PHASE II FIELD INVESTIGATION REPORT

PART 1 & PART 2

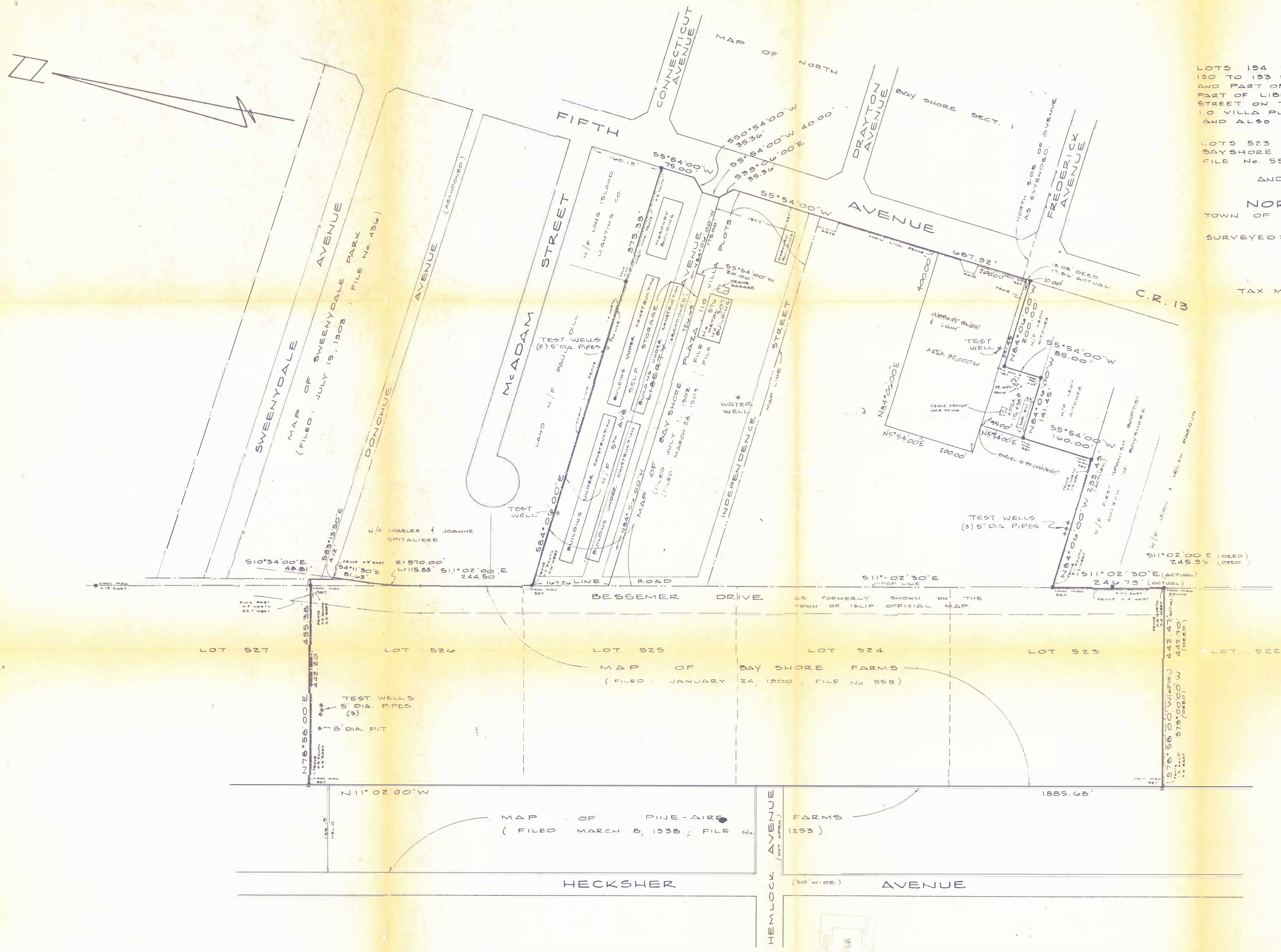
HUBBARD SAND AND GRAVEL CORP.
BAYSHORE, N.Y.

MARCH 1992

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

PART I

FIRST ROUND SAMPLING



MAP OF
LOTS 194 TO 260 INCL. PART OF LOTS
190 TO 193 INCL. AND LOTS 269 TO 299 INCL.
AND PART OF LOTS 261 TO 268 INCL. AND
PART OF LIBERTY AVE. (ABANDONED) & INDEPENDENCE
STREET ON THE MAP OF BAYSHORE PLAZA,
110 VILLA PLOTS FILED JULY 1, 1902; FILE No. 576
AND ALSO FILED MARCH 28, 1903; FILE No. 307.
ALSO
LOTS 523 THRU 526 INCL ON THE MAP OF
BAYSHORE FARMS FILED JAN. 24, 1900;
FILE No. 559

AND A DESCRIBED PARCEL
SITUATE

NORTH BAYSHORE,

TOWN OF ISLIP SUFFOLK COUNTY, N.Y.

SURVEYED: SEPTEMBER 23, 1987 SCALE: 1"=100'

AREA = 37.880 ACRES

TAX MAP No. 0500-223-02-53,54,57
0500-224-01-93.1,94,80
0500-244-02-56,57

CERTIFIED TO:
HUBBARD SAND & GRAVEL CORP.

PETER J. VAN WEELE & CO.
BY:

SURVEYED BY:
PETER J. VAN WEELE & CO.
3 LAZARE LANE
ISLIP, NEW YORK

F 235/25-52
01/9336

CONVEYANCE PARCEL ADDED FEB 19 1988
TEST WELLS ADDED: JUL. 7 1991

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

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Part I

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* = Provided individually under separate cover

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1.0 INTRODUCTION

The purpose of this document is to describe the activities and results of a Phase II field investigation that was conducted at Hubbard Sand & Gravel Corporation, 1612 Fifth Avenue, Bay Shore, Suffolk County, N.Y. This investigation was part of a December 31, 1987 Consent Order/Workplan (Index No. 1-1529) from the New York State Department of Environmental Conservation (NYSDEC). The goal of the Phase II investigation was to evaluate and determine the presence, nature, extent and impacts of possible wastes disposed of at the site.

A Site Inspection Report and Preliminary Assessment Report were prepared for the Hubbard Sand & Gravel Corp. (HSGC) site by the USEPA in April 1983. The property has been designated as an inactive hazardous waste site by the NYSDEC. Site information available from the NYSDEC Listing of Inactive Hazardous Waste Disposal Sites is presented in Appendix A. This information shows that the site, identified as the Hubbard-Wilson Landfill, (Code Number: 152008, EPA ID: NYD 005923677) was given a classification code of 2a. This code is defined as a temporary classification which is assigned to sites that allegedly may have received hazardous material.

This investigation was conducted with the authorization and cooperation of HSGC, and field work was witnessed by representatives of the NYSDEC.

2.0 SITE DESCRIPTION AND HISTORY

2.1 Site Location, Land Use and Zoning

The Hubbard Sand & Gravel Corp. landfill site consists of approximately 19 acres situated on a 38 acre parcel and is located north of Southern State Parkway in the Town of Islip, Village of Bay Shore, Suffolk County, New York (Figure 2-1). Land use within a one-mile radius of the site,

HUBBARD SAND & GRAVEL

2000' 0 2000'

SCALE IN FEET

SOURCE: USGS GREENLAWN,NY QUADRANGLE 1979

FIGURE 2-1

VICINITY PLAN

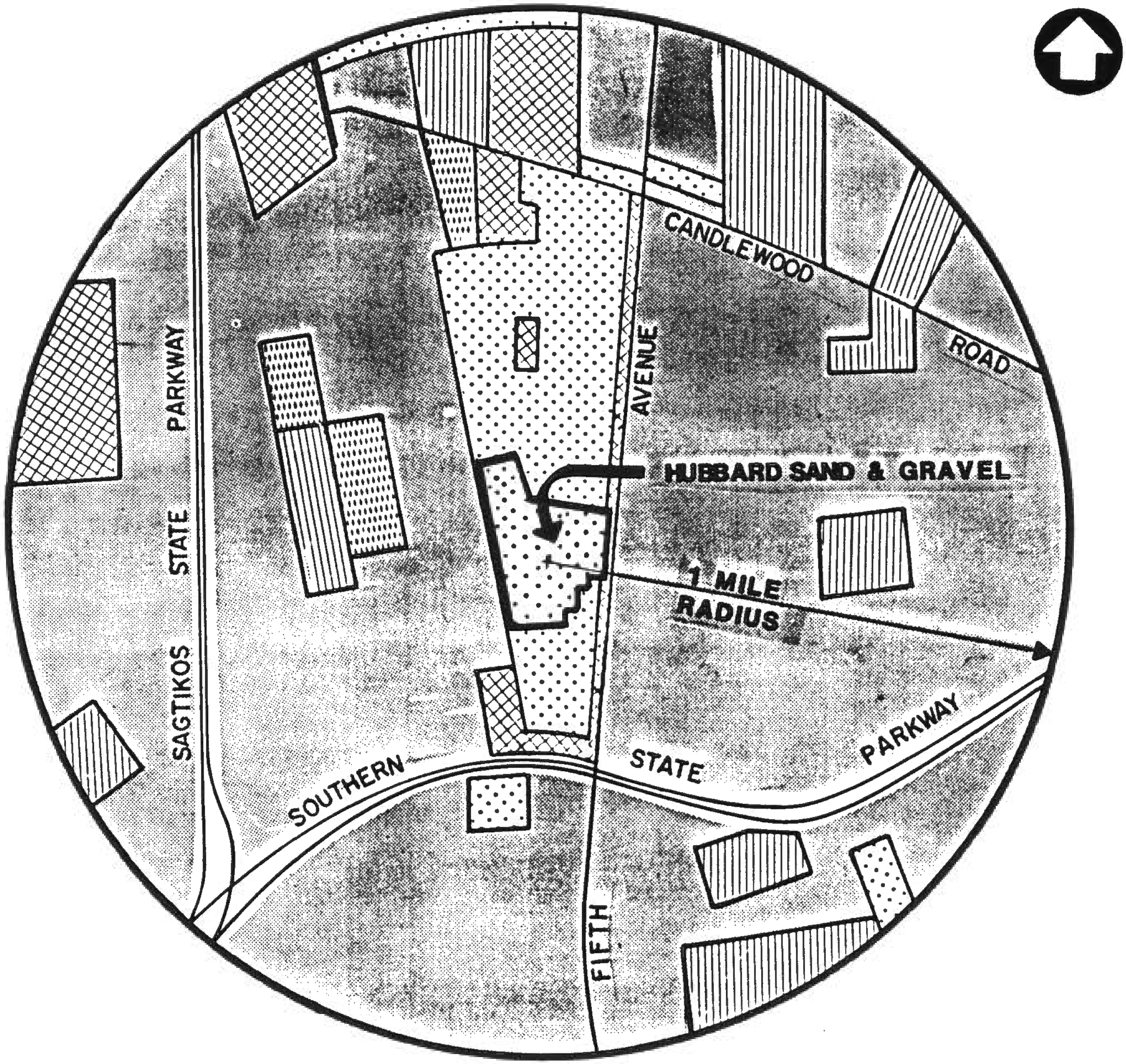
according to the Long Island Regional Planning Board, is shown on Figure 2-2. Field observation of land use was generally consistent with that presented in the figure. Specifically, Figure 2-3 shows that the site is bounded by Fifth Avenue to the east, several residential homes to the west, light industry to the south, and an auto wrecker (junkyard) to the north. The wrecker is situated over an inactive Town of Islip landfill. A mini-storage facility and auto car wash are located on the northeastern portion of the 38 acre site, but not on the landfill.

