing with distilled water prior to sampling.
- The decontaminated bailer was lowered into the well and allowed to fill with water.
- After the bailer was full, it was carefully retrieved from the well point.
- Sample containers were rinsed with appropriate sample prior to filling.
- Sample containers were filled with water and caps secured.
- Sample containers were labeled according to chain-of-custody procedures.

TABLE 5-3

ANALYTICAL RESULTS FOR
PCB CONCENTRATIONS IN GROUNDWATER SAMPLES (ug/l)

WOODBRIDGE RESEARCH FACILITY
WOODBRIDGE, VIRGINIA

Monitoring Well Number	Installed By	Landfill No.	Date Sampled	1016	1260	Total
MW-1	WESTON	1	3/20/85	ND	ND	ND
MW-2	WESTON	1	3/20/85	ND	ND	ND
MW-3	WESTON	1	3/20/85	ND	ND	ND
MW-4	WESTON	1	3/20/85	ND	ND	ND
MW-5	WESTON	1	3/20/85	ND	ND	ND
MW-6	WESTON	1	3/20/85	ND	ND	ND
MW-1	WESTON	1	6/14/85	ND	ND	ND
MW-2	WESTON	1	6/14/85	ND	ND	ND
MW-3	WESTON	1	6/14/85	ND	ND	ND
MW-4	WESTON	1	6/14/85	ND	ND	ND
MW-5	WESTON	1	6/14/85	ND	ND	ND
MW-6	WESTON	1	6/14/85	ND	ND	ND
MW-1	ES&E	2	6/13/85	ND	ND	ND
MW-2	ES&E	2	6/13/85	ND	ND	ND
MW-3	ES&E	2	6/13/85	ND	ND	ND
MW-4	ES&E	2	6/13/85	ND	ND	ND
MW-5	ES&E	2	6/13/85	ND	ND	ND
MW-6	ES&E	2	6/13/85	ND	ND	ND
MW-1	WESTON	1	9/05/85	ND	ND	ND
MW-2	WESTON	1	9/05/85	ND	ND	ND
MW-3	WESTON	1	9/05/85	ND	ND	ND
MW-4	WESTON	1	9/05/85	ND	ND	ND
MW-5	WESTON	1	9/05/85	ND	ND	ND
MW-6	WESTON	1	9/05/85	ND	ND	ND

ND: Non-detected. Less than detectable limit of .6 ug/g.

TABLE 5-4

MONITOR WELL ELEVATIONS AND WATER LEVELS

Woodbridge Research Facility
Woodbridge, Virginia

Well No.	Landfill No.	Sampled	GW Surface From TOC*	GW Elevation Above MSL	Surface Elevations
MW-1	1	3/20/85	8.83'	.81'	Not Taken
MW-2	1	3/20/85	27.00'	.65'	
MW-3	1	3/20/85	4.25'	.84'	
MW-4	1	3/20/85	4.17'	.60'	
MW-5	1	3/20/85	5.42'	.69'	
MW-6	1	3/20/85	5.67'	.96'	
MW-1	1	6/14/85	8.75'	.89'	Not Taken
MW-2	1	6/14/85	26.75'	.90'	
MW-3	1	6/14/85	4.33'	.76'	
MW-4	1	6/14/85	4.58'	.19'	
MW-5	1	6/14/85	5.50'	.61'	
MW-6	1	6/14/85	5.58'	1.05'	
MW-1	2	6/13/85	12.50'	2.38'	Not Taken
MW-2	2	6/13/85	8.25'	1.73'	
MW-3	2	6/13/85	8.08'	1.60'	
MW-4	2	6/13/85	8.17'	1.67'	
MW-5	2	6/13/85	8.25'	2.06'	
MW-6	2	6/13/85	9.00'	1.06'	
MW-1	1	9/05/85	7.93'	1.71'	Not Taken
MW-2	1	9/05/85	26.19'	1.46'	
MW-3	1	9/05/85	3.62'	1.47'	
MW-4	1	9/05/85	4.02'	.75'	
MW-5	1	9/05/85	5.77'	.34'	
MW-6	1	9/05/85	5.03'	1.60'	
MW-1	1	4/25/86	8.46	1.18'	Occoquan Bay
MW-2	1	4/25/86	26.47	1.18'	0.68' Above
MW-3	1	4/25/86	4.33	.76'	MSL
MW-4	1	4/25/86	3.73	1.04'	
MW-5	1	4/25/86	5.00	1.11'	
MW-6	1	4/25/86	5.85	.78'	
MW-1	2	4/25/86	11.96'	2.92'	Occoquan Bay
MW-2	2	4/25/86	7.58'	2.40'	0.68' Above
MW-3	2	4/25/86	7.29'	2.39'	MSL
MW-4	2	4/25/86	7.19'	2.65'	
MW-5	2	4/25/86	7.96'	2.35'	
MW-6	2	4/25/86	7.73'	2.33'	

*TOC = Top of Casing

5.4 CLARIFICATION OF ANALYTICAL RESULTS FOR SOIL AND GROUNDWATER SAMPLES

During the analyses of soil samples from the Woodbridge Research Facility, it became apparent that PCB isomers, other than PCB 1016 and 1260 which ES&E was authorized to report, were present in the soils. ES&E utilized USATHAMA Method 9T to analyze these samples for PCB's but calibrated the gas chromatograph with PCB isomers 1016, 1242, 1254 and 1260. ES&E then utilized the "pattern recognition" technique to identify and quantify PCB 1242 and 1254 in the soil samples. Since more than one PCB isomer was detected in many of the soil samples, it was also decided to report a "Total" PCB which represented the sum of all PCB isomers detected in each sample (see Table 5-2).

The water samples were extracted and analyzed according to USATHAMA Method 2F which is certified for PCBs 1016 and 1260. There were no PCB isomers detected in any of the water samples analyzed (see Table 5-3 of the Final Report). Had PCB isomers other than 1016 and 1260 been detected, they would have been quantitated against the specific PCB isomer detected, as was done for the soil samples. Since this was not the case, it was felt that reporting ND (Not Detected) for the PCB isomers for which the method is certified (i.e., PCB 1016 and 1260) and also for "Total" PCB would provide adequate data on the PCB content of these water samples. The term "Total" PCB in Table 5-3 represents the sum of all PCB isomers detected in each sample.

5.5 WELL DEVELOPMENT WATER SAMPLING

During the course of the field activities performed by ES&E and WESTON, well development water was generated as the result of groundwater sampling. Prior to the second round of groundwater sampling by WESTON (13-14 June 1984), all well development water was maintained in 55-gallon steel drums. These drums were stationed adjacent to the respective wells from which the development water was produced. Toward the conclusion of the WESTON remediation program, all drums containing well development water were brought to the soil staging area at Landfill No. 2 and grouped according to landfill origin.

Utilizing separate 10mm diameter x 130cm long glass tubes, representative samples of well development water from each drum in a landfill group was collected to form a composite sample. One composite sample for each landfill group was collected and sent to the ES&E laboratory for analysis. For both composite samples, PCB concentrations were not detected above the detection limits of 0.4 ug/l and 0.3 ug/l for isomers 1016 and 1260, respectively.

As a result, well development water contained within the sampled drums was poured into the trench and solidified as part of the closure process described in Section 6.3. Well development water generated during the second and third rounds of WESTON groundwater sampling were similarly maintained in steel drums until analytical results were obtained. As PCB's were not detected above the detection limits of 0.4 ug/l (PCB 1016) and 0.3 ug/l (PCB 1260) in the groundwater samples, the well development water from each sampling round was discharged onto the ground.

Drums utilized as well development water containers were decontaminated with a high pressure rinse and Alconox detergent wash followed by another high pressure rinse. Following decontamination, the drums were offered to WRF for reuse.

5.6 SAMPLE PACKAGING AND SHIPMENT

All sample containers were labeled by the field laboratory technician with the following information:

- Sample Identification Number
- Site
- Client
- Date/Time Collected
- Analyte Group
- Sampling Personnel

USEPA chain-of-custody procedures were followed by WESTON field personnel to ensure preservation of the integrity of the samples. Collected samples were under a visual control administered by the field laboratory technician. The field laboratory technician monitored the location of collected samples and was charged with the responsibility of acting as sample custodian while in the field. Chain-of-custody records were initialed at the time of sample bottle preparation and followed each bottle and lot through the sequence from bottle preparation to shipment to ES&E's laboratory.

Thermal chests were secured and shipped to the ES&E laboratory using a common carrier. Shipments were required every day, with delivery to ES&E's laboratory within 48 hours following sample collection in order to meet the seven day maximum holding period prior to sample extraction. ES&E analytical personnel acknowledged receipt of the shipped samples at their time of arrival.

Collected soil/water samples were prepared for shipment to ES&E Laboratory, Gainesville, Florida, according to the following procedures:

- 14 x 14 x 30 inch plastic thermal chests were used for shipping samples.
- Each chest was lined with a commercial plastic bag.
- Vermiculite was poured into the lined chest for absorbent and cushioning purposes.
- Each glass sample container was enclosed in a zip-lock storage bag and placed into the chest.
- The plastic bag was tied and ice was added to the chest to ensure preservation of sample integrity.
- Each chest was bound by fiberglass binding tape and labeled according to DOT requirements.

- EPA chain-of-custody forms were completed by the field laboratory technician and taped to the top of the thermal chest.

- The thermal chests were received by the ES&E Laboratory within 48 hours following sampling.

5.7 SAMPLE IDENTIFICATION AND DOCUMENTATION

A bound field notebook was used to document and identify each sample collected. Entries were made by the field laboratory technician in standard format and included the following:

- Site identification
- Sample location referenced from known points
- Sample depth
- Pile location (number) where material is deposited
- Date
- Time of collection (24-hour clock)
- Type of sample container
- Comments and other relevant observations
- Signature of sampler

SECTION 6

CLOSURE

6.1 DECONTAMINATION VERIFICATION PROGRAM

In order to complete closure of the excavated site (Landfill No. 2) at WRF, it was necessary to implement a sampling and analytical plan to determine the concentrations of residual PCB contamination in the soil subsequent to excavation operations. The levels of PCB contamination indicated whether further excavation was warranted or whether closure could be implemented. Representative soil samples were obtained and analyzed for PCB contamination via USATHAMA certified methodology to establish the effectiveness of the excavation process.

Samples from the excavated area were collected at regular intervals based on a grid pattern. The grid consisted of 10-foot squares located from the corner reference points which had been previously established. All sample locations were surveyed into place and marked with stakes prior to sampling. Figure 6-1 illustrates grid locations.

A total of 60 grab samples were collected from the trench floor and walls. The sampling was accomplished by using thin-walled aluminum tubes. Soil samples were collected at locations where grid lines intersected on the trench floor and at mid-depth locations in the side walls. A sufficient soil mass was collected at each point to permit certified analysis to be performed. The thin-walled sampling tubes were hand driven into the ground to a depth of 6 inches. The top 2 inches of the sample was discarded and the lower 4 inches retained and analyzed. [illegible] the soil was forced into the thin-walled tube, the material was [illegible] clean, labeled aluminum cans and transferred from the work area [illegible] Stainless steel sampling tubes were decontaminated after each use by [illegible] in a detergent wash, potable water rinse, [illegible] water rinse. A field log was maintained by WESTON [illegible] sample locations. At the end of the work day, all samples were [illegible] wide-mouth amber glass containers with [illegible] use of a clean spatula. Samples were [illegible] for shipment to the laboratory. All [illegible] and chain-of-custody forms were completed [illegible] with the sequence and preservation of samples.

Analytical Methods

Analyses for PCB [illegible] were performed in accordance with USATHAMA [illegible] Methods 8 and protocols for the soils [illegible] Analyses [illegible] and were detected and reported [illegible] Analytical results are provided in Table [illegible] The results presented indicate that total PCB concentrations for each grab sample were less than the 49 ug/g ppm cleanup criteria established for Section 4 [illegible] Sampling, within the Sampling Plan. Therefore, the side walls and floor of the excavated trench were

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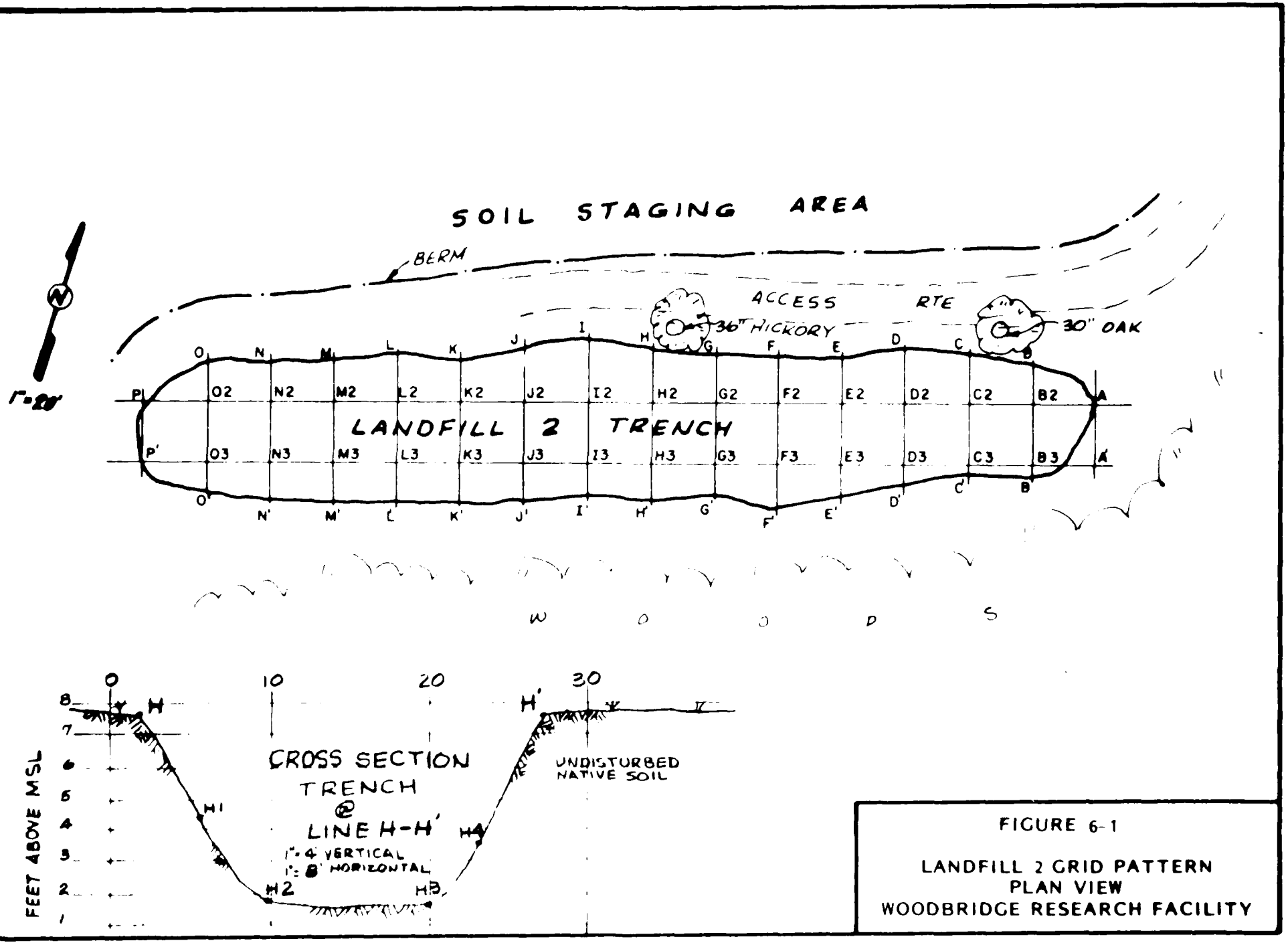