Existing Suffolk County Water Authority well fields are located approximately one-third of a mile to the northwest and one and one-quarter mile to the southeast of the Hubbard facility. Within one mile of the site there are five schools. There are no streams or airports in the vicinity of the site. The site is zoned industrial and adjacent zoning shown in Figure 2-4 is a mix of residential, industrial and business.

2.2 Site Utilization

Sand and gravel was mined at the site over a 30 year period utilizing construction equipment for the mining operations. Brush and demolition debris was deposited on-site from 1963 to about 1986 (Kenedy, site owner). Allegedly, automobile shredder waste from a Westbury metals company and a chromium waste from Olin Chemical Company were deposited during 1974 (NYSDEC, 1985) and 1981 (Maloney, SCDHS), respectively.

Currently, operations performed at the site include sand washing and screening, crushing of used concrete, storage of construction material, shredding/storage of scrap wood and operation of a wood fired co-generation plant. Since there is no sand mining on the site, sand is trucked to the site, washed, screened, graded and stored. The sand screening operation is



Scale: 1" = 2000'

LEGEND:

░ RESIDENTIAL
⁘ INDUSTRIAL
▥ INSTITUTIONAL
☐ RECREATIONAL
▩ VACANT

SOURCE: LONG ISLAND REGIONAL PLANNING
BOARD 208 STUDY DEC., 1982
AND FIELD OBSERVATION 1989

FIGURE 2-2

LAND USE WITHIN 1 MILE OF
HUBBARD SAND AND GRAVEL

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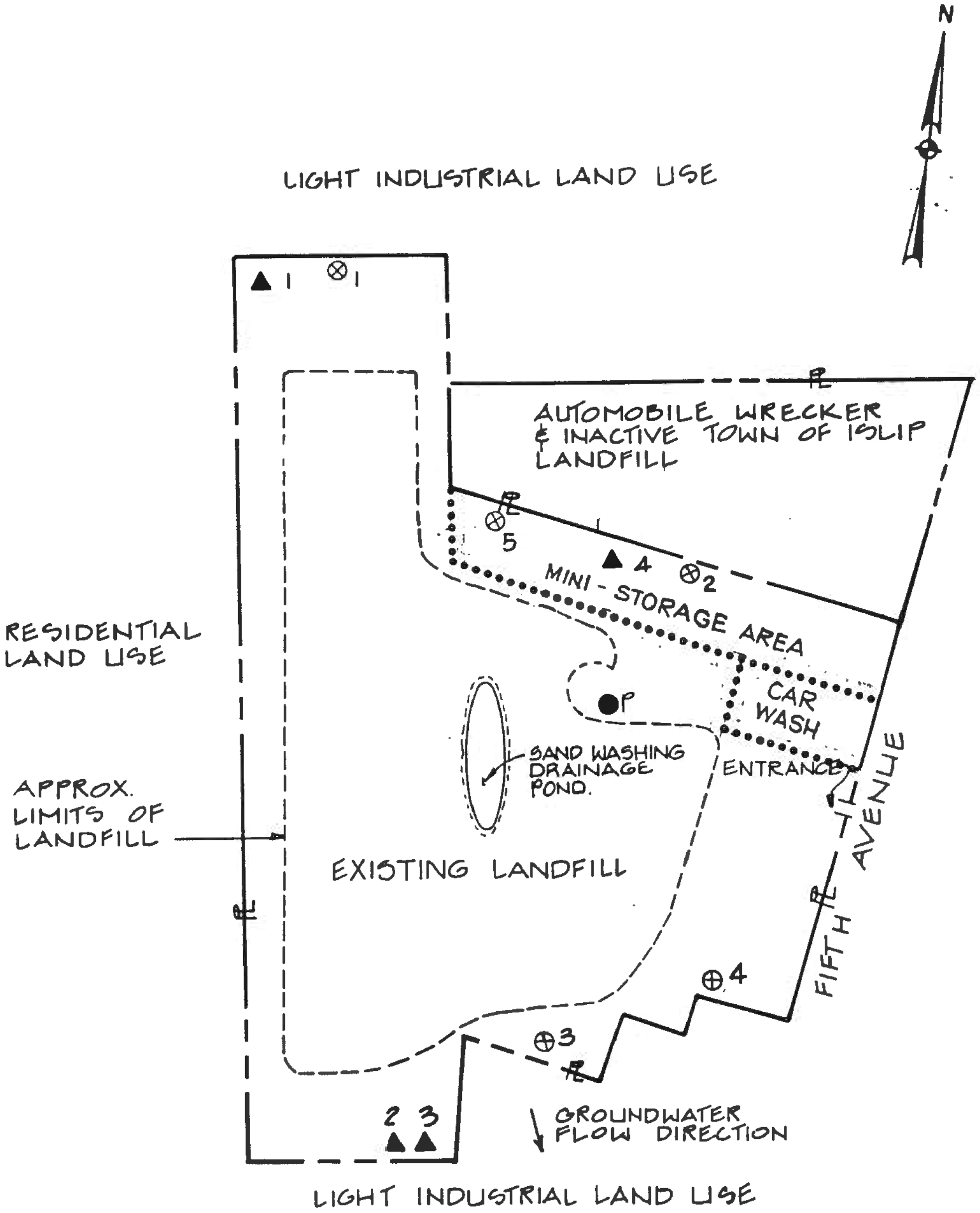


▲1 ABANDONED GROUNDWATER MONITORING WELL

●P PROCESS WATER WELL
FOR SAND WASHING OPERATIONS.

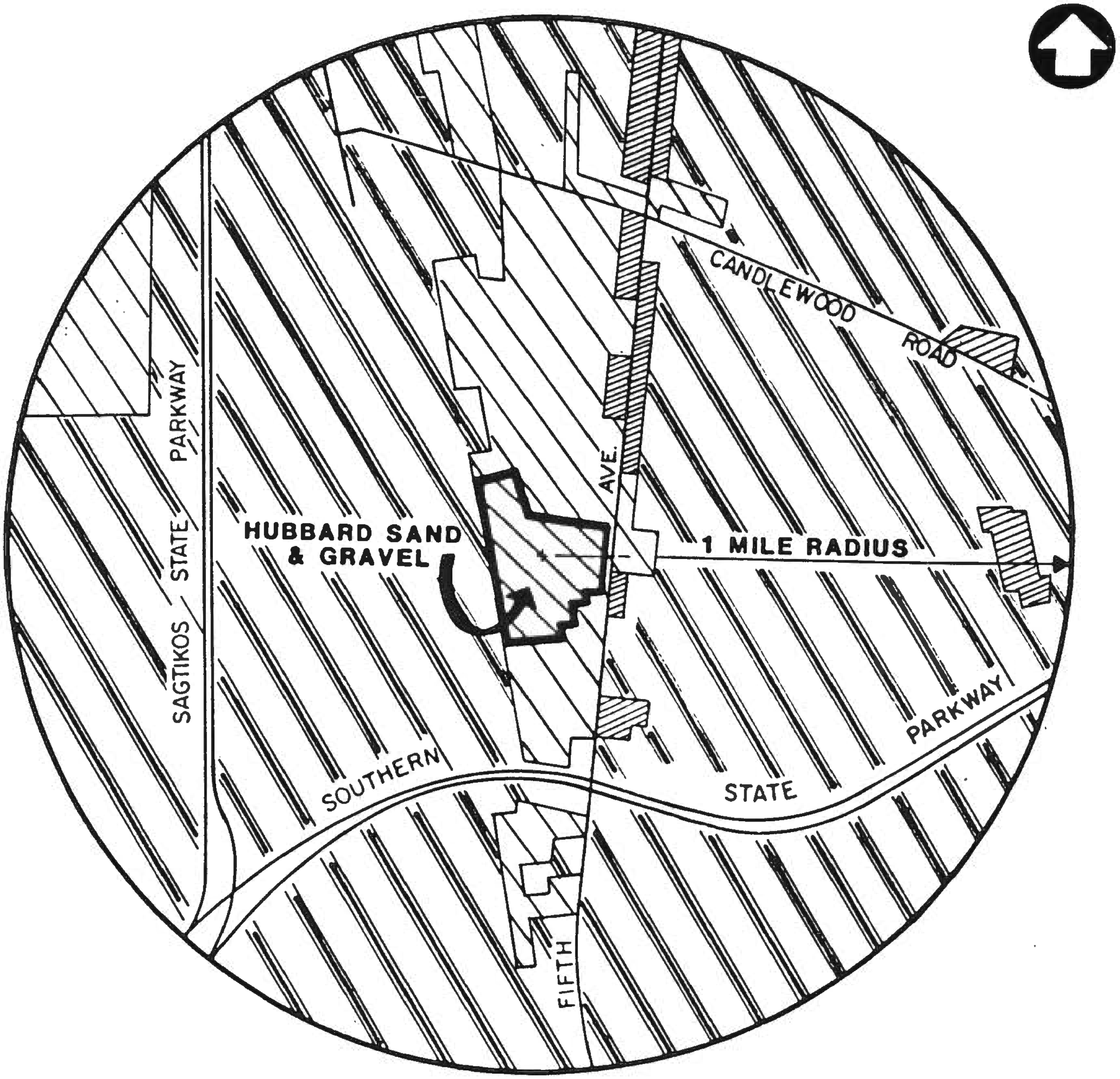
⊗4 PHASE II MONITORING WELL LOCATIONS.

SCALE: 1" = 400'±

FIGURE 2-3

SITE PLAN

LKB JOB #5005-02



Scale: 1" = 2000'

LEGEND:

▧ RESIDENTAL

▨ INDUSTRIAL

▤ BUSINESS

SOURCE: TOWN OF ISLIP
ZONING MAP NOVEMBER, 1989

FIGURE 2-4

ZONING WITHIN 1 MILE OF HUBBARD SAND & GRAVEL

a wet process that utilizes an on-site process water well for sand washing, an inclined conveyor, and a wastewater evaporation lagoon. Concurrent with sand operations, brick and other masonry/construction products are stored on-site and sold to homeowners as well as private contractors. In addition, on the eastern portion of the property's northern boundary, HSGC has constructed a mini-storage operation. HSGC also rents one acre of the site to a company that operates a car wash. This facility is located on the eastern boundary of the property, directly adjacent to Fifth Avenue and immediately south of the mini-storage facility.

2.3 Site Topography and Geology

The site topography, ranges from an elevation of about 60 feet MSL in the eastern half of the site to an elevation of 75 feet MSL near the western site boundary. Spot grades higher than elevation 66 feet occur from various material stockpiles including sand, gravel, topsoil, and masonry products. A berm reaches elevation 88 and stretches along the western property boundary. The berm, which was constructed several years ago by HSGC, acts as a noise and visual buffer between the residential area and HSGC operations.

The surface geology at the site is principally sand and gravel, and the water table is about 20-25 feet below grade. Based on public water supply well boring logs and USGS borings, the Gardiners Clay strata is reported to exist under the site.