FIGURE 6-1

LANDFILL 2 GRID PATTERN
PLAN VIEW
WOODBRIDGE RESEARCH FACILITY

TABLE 6-1

ANALYTICAL RESULTS FOR
PCB CONCENTRATIONS IN SOIL GRAB SAMPLES (ug/g)

WOODBRIDGE RESEARCH FACILITY
WOODBRIDGE, VIRGINIA

SAMPLE LOCATION	FLOOR (F) or WALL (W)	1016	1242	1254	1260	TOTAL
B1	W	ND	ND	ND	ND	0
B2	F	ND	ND	ND	ND	0
B3	F	ND	ND	ND	ND	0
B4	W	ND	ND	ND	ND	0
C1	W	ND	ND	ND	ND	0
C2	F	ND	ND	ND	ND	0
C3	F	ND	ND	ND	ND	0
C4	W	ND	ND	ND	ND	0
D1	W	ND	ND	ND	ND	0
D2	F	ND	ND	ND	ND	0
D3	F	ND	ND	ND	ND	0
D4	W	ND	ND	ND	ND	0
E1	W	ND	ND	ND	ND	0
E2	F	ND	ND	ND	ND	0
E3	F	ND	8	1	ND	9
E4	W	ND	ND	ND	ND	0
F1	W	ND	ND	ND	ND	0
F2	F	ND	2	ND	ND	2
F3	F	ND	7	2	ND	9
F4	W	ND	ND	ND	ND	0

TABLE 6-1 (continued)

ANALYTICAL RESULTS FOR
PCB CONCENTRATIONS IN SOIL GRAB SAMPLES (ug/g)

WOODBRIDGE RESEARCH FACILITY
WOODBRIDGE, VIRGINIA

SAMPLE LOCATION	FLOOR (F) or WALL (W)	1016	1242	1254	1260	TOTAL
G1	W	ND	ND	ND	ND	0
G2	F	ND	ND	ND	ND	0
G3	F	ND	4	ND	ND	4
G4	W	ND	ND	ND	ND	0
H1	W	ND	ND	ND	ND	0
H2	F	ND	ND	ND	ND	0
H3	F	ND	2	ND	ND	2
H4	W	ND	ND	ND	ND	0
I1	W	ND	2	3	ND	5
I2	F	ND	ND	ND	ND	0
I3	F	ND	10	4	ND	10*
I4	W	ND	ND	ND	ND	0
J1	W	ND	1	ND	ND	1
J2	F	ND	2	3	ND	5
J3	F	ND	3	1	ND	4
J4	W	ND	ND	ND	ND	0
K1	W	ND	ND	ND	ND	0
K2	F	ND	ND	ND	ND	0
K3	F	ND	6	4	ND	10
K4	W	ND	ND	ND	ND	0

TABLE 6-1 (continued)

ANALYTICAL RESULTS FOR
PCB CONCENTRATIONS IN SOIL GRAB SAMPLES (ug/g)

WOODBRIDGE RESEARCH FACILITY
WOODBRIDGE, VIRGINIA

SAMPLE LOCATION	FLOOR (F) or WALL (W)	1016	1242	1254	1260	TOTAL
L1	W	ND	ND	ND	ND	0
L2	F	ND	2	1	ND	3
L3	F	ND	ND	ND	ND	0
L4	W	ND	ND	ND	ND	0
M1	W	ND	ND	ND	ND	0
M2	F	ND	5	8	ND	10*
M3	F	ND	4	6	ND	10
M4	W	ND	ND	ND	ND	0
N1	W	ND	ND	ND	ND	0
N2	F	ND	1	2	ND	3
N3	F	ND	5	3	ND	8
N4	W	ND	ND	ND	ND	0
O1	W	ND	ND	ND	ND	0
O2	F	ND	ND	ND	ND	0
O3	F	ND	ND	ND	ND	0
O4	W	ND	ND	ND	ND	0
NW Wall	W	ND	ND	3	ND	3
SW Wall	W	ND	1	4	ND	5
NE Wall	W	ND	ND	ND	ND	0
SE Wall	W	ND	ND	ND	ND	0

* Total PCB quantities rounded to one significant digit due to level of certification performed

ND: Non-detected. Less than detectable limit of 0.6 ug/g.

considered "clean." Therefore, further excavation was not warranted and site closure operations could be implemented. USATHAMA certification parameters for the analyses performed are provided in Table 5-2.

6.3 SEMI-PERMANENT BENCH MARKS

Pursuant to the requirements of Section T.3.5.4 of the WESTON Technical Plan, semi-permanent bench marks were established at the toe of Landfill No. 1 and near the surface water body adjacent to Landfill No. 2. The purpose of these benchmarks is to assist in obtaining surface water elevations of the Occoquan Bay near Landfill No. 1 and Marumsco Creek near Landfill No. 2.

The semi-permanent bench marks consisted of three-foot threaded metal pins driven into the subsurface with an approximate protrusion of six inches. Bench mark elevations for each pin were established by running levels from ES&E established turning points. For the Landfill No. 1 bench mark, turning point No. 10 was utilized for the initial back sight elevation. The elevation of the Landfill No. 1 bench mark was recorded at 3.94 feet above mean sea level. For Landfill No. 2 bench mark, turning point No. 37 was utilized for the initial back sight elevation. The elevation of the Landfill No. 2 bench mark was recorded at 6 feet above mean sea level. The location for the semi-permanent level mark at Landfill No. 1 is noted in Figure 2-1. The location for the semi-permanent bench mark at Landfill No. 2 is noted in Figure 3-1.

The surface elevation of the Occoquan Bay was determined to be 0.68 feet above mean sea level at 1:30 p.m. on April 25, 1986. The measurement was obtained by WESTON personnel using leveling instruments and top of casing elevation data from monitoring wells in Landfill No. 1 and Landfill No. 2.

6.4 DEMOBILIZATION AND SITE RESTORATION

After completion of the trench excavation and removal of all PCB contaminated soils and trench debris exhibiting detectable PCB concentrations (greater than 0.6 ug/g), a site restoration and demobilization program was initiated. The objectives of the program were to clean and remove work equipment and restore the disposal site for any future use.

All equipment employed within the work zone was decontaminated and removed from site. Decontamination activities were performed on the existing decontamination pad. All visible contamination was removed by application of high pressure water. The surface was rinsed with an appropriate decontamination solution (Alconox detergent and water) and again rinsed with high-pressure water.

All potentially contaminated materials within the work zone were removed prior to demobilization. The gravel access road and the concrete transformer/capacitor staging pad situated in the work zone were also removed and disposed of at the Chemical Waste Management facility at Model City, New York. Any remaining miscellaneous materials which could have been potentially contaminated were removed for disposal.

The earthen surface of the soil staging area was scraped down to a depth approximately 3 inches below existing ground surface. The material was stockpiled and subsequently loaded onto prepared semi-dump trailers for transportation to the disposal facility in Model City, New York.

After all site equipment had been cleaned, the decontamination pad was washed down with high pressure water. Sludges and potentially contaminated water remaining in the sump were then removed and solidified with remaining soil. This material was subsequently loaded into a prepared semi-dump trailer for transportation to the disposal facility. The decontamination pad was then bulldozed and loaded into the trucks for disposal.

Upon completion of all decontamination activities, the field laboratory trailer and decontamination trailer were dismantled and removed from the facility. The command trailer remained in place for the remainder of site restoration activities.

After all contaminated materials, equipment and trailers had been removed, site restoration was instituted. Restoration consisted of construction of a compacted cover over the original trench, topographic modification, and revegetation.

Following completion of the soil and debris exhumation in which all of the material was excavated in dry subsurface conditions, groundwater flowed into the trench during the period of inactivity in which verification sampling results were being determined. During the seventeen-day period between 14 March 1985 (date of final excavation activities) and 1 April 1985 (date off-site transportation began), groundwater filled approximately 95 percent of the trench floor to a depth of about 16 inches. After consultation with USATHAMA, it was decided that the groundwater contained within the trench should remain as verification sampling results indicated that PCB concentrations were less than 40 ug/g.

To facilitate the compaction of clean fill material above the groundwater, WESTON mixed 40 tons of cement kiln dust into the groundwater and saturated soil in the bottom and along the sides of the trench. Utilizing the excavator bucket, the admixture was sufficiently agitated to produce a physical/chemical reaction which solidified the materials into a stabilized mass capable of supporting an earthen cap.

Following a 24-hour period in which the stabilized mass cured into a concrete-like structure, clean fill material was added to the trench from a stockpile of soil created during site preparation activities. A minor amount of fill was obtained from areas northeast of the excavation zone which were created during earthen berm construction prior to initiating exhumation activities.

Movement of the borrow materials was accomplished by means of a front-end loader and bulldozer. Prior to initiation of filling operations, the temporary gravel access road north of the site was scraped and the gravel removed by WRF personnel.

As the borrow materials were emplaced into the trench, they were compacted with a vibrating 42-inch Sheepsfoot roller. The roller was utilized continuously as materials were delivered to the site to provide compaction of all disturbed soils. Compacted soils provided a relatively impermeable cap for the excavated site. The total depth of the emplaced fill ranged from 5 to 8 feet according to location within the trench.

The materials were deposited so as to achieve a gentle slope (less than 20:1). The overall effect of the grading was a shallow southward slope with approximately parallel contours which permit good drainage over the site at the existing natural drainage area.

With the exception of the compacted cover, the remaining work area was disked to an approximate depth of 3 inches. After the soil was disked, the area was fertilized with 300 lbs per acre of 10-10-10 fertilizer. A hand-sown application of Kentucky 31 Tall Fescue grass seed was applied at a rate of 60 pounds per acre.

Upon completion of the site restoration activities, the remaining WESTON personnel, the office trailer and all remaining equipment were demobilized from the site.

Several weeks after project demobilization, the sown grass seed did not germinate to the point which would indicate a sufficient vegetative cover. At the request of the COE, WESTON representatives returned to WRF to re-sow grass seed. At this time, the soil outside the excavation zone was disked and the area was fertilized with 600 pounds per acre of 12-12-12 fertilizer and agricultural lime applied at a rate equivalent to 4000 pounds per acre. A hand-sown mixture of 30 percent Kentucky Tall Fescue and 70 percent Hulled Bermuda was applied at a rate of 60 pounds per acre. Hay mulch was applied to the seeded area at a rate of one-and-one-half tons per acre.

The re-seeded area was inspected by WESTON personnel during a subsequent groundwater sampling event at the site (June 1985). Inspection of the area revealed that a sufficient vegetative cover for the excavation zone was in place.

APPENDIX A

WELL CONSTRUCTION SUMMARIES
AND
DRILLING LOGS

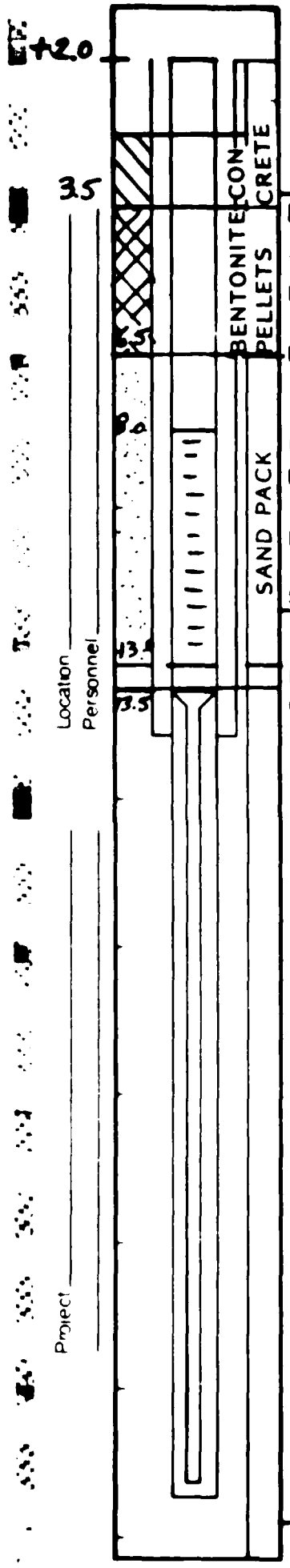
Well MW-1

Well Construction Summary

Location or Coords. WOODBRIDGE LF-1

Elevation Ground Level

Top of Casing



Drilling Summary:

Total Depth 13.5 feet

Borehole Diameter 12 in.= 1 foot

Driller ATEC

Rig CME 45

Bit(s) HOLLOW STEM AUGER
WEDGE BIT

Drilling Fluid NONE

Surface Casing NONE

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling 0-15'	2/11	1615	2/11	1655
Geophys Logging				
Casing 0-13.5'	2/11	1700	2/11	1705
Filter Placement	2/11	1705	2/11	1730
Cementing				
Development				
Other BENTONITE	2/11	1730	2/11	1735

Well Design:

Basis Geologic Log ____ Geophysical Log ____

Casing String(s)				Casing	Screen
C	-	+2	-3		
C	-	3	8		
S	-	8	13.5		

Casing S/STEEL SCHEDULE 40
2" DIAMETER
SAME

Screen 13.5-8.0 S/STEEL
.02 WOUND 2" DIAMETER

Centralizers

Filter Material 40 SAND MAT'L
MAT'L PACK

Cement PORTLAND/SAND 1:2

Other "PELTONITE" BENTONITE PELLETS
150 LBS.