2.4 Previous Studies

Prior to the Phase II Investigation, the Suffolk County Department of Health Services (SCDHS) had conducted two water quality studies near the

HSGC site. The first study (SCDHS, March 10, 1983) identified a plume from the landfill based on temperature and conductivity measurements at seven groundwater monitoring wells: one upgradient and six downgradient from the site. Trace organics were detected (Tetrachloroethylene and Trichloroethylene) in the upgradient and downgradient wells.

The second study (SCDHS, November 1983) identified a narrow plume of organic solvent emanating from a dry cleaning establishment. The dry cleaner is located approximately 400 feet east of HSGC.

During previous landfill permitting activities, HSGC installed four monitoring wells: two upgradient and two downgradient. The location of these wells is shown in Figure 2-3. As part of the Phase II Investigation, these wells were to be permanently abandoned by being filled with a cement/bentonite grout. Well #1 was abandoned as planned. After being located, it was discovered that Wells #2 and #3 had already been grouted. Although diligently sought for, Well #4 was not able to be found. Construction activities regarding development of a mini-storage facility are felt to have resulted in destruction of the well. In addition, an existing 600 gpm process water well is located on-site. Wash water generated during the sand washing operations is discharged to a drainage pond located approximately 200 feet southwest of the process water well. In April 1984, groundwater samples were collected which indicated traces of 1,1,1-Trichloroethane in one downgradient well (Well #3) and Tetrachloroethylene in one upgradient well (Well #4). High concentrations of Iron and Manganese were found in upgradient and downgradient wells, however, no Chromium was detected in any of the wells.

Well #4 and the process water well were sampled and analyzed by the NYSDEC in August of 1984. A concentration of 95 ppb, 1,1,1-Trichloroethane was detected in the process water well. Xylene and Toluene were also detected in Well #4; these constituents could be indicative of contamination from the auto wrecker facility.

Air sampling at the site was conducted by the United States Environmental Protection Agency (USEPA). All measurements, including Methane, were below background levels.

NYSDEC Right-to-Know (RTK) data sheets were previously obtained and indicated that Olin Chemical Company may have deposited Chromium waste during 1974 at the Hubbard Sand & Gravel site. Olin Chemical Company officials indicated that the RTK data is vague and, to their knowledge, no Chromium dumping has occurred at the Hubbard Sand & Gravel site (Hendley, Olin Chemical, March 1985).

LKB possesses aerial photographs of the site taken during 1959, 1966, 1972 and 1984. Using the photos and previous property surveys, the approximate limit of the landfill boundary has been defined. This boundary is plotted on Figure 2-3.

3.0 FIELD INVESTIGATION METHODS

3.1 Project Initiation

The Phase II Field Investigation initially began in December 1988 after long standing equipment availability delays were resolved by the boring contractor. However, shortly into the program the boring contractor was unable to adequately perform the required scope of work and was released from further site activities. Subsequently, the project was again offered up for bid. A new boring contractor was secured and site activities resumed in August 1989.

Soil borings and groundwater monitoring well installations along with soil and groundwater sample collection was sucessfully conducted between August 7th and September 7, 1989. As described in the NYSDEC agreed upon workplan, soil samples were obtained from each boring and water samples were collected from each monitoring well for analysis of the compounds listed in the U.S. Environmental Protection Agency's (EPA) "Contract Laboratory Program" (CLP). Sample collection and monitoring well installations were conducted in accordance with NYSDEC "Phase II Oversight Guidance" specifications (See Appendix B).

3.2 Auger Borings and Soil Sampling

Soil borings were conducted at each location where a groundwater monitoring well was desired (See Figure 2-3). The 6" hollow stem augers used were advanced below grade with split spoon soil samples generally being collected at 5 foot intervals. At locations MW-1 through MW-4, the augers were advanced from 109 to 142 feet below the surface in an attempt to locate the Gardiners Clay layer which was suspected to exist under the site. As the suspected depth of the clay was approached, continuous split-spoon sampling was conducted. The augers and split spoon sampling equipment were steam cleaned at 212 degrees Fahrenheit prior to use and between boring locations. Split spoon samples collected from the surface to the bottom of each boring were screened in the field for volatile organic compounds using a calibrated TIP II photoionization meter. Screening of each sample was conducted immediately upon opening the split spoon. In addition, combustible gases were monitored during drilling operations using an MSA Gascope Combustible Gas Meter that was calibrated with methane. The wand of the meter was inserted into the top of the hollow stem of the augers being advanced into the ground and a sample collected. The TIP and combustible gas readings (levels above background)

TABLE 3.1

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

Monitoring Well Specifications

Monitoring Well #	Elevation at Top of Well Casing (Ft.-MSL)	Depth of Well Below Grade (ft.)	Feet of Well Screen (Ft.)	Approx. Depth To Groundwater From Grade (Ft.)	Depth of Soil Sample From Grade* (Ft.)
MW-1S	74.38	36.1	15	25	31
MW-1M	74.45	55.5	10	25	50
MW-1D	74.43	124.7	10	25	125
MW-2S	71.70	33.6	15	24	28
MW-2M	71.93	52.2	10	24	55
MW-3S	64.91	29.3	15	19	23
MW-3M	64.77	50.8	10	19	45
MW-3D	64.87	112.6	10	19	107
MW-4	68.02	52.3	10	21	55
MW-5	70.71	33.9	15	22	28

NOTE: Shallow, mid-level and deep monitoring wells are identified by suffixes S, M & D, respectively.

* Sample collected for laboratory analysis.

along with visual and olfactory observations were recorded in the field log book and are presented in Appendix C. Soil samples were collected in glass jars and retained. A qualified geologist inspected the samples and determined which would be evaluated for grain size analysis. In addition, one soil sample from each boring, taken at or near the depth proposed for well screen placement (See Table 3.1), was collected in laboratory supplied glassware and sent for laboratory analysis of CLP compounds. In addition, four soil samples (MW-1 126', MW-2 119', MW-3 111' and MW-4 118') were analyzed for Gardiners Clay characteristics.

Geologic descriptions of the soil were conducted by the boring contractor for each well. Soil texture, color and classification were identified for each split-spoon sample. The depth to groundwater was also identified during drilling. Soil sample descriptions and observed depths to groundwater are shown in Appendix D.

3.3 Monitoring Well Installation

A total of ten 2-inch PVC monitoring wells (MW) were installed at five locations onsite. The workplan called for the installation of six wells, however an additional four wells were installed to more accurately determine upgradient groundwater quality. Cluster wells, with a lateral separation of about 10 feet, were installed at locations MW-1 and MW-3. The three wells within each cluster were screened at different depths to allow sampling of several aquifer levels. Each cluster contained a shallow well (screened at the top of groundwater), a deep well (at the top of the suspected Gardiners Clay member) and an intermediate depth well (between the shallow and deep well). A shallow well was installed at the MW-2 and MW-5 location to further monitor the upgradient area of the site. The remaining wells, MW-2M and MW-4 were screened at intermediate depths based

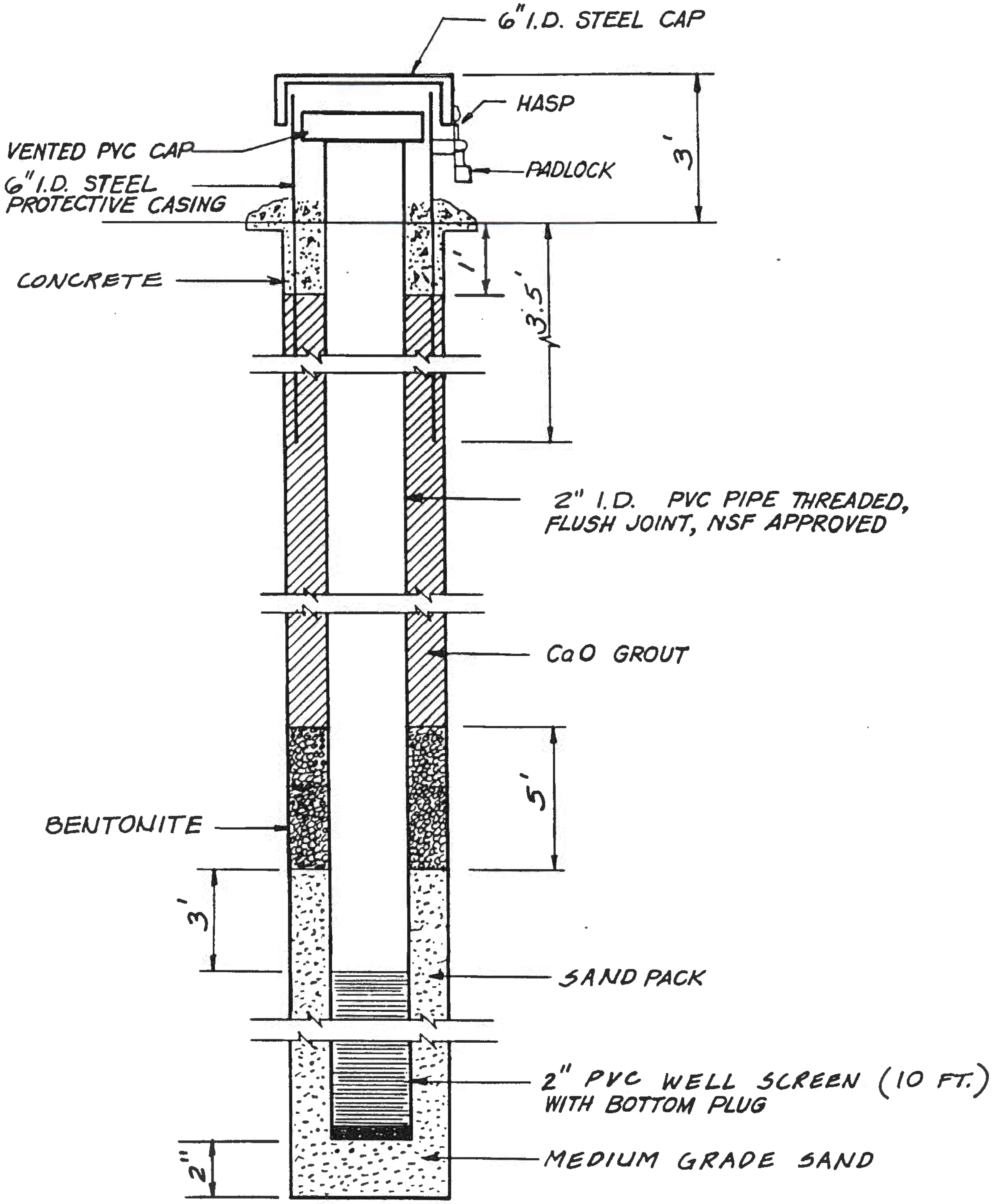


FIGURE 3-1

LKB

NYS DEC PHASE II GROUNDWATER MONITORING WELL SPECIFICATIONS

upon soil observations at the initial boring, MW-3. All monitoring wells were installed according to NYSDEC Phase II Well Specifications (Figure 3-1). The specific depths and screening levels of each well are shown in Table 3.1. On the tables and figures in this report, the shallow, mid-level and deep monitoring wells at each sampling location are identified by suffixes S, M and D, respectively. Shallow wells used a 15 foot screen, 10 feet of which was set into the water table. All other wells were installed using a 10 foot screen.

Upon completion of the monitoring wells gamma logging was conducted. This activity was performed at monitoring wells, MW-1D, MW-3M and MW-2M. Gamma Logging of MW-3D was attempted, however, the instrument sensor was unable to be lowered past an apparent bend in the well casing.