Well Development:

Comments:

NO PROTECTIVE CASING USED

WESTON

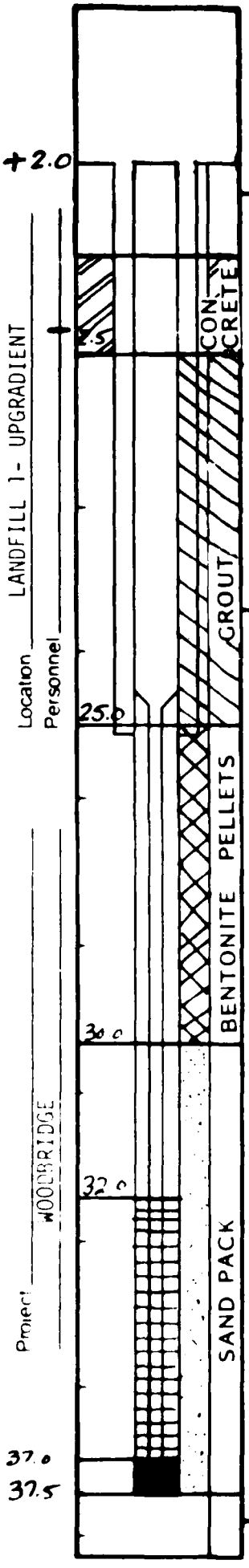
Well MW-2

Well Construction Summary

Location or Coords: WOODBRIDGE, VA. LF-1

Elevation Ground Level ~30'

Top of Casing



Drilling Summary:

Total Depth

Borehole Diameter 12"=1'

Driller ATEC

Rig CME 45 TRACK

Bit(s) HOLLOW STEM AUGER-WEDGE BIT

Drilling Fluid NONE

Surface Casing NONE

Well Design:

Basis Geologic Log XX Geophysical Log

Casing String(s)		C Casing	S Screen
S	32	37.5	
C	22	32	
C	12	22	
C	2	12	
C	+3	2	

Casing C: SCHEDULE 40 S/STEEL EXTERNAL COUPLINGS S/STEEL

Screen S: .02 JOHNSON WOUND S/STEEL

Centralizers

Filter Material MQ GRANULAR SAND (ANGULAR MED)

Cement PORTLAND 20 BENTONITE 1

Other BENTONITE PELLET SEAL OVER PACK

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling 0-35'	1/30	1030	1/30	1540
35-40	2/5	0845	2/5	0900
Geophys Logging				
Casing	2/5	1300	2/5	1330
Filter Placement	2/5	1330	2/5	1345
Cementing	2/6	1400	2/6	1430
Development				
Other				
SURFACE CEMENT PROTECTIVE CASING	2/11	0700	2/11	0930

Well Development:

Comments:

GROUT BATCH 1: 4 BAGS PC 30 GAL H2O
2: 4 BAGS PC 20 GAL "
3: 2 BAGS PC 20 GAL "
4: 2 " " 20 "

SURFACE (0-5.0')

5: 3 " " 20 "
W/ 2 BAGS BENTONITE
2 GAL
1.5 BAGS/55 LBS " "
ORITE POWDER

WESTON

1.8

Well MW-3

Well Construction Summary

Location or Coords: WOODBRIDGE LF-1

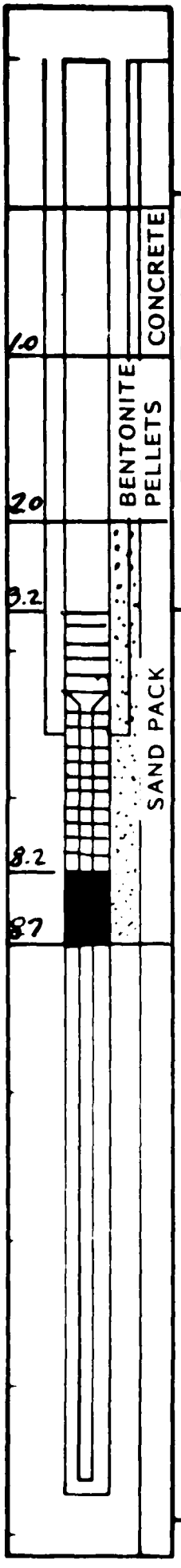
Elevation Ground Level

Top of Casing

Location

Personnel

Project



Drilling Summary:

Total Depth 10'

Borehole Diameter 1.0'

Driller ATEC

Rig CME 45 TRACK

Bit(s) HOLLOW STEM AUGER-WEDGE BIT

Drilling Fluid NONE

Surface Casing NONE

Well Design:

Basis Geologic Log ____ Geophysical Log ____

Casing String(s)	C Casing	S Screen
C	+1.8 to -3.2	
S	-3.2 to -8.7	

Casing: S/STEEL 2" DIAMETER SCHEDULE 40

Screen: ~~JOHNSON WOUND .0x SLOT~~

Centralizers:

Filter Material: #6 SAND AND PACK

Cement: PORTLAND/SAND

Other: BENTONITE PELLETS "PELTONITE" 1/3 BUCKET OR 66 lbs.

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling 0-10'	2/7	1230	2/7	1315
Geophys Logging				
Casing 5' SCREEN, 5' CASING	2/7	1330	2/7	1345
Filter Placement	2/7	1345	2/7	1355
Cementing				
Development				
Other BENTONITE PELLETS	2/7	1400	2/7	1405

Well Development:

Comments:

WESTON DESIGNERS CONSULTANTS

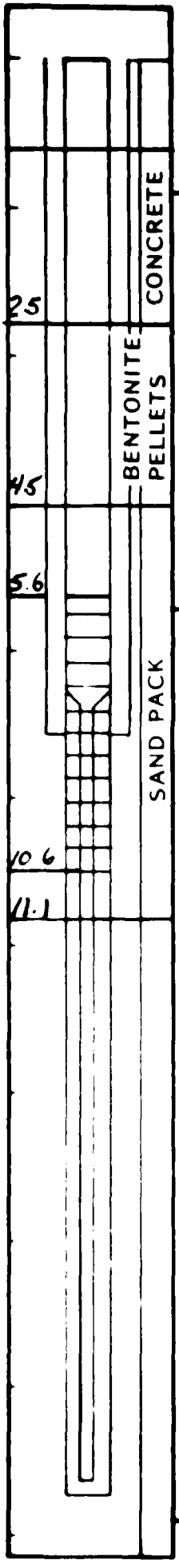
Well MW-4

Well Construction Summary

Location or Coords: WOODBRIDGE LANDFILL 1

Elevation Ground Level

Top of Casing



Location

Personnel

Drilling Summary:

Total Depth 11.5 '

Borehole Diameter 1.0'

Driller ATEC

Rig CME 45 TRACK

Bit(s) ~~HOLLOW STEM AUGERS-WEDGE BIT~~

Drilling Fluid NONE

Surface Casing NONE

Well Design:

Basis Geologic Log ___ Geophysical Log ___

Casing String(s) C Casing S Screen

C	+2.0	-.5	
C	-.5	-5.6	
S	5.6	11.1	

Casing S/STEEL 4" SCHEDULE 40

Screen S/STEEL [illegible]

Filter Material 4 SAND PACK

Cement PORTLAND-SAND [illegible]

Other BENTONITE PELLETS PELTONITE

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling 0-15'	2/7	1545	2/7	1630
Geophys Logging				
Casing 7.5' CASING 5.0' SCREEN	2/7	1640	2/7	1645
Filter Placement	2/7	1650	2/7	1730
Cementing				
Development				
Other				

Well Development

Comments

WESTON

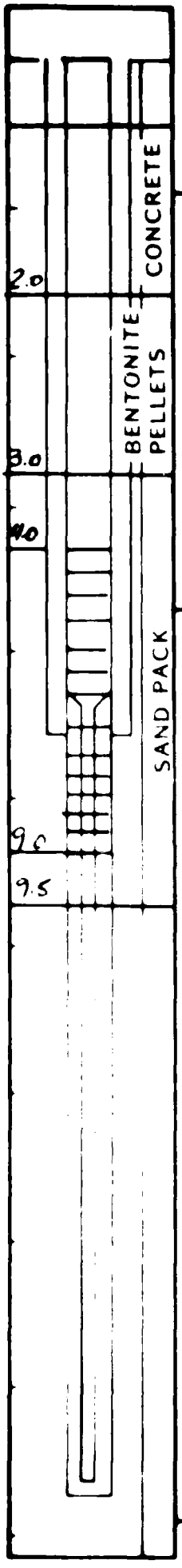
Well MW-5

Well Construction Summary

Location or Coords WOODBRIDGE VA. LANDFILL 1

Elevation Ground Level

Top of Casing



Drilling Summary:

Total Depth 9.5'

Borehole Diameter 1.0'

Driller ATEC

Rig CME 45

Bit(s) HOLLOW STEM AUGER-WEDGE BIT

Drilling Fluid NONE

Surface Casing NONE

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling 0-10	[illegible] 11	1400	[illegible] 11	14[illegible]
Geophysical Logging				
Casing	[illegible] 11	14[illegible]	[illegible] 11	[illegible]
Filter Placement	[illegible] 11	144	[illegible] 11	[illegible]
Cementing	[illegible] 11		[illegible] 11	
Development	[illegible] 13			
Other BENTONITE	[illegible] 12	[illegible]	[illegible] 12	[illegible]

Well Design:

Basis: Geologic Log Geophysical Log

Casing Strings: C Casing S Screen

C	+1	-4	
S	4	9.5	
* C	+4	+1	added 4-13

[illegible] STEEL [illegible]
[illegible] DIAMETER

[illegible]

[illegible]

[illegible] Material [illegible]

[illegible] DIAMETER

Other BENTONITE PELLETS [illegible]

Well Development

Comments

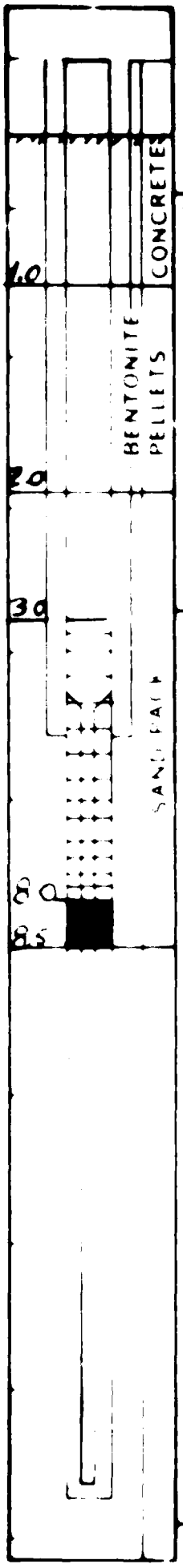
WESTON

Well MW-6

Well Construction Summary

Location or Coords
WOODBRIDGE, VA LANDFILL

Elevation Ground Level
Top of Casing



Drilling Summary

Total Depth
Borehole Diameter
Driller
Rig
Bits

Construction Time Log

Start

Well Design

Well Development

Comments

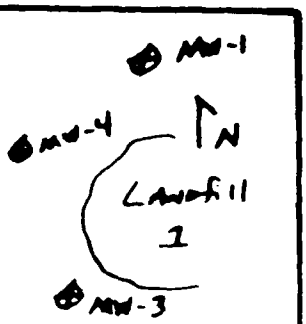
WESTON

WESTON

DRILLING LOG

WELL NUMBER MW-1
LOCATION [illegible]
OWNER
ADDRESS WOODBRIDGE, VA
TOTAL DEPTH 15'
SURFACE ELEVATION
WATER LEVEL approx. 8.0'
DRILLING COMPANY [illegible]
DRILLING METHOD
DATE DRILLED [illegible]
DRILLER
HELPER
LOG BY [illegible]

SKETCH MAP



NOTES
NO OVA RESPONSE IN BORING OR WORKING AREA

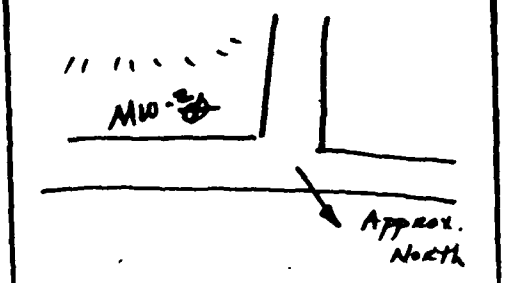
DEPTH (FT)	COLOR (M)	SAMPLE I. NUMBER	SAMPLE I. TYPE	SAMPLE I. BLOW/6"	DESCRIPTION SOIL CLASSIFICATION (COLOR TEXTURE STRUCTURES
[illegible]					

WESTON

DRILLING LOG

WELL NUMBER MW -2 OWNER
LOCATION LF-1 UPGRADIENT ADDRESS WOODBRIDGE, VA.
TOTAL DEPTH
SURFACE ELEVATION 25-30 WATER LEVEL
DRILLING COMPANY ATEC DRILLING METHOD AUGER DATE DRILLED 1/30/85
DRILLER HELPER
LOG BY RCJ