3.4 Well Development

The monitoring wells were developed on August 25th and 29, 1989. Development was conducted to (1) purge the well of sand and silt introduced during construction, (2) introduce representative site groundwater into the well, and (3) establish acceptable turbidity values. Each well was developed, utilizing an above grade centrifugal pump and pre-cleaned 1-inch semi-ridged polyethylene piping for a minimum of one hour and until turbidity readings of less than 50 N.T.U.'s were achieved. A Hach Portable Nephelometer was used in the field to determine turbidity.

3.5 Groundwater Sampling

Groundwater samples were collected at each of the ten wells on September 6th and 7, 1989. Prior to sampling, water level measurements were recorded at each well and 4 to 16 volumes of standing water were removed (See Table 3.2). This was accomplished using an above grade centrifugal pump and

TABLE 3.2

HUBBARD SAND & GRAVEL
PHASE II SUBSURFACE INVESTIGATION

Groundwater Sampling - September 6 & 7, 1989

Monitoring Well #	Water Level Elevations Before Purging (Ft. MSL)	Well Purge Volumes Before Sampling (Gals./#Standing Vol.)	Sample pH*	** Turbidity (NTU's)
MW-1S	46.83	21/12X	5.0	5
MW-1M	46.78	24/5X	6.1	4
MW-1D	46.84	65/4X	5.7	5
MW-2S	45.72	15/9X	6.2	6
MW-2M	45.66	20/4X	6.2	4
MW-3S	44.13	28/16X	6.8	10
MW-3M	44.08	24/5X	6.5	5
MW-3D	44.05	62/4X	6.6	7
MW-4	44.21	24/7X	6.6	2
MW-5	45.98	18/10X	6.5	14

* - Sample pH measured in field and checked twice.
** - NTU's measured after well development on August 25 & 29, 1989.

NOTE: Shallow, mid-level and deep monitoring wells are identified by suffixes S, M & D, respectively.

1-inch semi-ridged polyethylene piping. The piping was cleaned between wells by scrubbing with an Alconox solution followed by a distilled water, Acetone and Hexane rinse.

The tops of the PVC well casings were surveyed to the nearest one-hundredth of a foot (See Table 3.1). Elevations were established utilizing the National Geodetic Vertical Datum (NGVD). In addition, pH readings were taken at each well to further characterize the groundwater samples.

Sampling was performed in accordance with NYSDEC Phase II protocol. The procedures listed below were followed during the groundwater sampling program:

1. Open the well and clean off any surficial dirt from the protective casing.

2. Place a 5'x5' piece of unused polyethylene sheet adjacent to the well casing.

3. Measure the depth to water in the well to the hundredth of a foot with an electric water level indicator. Compute the amount of water standing in the well.

4. Wearing clean surgical gloves, disassemble the bailer and scrub inside and out using a brush and solution of Alconox to remove surficial contaminants. Rinse the bailer parts with generous amounts of distilled water. Wash bailer with Acetone and apply final Hexane rinse.

5. Reassemble the bailer and place on the plastic sheeting. Attach an appropriate length of unused nylon cord to the bailer using a secure knot.

6. Lower the bailer into the well and into the water column gradually, to minimize turbulence. Allow the bailer to sink and become fully submerged. Recover one to two bailer volumes from the well and discard.

7. Lay bailer cord on plastic sheeting while bailing.

8. Label all containers (project, well, date, etc.) and wrap with clear cellophane tape.

9. Recover bailer with water to be placed in sample jars.

10. Fill the vials for VOC's first, insuring that there are no air bubbles.

11. Fill remaining sample containers.

12. Close well.

13. Pack samples in a zip-lock plastic bag and place on ice in a cooler. Fill out remaining data on Water Sampling Log and complete Chain of Custody. Deliver samples to the lab via Federal Express as soon as possible and obtain receivers signature on Chain of Custody form.

14. Discard cord, gloves and sheeting. Rinse and place bailer in plastic until next use.

Both the soil and water samples were packaged and sent to Cambridge Analytical Associates in Boston, Massachusetts (CAA). CAA is a NYSDEC approved analytical laboratory. Laboratory analyses performed on the samples include all parameters listed in U.S. E.P.A.'s Contract Laboratory Program (CLP), including volatile organics, semi-volatile organics, inorganics, pesticides and PCB's.

3.6 QA/QC Sampling

During the soil and groundwater sampling program, several additional water samples were collected for quality assurance/quality control (QA/QC) purposes. These included field and trip blanks, a truck tank sample, a bailer blank, a purge pipe blank and a duplicate groundwater monitoring well sample. Field and trip blanks were each collected on two separate occasions, August 10 and August 23, 1989. Trip blanks originated from the analytical laboratory and accompanied the laboratory supplied glassware to and from the site. Field blanks were obtained in the field using distilled water. The truck tank sample was obtained from the drill rigs on-board water storage tank. This tank was filled from an on-site source of potable water supplied by the Suffolk County Water Authority System. At some locations, this tank water was used downhole to prevent soil heaving. The sample was collected for analysis to determine if contaminants may have been present in the storage tank. The sample designated as "bailer blank" was collected by pouring distilled water through a field cleaned sampling bailer. The purge pipe sample was obtained by collecting distilled water that was allowed to flow over the field cleaned exterior of the polyethelene piping used in purging standing water from the monitoring wells. The bailer and purge pipe blanks were obtained during the monitoring well sampling effort to check cleaning efficiency. In addition, a duplicate groundwater monitoring well sample was collected from MW-3D to evaluate repeatability of analytical results.

4.0 RESULTS

4.1 Soil Screening

A review of the TIP readings, combustible gas levels and visual and olfactory observations presented in Appendix C indicates, that most split-spoon samples obtained were not affected by contamination. With the exception of Site 5, a majority of the TIP readings ranged from 0.0 to 0.1 ppm. These concentrations are considered negligible. Occasionally, a minor reading, up to 0.7 ppm, was recorded in a sample. At Site 5 a TIP reading of 19.3 ppm was obtained in auger cuttings from the surface to about 5 feet below grade. Visual and olfactory observations showed that fill material with a strong creosote type odor was present. Observations of contamination were present to a level where soil and groundwater samples were collected for laboratory analysis (28 feet below grade). It should be noted that Site 5 is on the upgradient side of the site, immediately south of an auto wrecking facility and part of a former Town of Islip Landfill. Aside from Site 5, the only other site where visual evidence of contamination existed was Site 3. Observations of split spoon samples obtained between the 25 foot to 55 foot levels showed that the sand was grey in color and possessed odor somewhat indicative of landfill leachate.

In addition to volatile organics screening, sampling for combustible gas was conducted at each boring. Concentrations of combustible gas and landfill gas odors were not detected.

4.2 Groundwater Characteristics

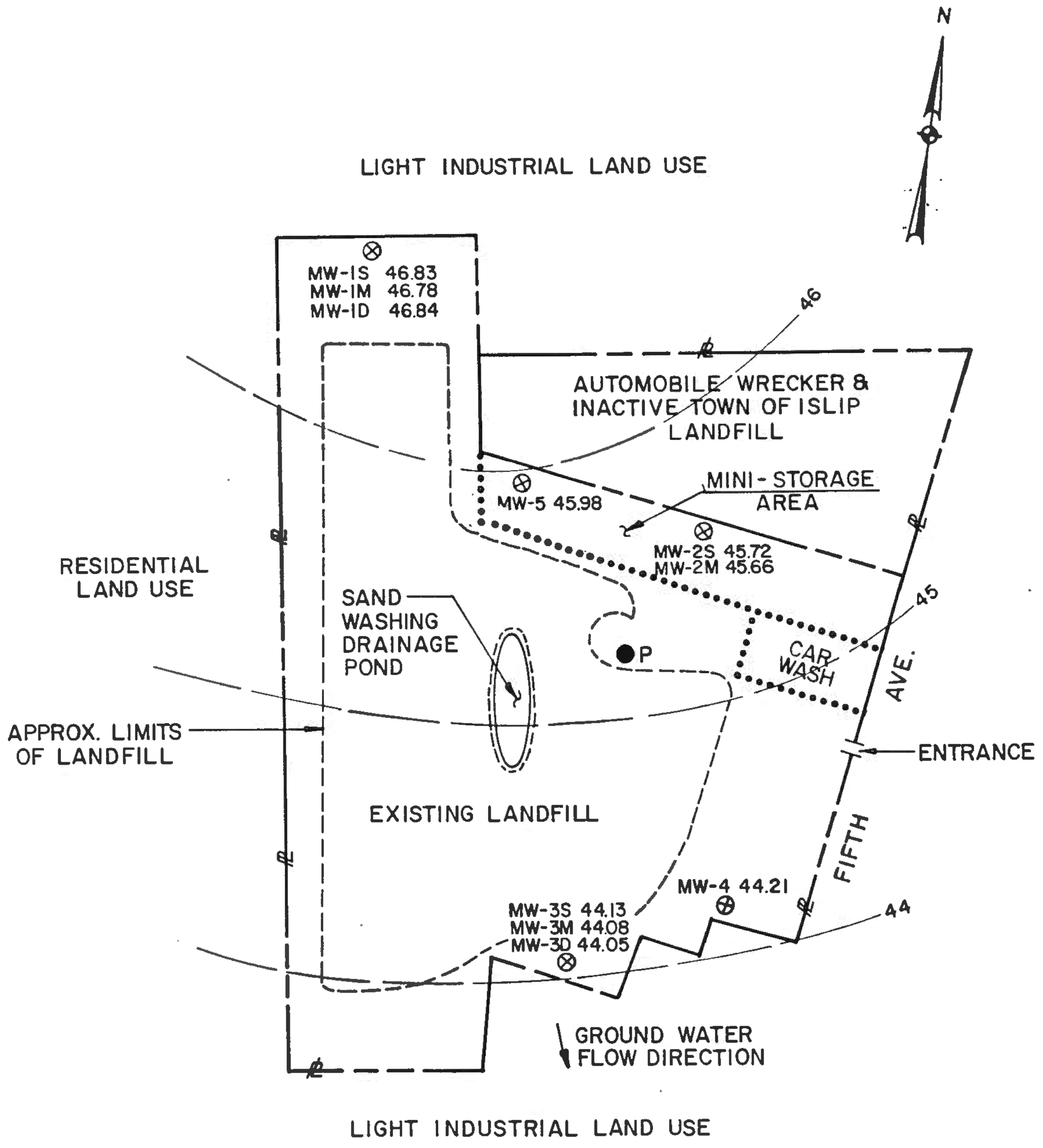
4.2.1 Groundwater Level and Flow Direction

Prior to purging and sampling, the static water level in each groundwater monitoring well was measured. Measurements, presented in Table 3.2, were obtained to the nearest hundredth of a foot and show that water level elevations across the site ranged from 44.05 foot MSL (MW-3D) to 46.84 (MW-1D). These elevations correspond to a depth of water below grade ranging from about 25 feet on the north side of the site (MW-1) to about 19 feet on the sites southern boundary (MW-3).

The groundwater elevations and resultant water table contour lines, derived from interpolation of the measured elevations, are shown in Figure 4-1. The data clearly indicates, and verifies previous studies, that groundwater in the vicinity of the site flows in a southeasterly direction. Therefore, the monitoring wells on the properties' northern boundaries (MW-1, MW-2 and MW-5) are upgradient and those on the southern boundaries (MW-3 and MW-4) are downgradient.