SKETCH MAP



NOTES
RIG-CME 45
TRACK MOUNTED

12" OD H.S. AUGER 6" ID

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
			A		0-4' YELLOW BROWN SILT, SLIGHTLY PLASTIC, DAMP
					10 YR 5/6 ML
	ML		(OVERBANK)		
	SP	1	SS	15 30 37	3.5-5.0 REC 1.1' .5' STIFF SILT LIGHTLY MOTTLED TO PALE BROWN 10 YR 8/3
			(LOW ENERGY		.6' V.DENSE FINE SAND/< 5% SILT
			FLUVIAL)		PALE BROWN 10 YR 8/3 DRY TO Y.BROWN 10 YR 7/8
	SP				
	SP				6.5 FT. OBSTRUCTION- MAY BE GRAVEL/CLEARED EASILY-PIECES OF SUB-
	ML	2	SS	8/11/12	ROUNDED COARSE GRAVEL IN CUTTINGS (AFTER SEVERAL MINUTES.. NO MORE OBSTRUCTION)
					8.5-10.0 ft. REC 1.6' STIFF SILT SLIGHTLY PLASTIC, DAMP, MOTTLED STRONG PINKISH WHITE
			(OVERBANK)		7.5 YR 8/2 TO STRONG BROWN 7.5 YR 5/6 ML
		3	SS	7/9/1	13.5-15.0 REC 1.35 STIFF SILT GRADING DOWN TO FINE SAND AND SILT STRONG MOTTLING STRONG BROWN
					7.5 YR 5/6 TO PALE BROWN 10 YR 8/4 ML
					TRACE OF BLACK CARBON STREAKS DRY-DAMP
					(CUTTINGS ARE DAMPER AT 19')
		4	SS		18.5-20' REC 1.2' .6' MOTTLED SILT, 20% FINE SAND (SAME AS ABOVE
	SP-SC				FINE SAND 10% CLAY YELLOW RED 5YR 5/8 DAMP

WESTON

DRILLING LOG

WELL NUMBER: MW-2 OWNER:
LOCATION: LF-1 ADDRESS: WOODBRIDGE
TOTAL DEPTH:
SURFACE ELEVATION: WATER LEVEL:
DRILLING COMPANY: DRILLING METHOD: DATE DRILLED:
DRILLER: HELPER:
LOG BY:

SKETCH MAP

5 MIN. H_2O at 31 FEET B.G.S.

WATER AT APPROX. 21' B.G.S. AT 1630 HOURS

NOTES

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
20					SP .3 FINE SAND≤ 10% CLAY SLIGHTLY PLASTIC
	SP-SC				CL .4 SAND AND CLAY MOD. PLASTIC
23					23.5-25.0 1.2 REC .5 CLAY≤10% SAND PALSTIC(MODERATE)
24	SP				DAMP TO MOIST SAND IS BROWN 5YR 4/6
	CL	5	SS	4/5/5	CLAY IS BROWN 5YR 4/6 WITH MOTTLES 5 YR 6/8 YELLOW BROWN
25					DRILLING STOPPED 1:20 P.M. PULLED AUGER TO 23'. HOLE DRY AT 2:30. PROBE TO 25' IN 25' AUGER (23' B.G.S.) DRILLING 25-30' CUTTINGS ARE VERY MOIST
	(OVERBANK FLUVIAL				
		6	SS	3/4/4	28.5 30.0 1.5'REC CLAY, ≤5% SAND, PLASTICITY LOW, MOIST/SAME AS ABOVE IN COLOR AND MOTTLING, PULLED AUGER TO 23',/ ~~KNOCKED OUT PLUG HOLE OPEN TO 28' AND DRY AFTER 15 MINUTES--CONTINUE TO DRILL~~ ~~HIT GRAVELLY LAYER AT APPROX. 33'~~
	SP				
		7	SS	11/24/20	33.5-35.0 1.1'REC 5'CLAYAS ABOVE/.5'M-C SAND SPOON WET 20% FINE GRAVEL ≤5% SILT VARIGATED
	(MODERATELY ENERGY FLUVIAL)				.1' INTERBEDS OF LIGHT GREY 10YR 7/1 to YELLOW BROWN 5YR 5/6/WET H_2O 31' B.G.S. IN 5 MIN. H_2O 26.5' B.G.S. IN 15 MINS. 26.3' IN 25 MIN. NO CHANGE AFTER 25 MIN. KNOCKED OUT PLUG- WATER UP TO 21' B.G.S.

WESTON

DRILLING LOG

WELL NUMBER MW-2 OWNER

LOCATION LANDFILL 1 ADDRESS WOODBRIDGE

TOTAL DEPTH 41.5'

SURFACE ELEVATION WATER LEVEL APPROX. 21'

DRILLING COMPANY AIEC DRILLING METHOD AUGER DATE DRILLED 1/30-2/5/85

DRILLER HELPER

LOG BY R. JOHNSON

SKETCH MAP

Addendum

NOTES

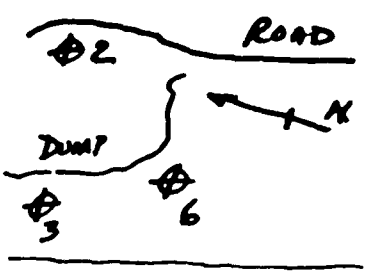
DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION / SOIL CLASSIFICATION (COLOR TEXTURE STRUCTURES)
40			SS	SP	40-41.5 FINE SAND, LOOSE, WET, PALE BROWN 10 YR/6/3
					AUGER WAS PULLED BACK TO 38'
					ROLLER BIT USED TO CLEAR PLUG IN AUGER AND ADVANCE TO 38'
					LESS THAN 55GALLONS OF WATER WAS ESTIMATED TO BE LOST IN HOLE

WESTON

DRILLING LOG

WELL NUMBER MW-3 OWNER
LOCATION LANDFILL 1 ADDRESS WOODBRIDGE, VA. RESEARCH CENTER
TOTAL DEPTH 10'
SURFACE ELEVATION WATER LEVEL ~4'
DRILLING COMPANY AIEC DRILLING METHOD AUGER DATE DRILLED 2/8/85
DRILLER HELPER
LOG BY R. JOHNSON

SKETCH MAP



NOTES

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0	GP	A		0	FINE GRAVEL W/30% M-C SAND, WET 7.5 YR/4/4 STRONG BROWN COHESIONLESS
5	SP		1/1/2	3.5-5.0	LOOSE FINE GRAVEL 20% FINE SAND .8 FT REC
					LOOSE F-MED SAND <5% SILT .6FT REC
					WET--WATER AT 4' B.G.S. IN AUGER 7.5 YR 4/2 BROWN CUTTINGS AT 7' F-MED SAND 10-15% CLAY BROWN 7.5 YR 5/2
	SC-SP				
	SP AND GP INTERBEDDED		3/5/5	8.5-10.0	.7 FT REC WET FIRM
					.3' FINE SAND W/20 CLAY 7.5 YR 4/2 BROWN
					.4' FINE GRAVEL, 30 COARSE SAND APPROX. 2-5% CLAY LT. GREY 7.5 YR 7/1
					WATER AT 4' END OF BORING

WESTON

DRILLING LOG

WELL NUMBER: MW-4 OWNER:
LOCATION: LANDFILL 1 ADDRESS: WOODBRIDGE
TOTAL DEPTH: 11'
SURFACE ELEVATION: WATER LEVEL: ~7'
DRILLING COMPANY: ATEC DRILLING METHOD: AUGER DATE DRILLED: 2/7/85
DRILLER: HELPER:
LOG BY: R.JOHNSON

SKETCH MAP

OVA READINGS WERE 300-800PPM IN AUGER DURING DRILLING. WENT TO ZERO IN 15 MINUTES AFTER COMPLETION OF BORING. CUTTINGS WERE AS HIGH AS 80 PPM. WORKING LEVEL WAS 0-2PPM SOIL WAS HIGHLY ORGANIC. SILT -NATURAL METHANE IS LIKELY NO WASTE WAS OBSERVED IN BORINGS.