4.2.2 Groundwater Sample pH

Measurements of pH were conducted in the field during the sampling of groundwater from the monitoring wells. The results of the pH readings are shown in Table 3.2. Prior to use, the pH meter employed was calibrated against a 7.0 pH buffer solution. The calibration was checked periodically throughout the sampling period. To assure accurate readings, the samples were checked twice. The data show a general trend of lower pH values at the upgradient well locations. The pH values obtained ranged between 5.0 (MW-1S) and 6.8 (MW-3S).



● P PROCESS WATER WELL FOR SAND WASHING OPERATIONS

⊕ PHASE II MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS (FT. MSL)

— — APPROXIMATE WATER TABLE CONTOUR LINES (FT. MSL)

SCALE: 1" = 400'

FIGURE 4-1

GROUNDWATER ELEVATIONS

LKB JOB #5005-02

4.2.3 Turbidity

After installation, the monitoring wells were developed to clear out residual sediments and establish groundwater in them. The wells were developed until turbidity levels, measured by a portable nephelometer, were less than 50 NTU's. Actual turbidity values obtained during development, presented in Table 3.2, were low ranging from 2 to 14 NTU's. During groundwater sampling, the visual appearance of samples collected was similar to that of the groundwater after development. Therefore, the groundwater sample collected for laboratory analysis could be considered to have similarly low turbidities.

4.3 Soil and Groundwater Laboratory Analyses

The complete CLP analysis of soil and groundwater samples performed by Cambridge Analytical Associates is presented under separate cover in eight (8) volumes identified as Appendices K through R. For ease of discussion and evaluation, the data have been summarized and condensed into tables which compare parameters for each sample. The data were accompanied by a letter from the laboratory explaining several features of the results (Appendix E). In addition, the data summaries include the analytical data qualifiers required in the CLP. The explanation of these qualifiers are presented in Table 4.1 and 4.2 for organic and inorganic analyses, respectively. In the ensuing discussions of laboratory results, it should be kept in mind that locations MW-1, MW-2 and MW-5 are upgradient of the Hubbard Sand & Gravel site while locations MW-4 and MW-3 are downgradient.

The soil and groundwater samples collected were evaluated for up to 20 additional volatile and semi-volatile organic compounds which were not part of the targeted list of CLP constituents. Where present, these are listed

TABLE 4.1

ORGANIC DATA QUALIFIERS

B - The "B" flag indicates that the analyte was found in the associated blank as well as in the sample.

E - The "E" flag identifies compound concentrations that exceed the calibration range of the GC/MS instrument. For Benzo(b) and Benzo(k)Flouranthene, the calibration range of each peak will be considered separately. Ortho, para, and meta xylene are quantified as two peaks, the calibration range of each peak will be considered separately.

D - If a sample is re-analyzed due to high concentrations and both the original analysis and re-analysis have been reported, the diluted analysis will have the "DL" suffix. All concentration values reported for the diluted analysis will be flagged with a "D".

U - The "U" flag indicates that the compound was analyzed for but not detected. The reported "U" value is the detection limit for the given compound. The value is corrected for dilution and for percent moisture.

J - The "J" flag indicates an estimated value. The flag is used for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicate the presence of a compound that meets the identification criteria but the quantitated value is less than the method quantitation limit.

Y - Compound values that are flagged with a "Y" have been edited on our RTE/MS data system.

X - Compound values that are flagged with a "X" have been edited on our Foremaster data reporting system.

TABLE 4.2

INORGANIC DATA QUALIFIERS

- C Qualifier - (concentration qualifier)

  " B " - If the reported value is less than the Contract Required Detection Limit (CRDL), but greater than the Instrument Detection Limit (IDL).

  " U " - Analyte was not detected. The result of the analyte is less than the Instrument Detection Limit (IDL).

- Q Qualifier -

  " E " - The reported value is estimated because of the presence of interference. If the 5-fold dilution analysis for one or more analytes is not within 10%, a chemical or physical interference effect must be suspected, and the data for all affected analytes in the samples received associated with that serial dilution must be flagged with an "E" on Form IX-IN and Form I-IN.

  " M " - Duplicate injection precision not met.

  " N " - Spike sample recovery not within control limits.

  " S " - The reported value was determined by the Method of Standard Addition (MSA)

  " W " - Postdigested spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance.

  " * " - Duplicate analysis not within control limits.

  " + " - Correlation coefficient for the MSA is less than 0.995.

- M (Method) Qualifier -

  " P " - for ICP

  " A " - for Flame AA

  " F " - for Furnace AA

  " CV "- for Manual Cold Vapor AA

  " C " - for Manual Spectrophotometric

  " NR "- if the analyte is not required to be analyzed under "Additional Peaks" on the tables. Identification of these other constituents, was conducted by comparing the compound "Fingerprint" with the extensive list of compound spectra present in the Environmental Protection Agency/National Institute of Health/National Bureau of Standards (EPA/NIH/NBS) mass spectrum data base. If the spectrum of additional compounds present did not match well with any compound in the library then it was listed as unknown. However, according to the analytical laboratory, these unknowns are generally not a typical industrial or pollutant compound and can often be a natural constituent of soil.

The data was compared to available groundwater and soil standards. Available standards are presented in Tables 4.3 through 4.6 for the various parameters analyzed. Currently, New York State does not have official groundwater or soil cleanup standards for evaluation or remediation of industrial or contaminated sites. Therefore, the analyses of water samples were compared to New York State and Federal drinking water standards as well as New Jersey ECRA groundwater action levels for cleanup of contaminated sites. The New York State drinking water standards were obtained from the NYSDEC and the New York State Department of Health (NYSDOH). New York State Technical Operations Guidance Series (NYSTOGS) values were also considered. The drinking water standards presented are the lowest value of either the NYSDEC (6 NYCRR Part 703.5), NYSDOH, (10 NYCRR Part 5-Subpart 5.1 and Part 170), NYSTOGS (No. 1.1.1) or Federal Maximum Containment Levels (MCL). Soil analyses were compared to NYSDEC unofficial soil cleanup guidelines along with New Jersey ECRA soil action levels.

4.3.1 Volatile Organics

Table 4.7 and 4.8 present the laboratory analysis of volatile organic compounds (VOC) for each of the soil and groundwater samples collected, respectively.

TABLE 4.3

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

Standards of Comparsion for Volatile Organic Analyses

CLP COMPOUNDS	N.Y. State or Federal Drinking Water Standards * (ug/l)	N.J. ECRA Groundwater Action Levels (ug/l)	N.Y.S. D.E.C. Soil Cleanup Guidelines (mg/kg)	N.J. ECRA Soil Action Levels (mg/kg)
Chloromethane	5	-	-	-
Bromomethane	5	-	-	-
Vinyl Chloride	2	-	-	-
Chloroethane	5	-	-	-
Methylene Chloride	5	-	-	-
Acetone	50	-	-	-
Carbon Disulfide	50	-	-	-
1,1-Dichloroethene	5	-	-	-
1,1-Dichloroethane	5	-	-	-
1,2-Dichloroethene (total)	5	-	-	-
Chloroform	A	-	-	-
1,2-Dichloroethane	5	-	-	-
2-Butanone	50	-	-	-
1,1,1-Trichloroethane	5	-	-	-
Carbon Tetrachloride	5	-	-	-
Vinyl Acetate	50	-	-	-
Bromodichloromethane	A	-	-	-
1,2-Dichloropropane	5	-	-	-
cis-1,3-Dichloropropene	5	-	-	-
Trichloroethene	5	-	-	-
Dibromochloromethane	5	-	-	-
1,1,2-Trichloroethane	5	-	-	-
Benzene	ND	-	1	-
trans-1,3-Dichloropropene	5	-	-	-
Bromoform	A	-	-	-
4-Methyl-2-Pentanone	50	-	-	-
2-Hexanone	50	-	-	-
Tetrachloroethene	5	-	-	-
1,1,2,2-Tetrachloroethane	5	-	-	-
Toluene	5	-	-	-
Chlorobenzene	5	-	-	-
Ethylbenzene	5	-	-	-
Styrene	5	-	-	-
Xylene (total)	5	-	-	-
Total Volatiles	B	10	10	1

* = The number presented is the more restrictive value of standards or guidelines available from NYS DEC 6 NYCRR Part 703.5, NYS DOH 10 NYCRR Part 5 - Subpart 5.1, NYS DOH 10 NYCRR Part 170, U.S. EPA MLC's or NYS TOGS 1.1.1.

A = According to 10 NYCRR Part 5, the total concentrations of these trihalomethanes, along with 1,2 Dibromo-3-Chloropropane, should not exceed 100 ug/l.

B = According to 10 NYCRR Part 5, the total concentration of Volatile and Semi-Volatile Organics (excluding vinyl chloride and trihalomethanes) should not exceed 100 ug/l.

ND = Not Detectable above method detection limit for compound.

\- = Not Available.

TABLE 4.4

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

Standards of Comparsion for Semi-Volatile Organic Analyses

CLP COMPOUNDS	N.Y. State or Federal Drinking Water Standards * (ug/l)	N.J. ECRA Groundwater Action Levels (ug/l)	N.Y.S. D.E.C. Soil Cleanup Guidelines (mg/kg)	N.J. ECRA Soil Action Levels (mg/kg)
Phenol	50	-	5 Times Detection Limit	-
bis(2-Chloroethyl)Ether	1	-		-
2-Chlorophenol	5	-		-
1,3-Dichlorobenzene	5	-		-
1,4-Dichlorobenzene	4.7	-		-
Benzyl Alcohol	50	-		-
1,2-Dichlorobenzene	4.7	-		-
2-Methylphenol	50	-		-
bis (2-Chloroisopropyl)Ether	5	-		-
4-Methylphenol	50	-		-
N-Nitroso-Di-n-propylamine	50	-		-
Hexachloroethane	5	-		-
Nitrobenzene	5	-		-
Isophorone	5	-		-
2-Nitrophenol	50	-		-
2,4-Dimethylphenol	50	-		-
Benzoic Acid	50	-		-
bis(2-Chloroethoxy)Methane	5	-		-
2,4-Dichlorophenol	5	-		-
1,2,4-Trichlorobenzene	5	-		-
Naphthalene	50	-		-
4-Choloraniline	5	-		-
Hexachlorobutadiene	5	-		-
4-Chloro-3-Methylphenol	5	-		-
2-Methylnaphthalene	50	-		-
Hexachlorocyclopentadiene	5	-		-
2,4,6-Trichlorophenol	5	-		-
2,4,5-Trichlorophenol	5	-		-
2-Chloronaphthalene	5	-		-
2-Nitroaniline	5	-		-
Dimethyl Phthalate	50	-		-
Acenaphthylene	50	-		-
2-6-Dinitrotoluene	5	-		-