NOTES

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0	OL		A		0-1' WET PLASIC ORGANIC SILT DARK GREY 5 YR 3/1 /OL
					OVA-30 PPM IN SAMPLE JAR FOR S-1 SAMPLE
5	SM	1	SS	1/1/2	3.5-5' MOIST REC 1.2' DARK GREY 5 YR 3/1
					.6'- PLASTIC ORGANIC SILT OL
					.6'- FINE SAND, 20% ORGANIC SILT SM SLIGHTLY PLASTIC DK GREY 5 YR 3/1
					OVA 400PPM IN AUGER. NO READING AT WORKING LEVEL
10	GM	2	SS	2/3/2	8.5-10' TOTAL REC 1.5' FINE SAND AND ORGANIC SILT SM
					(50/50).75 FT MOIST 2.5 YR 3/0 DK GREY
					.75 FT FINE GRAVEL w/20% CLAY 2.5 YR 5/0 GREY
					PULLED AUGER TO 6' 7FT TO WATER IN 15 MINUTES
					GM
					OVA READING IN SAMPLE S-1 30PPM S-2 80 PPM
					(AFTER COVERED FOR 1 MINUTE)

WESTON

DRILLING LOG

WELL NUMBER MW-5 OWNER
LOCATION WOODBRIDGE LANDFILL-1 ADDRESS WOODBRIDGE, VA
TOTAL DEPTH
SURFACE ELEVATION: WATER LEVEL:
DRILLING COMPANY: DRILLING METHOD DATE DRILLED
DRILLER: HELPER
LOG BY:

SKETCH MAP

NOTES

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0	OL		A		0-3.5 ORGANIC CLAY, LOW PALSTICITY, MOIST 10% SAND
					OLIVE BROWN 2.5 YR 4/2 GRADES TO ~ 30% COARSE SAND AT 4 FT.
					AT 3 FT. IN HOLE OVA 300 PPM, NOTHING AT WORKING LEVEL
	SP	1		2/2/	FREE WATER IN AUGER AT 3 FT. AFTER 5 MINUTES
					REC .25'
					3.5-5.0 MEDIUM SAND < 5% SILT LOOSE WET
5					7.5 YR 5/4 STRONG BROWN SP
					NO OVA READING AT 5 FT.
	OL				
10	SM	2		1/0/0	1.3 REC .3 MED SAND AS ABOVE SP
					.5 ORGANIC SILT-PALSTIC MOIST, V.SOFT OL
					.5 MED SAND W/30% SILT SLIGHTLY PLASTIC SM
					2.5 YR 3/0 DARK GREYISH, V. LOOSE
					HOLE WAS OVERDRILLED TO 13'TO HOLD BACK HEAVING SAND
					OVA- 200 PPM BOTTOM OF COMPLETED BORING
					NO READING OUTSIDE OF BORING
					OVA- READING S-1 30 PPM--JAR 1 MINUTE CLOSED
					S-2 10 PPM--JAR 1 MINUTE CLOSED

WESTON

DRILLING LOG

WELL NUMBER: MW-5 OWNER: _____

LOCATION: WOODBRIDGE LANDFILL-1 ADDRESS: WOODBRIDGE, VA

TOTAL DEPTH: _____

SURFACE ELEVATION: _____ WATER LEVEL: _____

DRILLING COMPANY: _____ DRILLING METHOD: _____ DATE DRILLED: _____

DRILLER: _____ HELPER: _____

LOG BY: _____

SKETCH MAP

NOTES

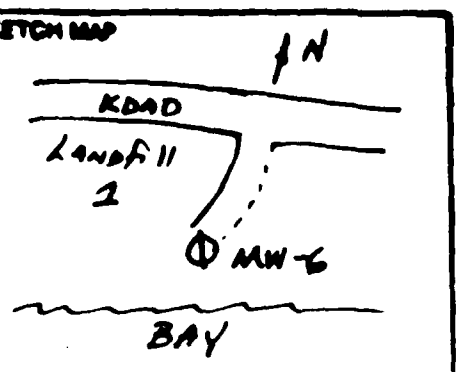
DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0	OL		A		0-3.5 ORGANIC CLAY, LOW PALSTICITY, MOIST 10% SAND
					OLIVE BROWN 2.5 YR 4/2 GRADES TO ~ 30% COARSE SAND AT 4 FT.
					AT 3 FT. IN HOLE OVA 300 PPM, NOTHING AT WORKING LEVEL
	SP	1		2/2/	FREE WATER IN AUGER AT 3 FT. AFTER 5 MINUTES
					REC .25'
					3.5-5.0 MEDIUM SAND < 5% SILT LOOSE WET
5					7.5 YR 5/4 STRONG BROWN SP
					NO OVA READING AT 5 FT.
	OL				
10	SM	2		1/0/0	1.3 REC .3 MED SAND AS ABOVE SP
					.5 ORGANIC SILT-PALSTIC MOIST, V.SOFT OL
					.5 MED SAND W/30 SILT SLIGHTLY PLASTIC SM
					2.5 YR 3/0 DARK GREYISH, V. LOOSE
					HOLE WAS OVERDRILLED TO 13' TO HOLD BACK HEAVING SAND
					OVA- 200 PPM BOTTOM OF COMPLETED BORING
					NO READING OUTSIDE OF BORING
					OVA- READING S-1 30 PPM--JAR 1 MINUTE CLOSED
					S-2 10 PPM--JAR 1 MINUTE CLOSED

WESTON

DRILLING LOG

WELL NUMBER MW-6
LOCATION LANDFILL-1
SURFACE ELEVATION
OWNER
ADDRESS WOODBRIDGE RESEARCH FAC.
TOTAL DEPTH 10'
WATER LEVEL APPROX. 3'
DRILLING COMPANY ATEC
DRILLING METHOD AUGER
DATE DRILLED 2/8
DRILLER
HELPER
LOG BY R. JOHNSON

SKETCH MAP



NOTES
START DRILLING 2/8 0800

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION / SOIL CLASSIFICATION (COLOR TEXTURE STRUCTURES)
0			A		0-3.0 MOIST SLIGHTLY PLASTIC SILT, <10 FINE SAND
	ML				RED- 2.5 YR 4/8
			A		3.0' AUGERS IN GRAVELLY SOIL AT 3'
	CL				GRAVELLY (20) CLAY MOD PLASTIC MOIST STRONG BROWN 7.5YR5/6
					SUBROUNDED GRAVEL ML SPOON IS WET CL
5	GP		SS	4/5/3	3.5-5.0 REC .9 FT. F-M GRAVEL-SUBROUNDED TO SUBANGULAR
					40 SAND AND 5-10 SILT GP
					WATER AT 4' IN AUGER
	SP		SS	13/8/6	8.0-9.5 1 FT. REC WET
10					.2' GRAVEL AS ABOVE GP
					.2' ROCK FRAGMENTS-WHITE 5 YR 8/1 GNEISS
					.6' FINE TO MED SAND <10 SILT
					GRADES DOWNWARD FINE-MED
					YELLOW-RED 5 YR 5/6 SP
					WATER AT 6.5' IN AUGER
					WATER AT 3' AFTER PULLING UP AUGER

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