TABLE 4.14

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

Groundwater Samples
Metals & Cyanide Analysis

CLP Analytes	Contract Required Detection Limit (ug/1)	Sample Locations and Concentrations (ug/1)										
		MW-1S	MW-1M	MW-1D	MW-2S	MW-2M	MW-3S	MW-3M	MW-3D		MW-4	MW-5
Aluminum	200	27100		8800	14700	1230	4260	2610	1320	(1160)	767	13700
Antimony	60	-		-	-	-	-	-	-	(-)	-	-
Arsenic	10	6.6 BN		6.4B N	4 BN	-	9.7 BSN	12.6 N	20.8 N	(21 N)	-	9.5 BN
Barium	200	275	N	79.4 B	171 B	49.9 B	402	427	180 B	(178 B)	128 B	156 B
Beryllium	5	4.1 B	O	-	-	-	-	-	-	(-)	-	-
Cadmium	5	1.3 B		-	-	1.1 B	6.6 S	-	-	(-)	-	-
Calcium	5000	6480	A	17000	115000	18000	184000	181000	98100	(94900)	99900	119000
Chromium	10	36 N	N		19.8 N	-	17.3 N	11.7 N	7.5 BN	(-)	-	25.9 N
Cobalt	50	50.5	A	21.5 B	25.6 B	-	53.7	25.1 B	16.8 B	(17.5 B)	-	33.2 B
Copper	25	140 E	L	41.9 E	65.4 E	34.5 E	49 E	30.8 E	13.3 BE	(10.5 BE)	14.7 BE	371 E
Iron	100	37500	Y	14500	19500	2310	49400	90900	43100	(40600)	1290	74200
Lead	5	66.2 N	S	14 SN	25.0 SN	9.3 SN	13.3 SN	8.4 SN	6.4 SN	(7.4 SN)	9.1 SN	44.1 SN
Magnesium	5000	5120	Y	8770	12700	3500 B	60800	40700	22000	(21700)	18900	30800
Manganese	15	4650 N	S	546 N	2170 N	40.8 N	18000 N	1940 N	504 N	(480 N)	2950 N	1540 N
Mercury	0.2	-		-	-	-	-	-	-	(-)	-	-
Nickel	40	54.9 *		42.3 *	-	40 *	29.8 B*	41.1 *	-	(-)	-	-
Potassium	5000	3410 BE		1710 BE	6030 E	1250 BE	141000 E	30900 E	18800 E	(18000 E)	28400 E	22400 E
Selenium	5	-		-	-	-	1.1 BN	-	-	(1.2 BN)	-	1.5 BN
Silver	10	22.5 N		18.3 N	21.7 N	13.6 N	29.4 N	43.3 N	32.8 N	(25.0 N)	10.6 N	10.3 N
Sodium	5000	4620 BE*		20800 E*	18000 E*	9330 E*	101000 *E	96200 E*	61700 E*	(60300 E*)	95700 *E	611 B*E
Thallium	10	-		-	-	-	-	-	-	(-)	-	-
Vanadium	50	51.7		42.7 B	25.5 B	-	19.9 B	24.2 B	10 B	(9.1 B)	-	40.7 B
Zinc	20	416 N		324 N	206 N	177 N	522 N	244 N	454 N	(461 N)	239 N	427 N
Cyanide	10	-	-	No Analysis	-	-	-	-	-	(-)	-	-

Notes: 1) Shallow, mid-level and deep sampling points at MW locations are identified by suffixes S, M and D, respectively.
2) Letter suffixes following concentrations are explained in Table 4.2 .
3) Dash symbols indicate that analyte was not detected (i.e. less than instrument detection limit).

TABLE 4.4 (Continued)

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

Standards of Comparsion for Semi-Volatile Organic Analyses

CLP COMPOUNDS	N.Y. State or Federal Drinking Water Standards * (ug/l)	N.J. ECRA Groundwater Action Levels (ug/l)	N.Y.S. D.E.C. Soil Cleanup Guidelines (mg/kg)	N.J. ECRA Soil Action Levels (mg/kg)
3-Nitroaniline	5	-	5 Times Detection Limit	-
Acenaphthene	50	-		-
2,4-Dinitrophenol	50	-		-
4-Nitrophenol	50	-		-
Dibenzofuran	50	-		-
2,4-Dinitrotoluene	5	-		-
Diethyphthalate	50	-		-
4-Chlorophebyl-phenylether	50	-		-
Fluorene	50	-		-
4-Nitroaniline	5	-		-
4,6-Dinitro-2-Methyphenol	50	-		-
N-Nitrosodiphenylamine (1)	50	-		-
4-Bromophenyl-phenylether	50	-		-
Hexachlorobenzene	0.35	-		-
Pentachlorophenol	5	-		-
Phenanthrene	50	-		-
Anthracene	50	-		-
Di-n-Butylphthalate	770	-		-
Fluoranthene	50	-		-
Pyrene	50	-		-
Butylbenzylphthalate	50	-		-
3,3'-Dichlorobenzidine	5	-		-
Benzo(a)Anthracene	50	-		-
Chrysene	50	-		-
bis(2-Ethylhexyl)Phthalate	50	-		-
Di-n-Octyl Phthalate	50	-		-
Benzo(b)Fluoranthene	50	-		-
Benzo(k)Fluoranthene	50	-		-
Benzo(a)Pyrene	ND	-		-
Indeno(1,2,3-cd)Pyrene	50	-		-
Dibenz(a,h)Anthracene	50	-		-
Benzo(g,h,i)Perylene	50	-		-
Total Base Neutral Extractables	A	50	-	10
Total Acid Extractables	A	50	-	Case-by-Case
Polynuclear Aromatic Hydrocarbons	-	-	-	10

* = The number presented is the more restrictive value of standards or guidelines available from NYS DEC 6 NYCRR Part 703.5, NYS DOH 10 NYCRR Part 5 - Subpart 5.1, NYS DOH 10 NYCRR Part 170, U.S. EPA MLC's or NYS TOGS 1.1.1.

A = According to 10 NYCRR Part 5, the total concentration of Volatile and Semi-Volatile Organics (excluding vinyl chloride and trihalomethanes) should not exceed 100 ug/l.

ND = Not Detectable above method detection limit for compound.

\- = Not Available.

TABLE 4.5

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

Standards of Comparsion for Pesticides/P.C.B.'s Analyses

CLP COMPOUNDS	N.Y. State or Federal Drinking Water Standards * (ug/l)	N.J. ECRA Groundwater Action Levels (ug/l)	N.Y.S. D.E.C. Soil Cleanup Guidelines (mg/kg)	N.J. ECRA Soil Action Levels (mg/kg)
Pesticides				
alpha-BHC	5	-	-	Case By Case Except Where Noted
beta-BHC	5	-	-	
delta-BHC	5	-	-	
Lindane	ND	-	-	
Heptachlor	ND	-	-	
Aldrin	ND	-	-	
Heptachlor epoxide	ND	-	-	
Endosulfan I	50	-	-	
Dieldrin	ND	-	-	
4,4'-DDE	ND	-	-	
Endrin	ND	-	-	
Endosulfan II	50	-	-	
4,4'-DDD	ND	-	-	
Endosulfan sulfate	50	-	-	
4,4'-DDT	ND	-	-	1-10
Methoxychlor	35	-	-	
Endrin ketone	-	-	-	
alpha-Chlordane	0.1	-	-	1
beta-Chlordane	0.1	-	-	1
Toxaphene	ND	-	-	
Total	-	-	1	-
PCB's				
Aroclor-1016	-	-	-	-
Aroclor-1221	-	-	-	-
Aroclor-1232	-	-	-	-
Aroclor-1242	-	-	-	-
Aroclor-1248	-	-	-	-
Aroclor-1254	-	-	-	-
Aroclor-1260	-	-	-	-
Total	0.1	1	10	1-5

* = The number presented is the more restrictive value of standards or guidelines available from NYS DEC 6 NYCRR Part 703.5, NYS DOH 10 NYCRR Part 5 - Subpart 5.1, NYS DOH NYCRR Part 170, U.S. EPA MLC's or NYS TOGS 1.1.1

ND = Not Detectable above method detection limit for compound.

\- = Not Available.

TABLE 4.6

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

Standards of Comparsion for Metals and Cyanide Analyses

CLP ANALYTES	N.Y. State or Federal Drinking Water Standards * (ug/l)	N.J. ECRA Groundwater Action Levels (ug/l)	N.Y.S. D.E.C. Soil Cleanup Guidelines (mg/kg)	N.J. ECRA Soil Action Levels (mg/kg)
Aluminum	-	-	No Greater Than Background	-
Antimony	3	-		10
Arsenic	25	50		20
Barium	1000	1000		400
Beryllium	3	-		1
Cadmium	10	10		3
Calcium	-	-		-
Chromium	50	50		100
Cobalt	-	-		-
Copper	<200	1000		170
Iron	300/A	-		-
Lead	25	50		200-1000
Magnesium	35000	-		-
Manganese	300/A	-		-
Mercury	2	2		1
Nickel	B	-		100
Potassium	-	-		-
Selenium	10	10		4
Silver	50	50		5
Sodium	<20000	-		-
Thallium	-	-		5
Vanadium	-	-		100
Zinc	<300	5000		350
Cyanide	<100	-		-
pH	6.5-8.5	-		-

* = The number presented is the more restrictive value of standards or guidelines available from NYD DEC 6 NYCRR, Part 703.5, NYS DOH 10 NYCRR Part 5 - Subpart 5.1, NYS DOH 10 NYCRR Part 170, U.S. EPA MCL's or NYS TOGS 1.1.1.

A = According to 10 NYCRR Part 5, the total concentration of iron and manganese should not exceed 500 ug/l.

B = Based on a verified reference dose for systemic toxicants, the EPA Health Based Criteria for Nickel is 700 ug/l.

\- = Not Available.

TA[redacted]7

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

Soil Samples
Volatile Organic Analysis

CLP COMPOUNDS	Contract Required Detection Limit* (ug/kg)	Sample Locations & Concentrations (ug/kg)										
		MW-1S	MW-1M	MW-1D	MW-1D+	MW-2S	MW-2M	MW-3S	MW-3M	MW-3D	MW-4	MW-5
Chloromethane	11-13	-	-	-	-	-	-	-	-	-	-	-
Bromomethane	11-13	-	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride	11-13	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	11-13	-	-	-	-	-	-	-	-	-	-	-
Methylene Chloride	6	19	24	19	18 B	13	7	29	9	8 BY	6	11
Acetone	11-13	-	-	-	-	-	-	1200 E	-	-	-	-
Carbon Disulfide	6	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	6	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	6	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene (total)	6	-	-	-	-	-	-	-	-	-	-	-
Chloroform	6	3 J	3 J	4 J	4 BJ	2 J	3 J	-	3 J	2 J	2 J	3 J
1,2-Dichloroethane	6	-	-	-	-	-	-	-	-	-	-	-
2-Butanone	11-13	-	-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane	6	-	-	-	-	-	-	-	-	-	-	-
Carbon Tetrachloride	6	-	-	-	-	-	-	-	-	-	-	-
Vinyl Acetate	11-13	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	6	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	6	-	-	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	6	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	6	-	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	6	-	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	6	-	-	-	-	-	-	-	-	-	-	-
Benzene	6	-	-	-	-	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	6	-	-	-	-	-	-	-	-	-	-	-
Bromoform	6	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-Pentanone	11-13	-	-	-	-	-	-	-	-	-	-	-
2-Hexanone	11-13	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	6	-	-	-	-	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	6	-	-	-	-	-	-	-	-	-	-	-
Toluene	6	-	-	-	3 J	-	-	-	-	-	-	-
Chlorobenzene	6	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	6	-	-	-	-	-	-	-	-	-	-	-
Styrene	6	-	-	-	-	-	-	-	-	-	-	-
Xylene (total)	6	-	-	-	-	-	-	-	-	-	-	-
Additional Peaks **												
1,1,2Trichloro-1,2,2Trifluoroethane		-	-	-	20 J	-	-	-	-	-	-	-
TOTAL		22	5	23	45	15	10	1229	12	10	8	14

* = Some compound detection limits varied due to correction for dilution and percent moisture.
** = Identification of additional peaks present in sample.
\+ = Repeat analysis of sample MW-1D by laboratory, due to low recovery of internal standards on initial analysis.

Notes: 1) Shallow, mid-level and deep sampling points at MW locations are identified by suffixes S, M & D, respectively. Samples were collected at or near level of well screen.
2) Letter suffixes following concentrations are explained in Table 4.1 .
3) Dash symbol indicates that compound was not detected.

TABLE 4.8

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

Groundwater Samples
Volatile Organic Analysis

	Contract Required Detection Limit (ug/l)	Sample Locations & Concentrations (ug/l)										
CLP COMPOUNDS		MW-1S	MW-1M*	MW-1D	MW-2S	MW-2M	MW-3S	MW-3M	MW-3D		MW-4	MW-5
Chloromethane	10	-	-	-	-	-	-	-	-	(-)	-	-
Bromomethane	10	-	-	-	-	-	-	-	-	(-)	-	-
Vinyl Chloride	10	-	-	-	-	-	-	-	-	(-)	-	-
Chloroethane	10	-	-	-	-	-	3 J	33	5 J	(5 J)	-	-
Methylene Chloride	5	6 B	220 BJ	6 B	2 BJ	3 BJ	3 BJ	3 BJ	4 BJ	(6 B)	3 BJ	3 BJ
Acetone	10	-	-	-	-	-	-	-	-	(-)	-	-
Carbon Disulfide	5	-	-	-	-	-	1 J	6	-	(-)	-	-
1,1-Dichloroethene	5	-	160 J	-	-	-	-	-	-	(-)	-	-
1,1-Dichloroethane	5	-	-	5	-	-	-	-	12	(18)	4 J	-
1,2-Dichloroethene (total)	5	-	-	-	-	-	-	-	-	(-)	-	2 J
Chloroform	5	2 BJX	110 BJ	4 BJ	2 BJ	2 BJ	-	-	-	(2BJX)	2 BJ	2 BJ
1,2-Dichloroethane	5	-	-	-	-	-	-	-	-	(-)	-	-
2-Butanone	10	-	-	-	-	-	-	-	-	(-)	-	-
1,1,1-Trichloroethane	5	-	4100	14	-	4 J	-	-	-	(-)	-	-
Carbon Tetrachloride	5	-	-	-	-	-	-	-	-	(-)	-	-
Vinyl Acetate	10	-	-	-	-	-	-	-	-	(-)	-	-
Bromodichloromethane	5	-	-	-	-	-	-	-	-	(-)	-	-
1,2-Dichloropropane	5	-	-	-	-	-	-	-	-	(-)	-	-
cis-1,3-Dichloropropene	5	-	-	-	-	-	-	-	-	(-)	-	-
Trichloroethene	5	-	-	-	-	12	-	-	4 J	(10)	2 J	-
Dibromochloromethane	5	-	-	-	-	-	-	-	-	(-)	-	-
1,1,2-Trichloroethane	5	-	-	-	-	-	-	-	-	(-)	-	-
Benzene	5	-	-	-	-	-	-	-	-	(-)	-	3 J
trans-1,3-Dichloropropene	5	-	-	-	-	-	-	-	-	(-)	-	-
Bromoform	5	-	-	-	-	-	-	-	-	(-)	-	-
4-Methyl-2-Pentanone	10	-	-	-	-	-	-	-	-	(-)	-	-
2-Hexanone	10	-	-	-	-	-	-	-	-	(-)	-	-
Tetrachloroethene	5	-	120 J	1 BJ	1 BJ	1 BJ	-	-	5 B	(14B)	1 BJ	3 BJ
1,1,2,2-Tetrachloroethane	5	-	-	-	-	-	-	-	-	(-)	-	-
Toluene	5	-	-	-	-	-	-	-	8	(-)	-	1 J
Chlorobenzene	5	-	-	-	-	-	2J	-	-	(-)	-	-
Ethylbenzene	5	-	-	-	-	-	-	-	-	(-)	-	-
Styrene	5	-	-	-	-	-	-	-	-	(-)	-	-
Xylene (total)	5	-	-	-	-	-	-	-	-	(-)	-	-
Total		8	4710	17	5	22	9	42	38	55	12	14

* Detection limits for this sample were elevated by a factor of 50.

Notes:
1) Shallow, mid-level and deep sampling points at MW locations are identified by suffixes S, M and D, respectively.
2) Letter suffixes following concentrations are explained in Table 4.1 .
3) Dash symbol indicates that compound was not detected.
4) Values in parentheses are results of a duplicate sample (MW-3DA) obtained from location MW-3D.

Table 4.7 shows a significant absence of compounds and suggests that Methylene Chloride and Chloroform are present in almost every soil sample. However, as addressed in Cambridge Analytical Associates (CAA) letter (Appendix E), these two compounds are common contaminants to their laboratory and are not felt to actually be present in the samples. This is supported by the fact that the compounds were detected in some laboratory blanks. Table 4.7 shows a significant concentration (1200 ug/kg) of Acetone in sample MW-3S. However, as explained in the CAA letter, the VOC's sample vial for this location broke and a split-sample for analysis of VOC's was taken from the bottle used for the semi-volatiles sample. Analysis of this sample detected the high concentration of Acetone which most likely was introduced as contamination from the semi-volatiles extraction laboratory where the compound is used extensively. Therefore, the concentration of Acetone in the soil sample is not felt to be significant.

With these factors in mind, a review of Table 4.7 indicates that the only contaminant present is a negligible amount of Toluene, 3 ug/kg, in the soil at an upgradient location (MW-1D). This concentration is well below the unofficial NYSDEC soil cleanup guideline of 10,000 ug/kg and New Jersey ECRA Soil Action Limit of 1,000 ug/kg for Total Volatiles shown on Table 4.3. The analytical data for the soil samples, therefore, indicates that soils at Hubbard Sand & Gravel are not contaminated with volatile organics.

The ubiquitous presence of Methylene Chloride and Chloroform is also seen in groundwater samples analyzed (See Table 4.8). This table also shows that Tetrachloroethene was present in most samples. However, these three compounds were also detected in the laboratory blank which indicates that the samples were affected by a contamination in the laboratory and not by the compounds actually being present in the groundwater. The highest VOC concentration (4,100 ug/l of 1,1,1-Trichloroethane) was found in monitoring well MW-1M. Due to the presence of a large amount of 1,1,1-Trichloroethane, it was necessary for the sample to be diluted by a factor of 50 in order for the analysis to be accomplished. This resulted in elevated detection limits for the compounds in sample MW-1M. The magnitude of 1,1,1-Trichloroethane present is far greater than that of other compounds observed in the samples analyzed.

Other compounds which occurred in upgradient samples included 1,1-Dichloroethene (160 ug/l MW-1M), 1,1-Dichloroethane (5 ug/l MW-1D and 4 ug/l MW-4), 1,2-Dichloroethene (2 ug/l MW-5), Trichloroethene (12 ug/l MW-2M and 2 ug/l MW-4), Benzene (3 ug/l MW-5) and Toluene (1 ug/l MW-5). A comparison of the data to New York State and Federal drinking water standards (Table 4.3) shows that concentrations of 1,1-Dichloroethene, 1,1,1-Trichloroethane, Trichloroethene and Benzene in upgradient samples exceeded respective standards. The detection of these compounds in the upgradient wells clearly shows that the contaminants are being introduced to the site from an upgradient location(s).

Some compounds (1,1-Dichloroethane, Trichloroethene and Toluene) observed in upgradient locations were also detected in downgradient well samples at concentrations which exceeded drinking water standards. The only compounds observed solely at downgradient wells were Chloroethane, Carbon Disulfide and Chlorobenzene. With the exception of Chloroethane at MW-3M (33 ug/l), compounds present downgradient were extremely low, ranging from 1 to 6 ug/l, and were below respective drinking water standards.

However, it is possible that Chloroethane did not originate as a contaminant introduced to the site during past landfilling activities. Studies by Vogel and McCarty, 1989, indicated that under methanogenic conditions 1,1,1-Trichloroethane can be biotransformed by reductive dehalogenation to 1,1-Dichloroethane and then to Chloroethane. The research was conducted using a plexiglass column (20 cm x 200 cm) filled with smooth 6 cm diameter quantizite rocks, supporting methanogenic bacteria, and fed a solution simulating certain contaminated groundwaters to evaluate biological reductive dehalogenation under anaerobic conditions. Transformation of 1,1,1-Trichloroethane to 1,1-Dichloroethane was shown to occur rapidly and was more than ninety percent complete with a 6-day detention time indicating a half-life of less than one day. The transformation of 1,1,1-Trichloroethane to Chloroethane was longer, on the order of sixty days. Given the distance between MW-1 and MW-3, about 2,200 feet, and an average groundwater flow rate of 0.22 feet/day (described later in the report) sufficient time would be available for the transformation to occur. Therefore, it is possible that the presence of Chloroethane and 1,1-Dichloroethane in MW-3 is a result of biotransformation from 1,1,1-Trichlorethane observed in the upgradient well, MW-1.

4.3.2 Semi-Volatile Organics

Laboratory analysis for CLP semi-volatile organic compounds (SVOC) are shown on Tables 4.9 and 4.10 for soil and groundwater samples, respectively.

With the exception of sample MW-5, the soil analyses (See Table 4.9) show that a minimal number of compounds are present in any one sample. The compound Bis (2-Ethylhexyl) Phthalate is shown in almost every sample. However, this compound was also detected in laboratory blanks thereby indicating the laboratory environment as the source of contamination and not the soil. Two samples showed the presence of Di-n-Butylphthalate,

TABLE 4.9

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

Soil Samples
Semi-Volatile Organic Analysis

CLP COMPOUNDS	Contract Required Detection Limit* (ug/kg)	MW-1S	MW-1M	MW-1D	MW-2S	MW-2M	MW-3S	MW-3M	MW-3D	MW-4	MW-5
		Sample Locations & Concentrations (ug/kg)									
Phenol	370-420	-	-	-	-	-	-	-	-	-	-
bis(2-Chloroethyl)Ether	370-420	-	-	-	-	-	-	-	-	-	-
2-Chlorophenol	370-420	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	370-420	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	370-420	-	-	-	-	-	-	-	-	-	-
Benzyl Alcohol	370-420	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	370-420	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	370-420	-	-	-	-	-	-	-	-	-	-
bis (2-Chloroisopropyl)Ether	370-420	-	-	-	-	-	-	-	-	-	-
4-Methylphenol	370-420	-	-	-	-	-	-	-	-	-	-
N-Nitroso-Di-n-Propylamine	370-420	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	370-420	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	370-420	-	-	-	-	-	-	-	-	-	-
Isophorone	370-420	-	-	-	-	-	-	-	-	-	-
2-Nitrophenol	370-420	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	370-420	-	-	-	-	-	-	-	-	-	-
Benzoic Acid	1800-2000	-	-	-	-	-	-	-	-	-	-
bis(2-Chloroethoxy)Methane	370-420	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	370-420	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	370-420	-	-	-	-	-	-	-	-	-	-
Naphthalene	370-420	-	-	-	-	-	-	-	-	-	56 J
4-Choloraniline	370-420	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	370-420	-	-	-	-	-	-	-	-	-	-
4-Chloro-3-Methylphenol	370-420	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	370-420	-	-	-	-	-	-	-	-	-	51 J
Hexachlorocyclopentadiene	370-420	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	370-420	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	1800-2000	-	-	-	-	-	-	-	-	-	-
2-Chloronaphthalene	370-420	-	-	-	-	-	-	-	-	-	-
2-Nitroaniline	1800-2000	-	-	-	-	-	-	-	-	-	-
Dimethyl Phthalate	370-420	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	370-420	-	-	-	-	-	-	-	-	-	110 J
2,6-Dinitrotoluene	370-420	-	-	-	-	-	-	-	-	-	-

* = Detection limit varied due to correction for dilution and percent moisture.

Notes:
1) Shallow, mid-level and deep sampling points at MW locations are identified by suffixes S, M & D, respectively. Samples were collected at or near level of well screen.
2) Letter suffix following concentrations is explained in Table 4.1 .
3) Dash symbol indicates that compound was not detected.

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Soil Samples
Semi-Volatile Organic Analysis

CLP COMPOUNDS	Contract Required Detection Limit* (ug/kg)	Sample Locations & Concentrations (ug/kg)									
		MW-1S	MW-1M	MW-1D	MW-2S	MW-2M	MW-3S	MW-3M	MW-3D	MW-4	MW-5
3-Nitroaniline	1800-2000	-	-	-	-	-	-	-	-	-	-
Acemaphthene	370-420	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	1800-2000	-	-	-	-	-	-	-	-	-	-
4-Nitrophenol	1800-2000	-	-	-	-	-	-	-	-	-	-
Dibenzofuran	370-420	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	370-420	-	-	-	-	-	-	-	-	-	-
Diethyphthalate	370-420	-	-	-	-	-	-	-	-	-	-
4-Chlorophenyl-phenylether	370-420	-	-	-	-	-	-	-	-	-	-
Fluorene	370-420	-	-	-	-	-	-	-	-	-	140 J
4-Nitroaniline	1800-2000	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-Methylphenol	1800-2000	-	-	-	-	-	-	-	-	-	-
N-Nitrosodiphenylamine (1)	370-420	-	-	-	-	-	-	-	-	-	-
4-Bromophenyl-phenylether	370-420	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	370-420	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	1800-2000	-	-	-	-	-	-	-	-	-	-
Phenanthrene	370-420	-	-	-	-	-	-	-	-	-	420
Anthracene	1800-2000	-	-	-	-	-	-	-	-	-	120 J
Di-n-Butylphthalate	370-420	-	-	-	-	-	45 BJ	-	92 BJ	-	-
Fluoranthene	370-420	-	-	-	-	-	-	-	-	-	190 J
Pyrene	370-420	-	-	-	-	-	-	-	-	-	290 J
Butylbenzylphthalate	370-420	-	-	-	-	-	-	-	-	-	-
3,3'-Dichlorobenzidine	750-840	-	-	-	-	-	-	-	-	-	-
Benzo(a)Anthracene	370-420	-	-	-	-	-	-	-	-	-	140 J
Chrysene	370-420	-	-	-	-	-	-	-	-	-	140 J
bis(2-Ethylhexyl)Phthalate	370-420	89 BJ	68 BJ	-	61 BJ	95 BJ	71 BJ	89 BJ	390 BJ	50 BJ	42 BJ
Di-n-Octyl Phthalate	370-420	-	-	-	-	-	-	-	-	-	-
Benzo(b)Fluoranthene	370-420	-	-	-	-	-	-	-	-	-	130 J
Benzo(k)Fluoranthene	370-420	-	-	-	-	-	-	-	-	-	-
Benzo(a)Pyrene	370-420	-	-	-	-	-	-	-	-	-	120 J
Indeno(1,2,3-cd)Pyrene	370-420	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)Anthracene	370-420	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)Perylene	370-420	-	-	-	-	-	-	-	-	-	-

* = Detection limit varied due to correction for dilution and percent moisture.

Notes:
1) Shallow, mid-level and deep sampling points at MW locations are identified by suffixes S, M & D, respectively. Samples were collected at or near level of well screen.
2) Letter suffixes following concentrations are explained in Table 4.1 .
3) Dash symbol indicates that compound was not detected.

TABLE 4.9 (Continued)

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

Soil Samples
Semi-Volatile Organic Analysis

	Sample Locations & Concentrations (ug/kg)									
CLP COMPOUNDS	MW-1S	MW-1M	MW-1D	MW-2S	MW-2M	MW-3S	MW-3M	MW-3D	MW-4	MW-5
Additional Peaks *										
Dimethylnapthalene isomer	-	-	-	-	-	-	-	-	-	150J,190J
Methylphenanthrene isomer	-	-	-	-	-	-	-	-	-	160J,170J
Methylanthracene isomer	-	-	-	-	-	-	-	-	-	210J
11 H-Benzoflurene isomer	-	-	-	-	-	-	-	-	-	180J
Unknown Compounds**	2 *** 250J,1500J	4 *** 160J-980J	2 *** 160J,1400J	2 *** 160J,1400J	4 *** 160J-610J	3 *** 170J-540J	1 *** 700J	2 *** 200J,480J	1 *** 230J	3 *** 210J-1600J
TOTALS										
CLP Compounds	89	68	-	61	95	116	89	482	50	1949
Additional Peaks	1750	1530	1560	1560	1210	960	700	680	230	3180

* = Identification of additional peaks present in sample.
** = Unknown Compounds = Additional peaks whose spectrum has no valid match to compounds in EPA/NIH/NBS Mass Spectral Data Base.
*** = Number indicates the number of unknown compounds listed in lab report, when more than 2 unknown compounds are indicated the range of concentrations is presented.

Notes:
1) Shallow, mid-level and deep sampling points at MW locations are identified by suffixes S, M & D, respectively. Samples were collected at or near level of well screen.
2) Letter suffix following concentrations is explained in Table 4.1 .
3) Dash symbol indicates that compound was not present at specified location.

TABLE 4.10

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

Groundwater Samples
Semi-Volatile Organic Analysis

CLP COMPOUNDS	Contract Required Detection Limit (ug/l)	Sample Locations & Concentrations (ug/l)										
		MW-1S	MW-1M	MW-1D	MW-2S	MW-2M	MW-3S	MW-3M	MW-3D		MW-4	MW-5
Phenol	10	-	-	-	-	-	-	-	-	(-)	-	-
bis(2-Chloroethyl)Ether	10	-	-	-	-	-	-	-	-	(-)	-	-
2-Chlorophenol	10	-	-	-	-	-	-	-	-	(-)	-	-
1,3-Dichlorobenzene	10	-	-	-	-	-	-	-	-	(-)	-	-
1,4-Dichlorobenzene	10	-	-	-	-	-	-	-	-	(-)	-	-
Benzyl Alcohol	10	-	-	-	-	-	-	-	-	(-)	-	-
1,2-Dichlorobenzene	10	-	-	-	-	-	-	-	-	(-)	-	-
2-Methylphenol	10	-	-	-	-	-	-	-	-	(-)	-	-
bis (2-Chloroisopropyl)Ether	10	-	-	-	-	-	-	-	-	(-)	-	-
4-Methylphenol	10	-	-	-	-	-	-	-	-	(-)	-	-
N-Nitroso-Di-n-Propylamine	10	-	-	-	-	-	-	-	-	(-)	-	-
Hexachloroethane	10	-	-	-	-	-	-	-	-	(-)	-	-
Nitrobenzene	10	-	-	-	-	-	-	-	-	(-)	-	-
Isophorone	10	-	-	-	-	-	-	-	-	(-)	-	-
2-Nitrophenol	10	-	-	-	-	-	-	-	-	(-)	-	-
2,4-Dimethylphenol	10	-	-	-	-	-	-	-	-	(-)	-	-
Benzoic Acid	50	-	-	-	-	-	5 J	-	-	(-)	-	20 J
bis(2-Chloroethoxy)Methane	10	-	-	-	-	-	-	-	-	(-)	-	-
2,4-Dichlorophenol	10	-	-	-	-	-	-	-	-	(-)	-	-
1,2,4-Trrichlorobenzene	10	-	-	-	-	-	-	-	-	(-)	-	-
Naphthalene	10	-	-	-	-	-	-	3 J	-	(-)	-	36
4-Choloraniline	10	-	-	-	-	-	-	-	-	(-)	-	-
Hexachlorobutadiene	10	-	-	-	-	-	-	-	-	(-)	-	-
4-Chloro-3-Methylphenol	10	-	-	-	-	-	-	-	-	(-)	-	-
2-Methylnaphthalene	10	-	-	-	-	-	-	-	-	(-)	-	6 J
Hexachlorocyclopentadiene	10	-	-	-	-	-	-	-	-	(-)	-	-
2,4,6-Trichlorophenol	10	-	-	-	-	-	-	-	-	(-)	-	-
2,4,5-Trichlorophenol	50	-	-	-	-	-	-	-	-	(-)	-	-
2-Chloronaphthalene	10	-	-	-	-	-	-	-	-	(-)	-	-
2-Nitroaniline	50	-	-	-	-	-	-	-	-	(-)	-	-
Dimethyl Phthalate	10	-	-	-	-	-	-	-	-	(-)	-	-
Acenaphthylene	10	-	-	-	-	-	-	-	-	(-)	-	2 J
2,6-Dinitrotoluene	10	-	-	-	-	-	-	-	-	(-)	-	-

Notes:
1) Shallow, mid-level and deep sampling points at MW locations are identified by suffixes S, M & D, respectively.
2) Letter suffixes following concentrations are explained in Table 4.1 .
3) Dash symbol indicates that compound was not detected.
4) Values in parentheses are results of a duplicate sample (MW-3DA) obtained from location MW-3D.

Table 4.10 (Continued)

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

Groundwater Samples
Semi-Volatile Organic Analysis

CLP COMPOUNDS	Contract Required Detection Limit (ug/l)	MW-1S	MW-1M	MW-1D	MW-2S	MW-2M	MW-3S	MW-3M	MW-3D		MW-4	MW-5
		Sample Locations & Concentrations (ug/l)										
3-Nitroaniline	50	-	-	-	-	-	-	-	-	(-)	-	-
Acenaphthene	10	-	-	-	-	-	-	4 J	-	(-)	-	-
2,4-Dinitrophenol	50	-	-	-	-	-	-	-	-	(-)	-	-
4-Nitrophenol	50	-	-	-	-	-	-	-	-	(-)	-	-
Dibenzofuran	10	-	-	-	-	-	-	-	-	(-)	-	-
2,4-Dinitrotoluene	10	-	-	-	-	-	-	-	-	(-)	-	-
Diethyphthalate	10	-	-	-	-	-	-	-	-	(-)	-	-
4-Chlorophenyl-phenylether	10	-	-	-	-	-	-	-	-	(-)	-	-
Fluorene	10	-	-	-	-	-	-	2 J	-	(-)	-	-
4-Nitroaniline	50	-	-	-	-	-	-	-	-	(-)	-	-
4,6-Dinitro-2-Methylphenol	50	-	-	-	-	-	-	-	-	(-)	-	-
N-Nitrosodiphenylamine (1)	10	-	-	-	-	-	-	-	-	(-)	-	-
4-Bromophenyl-phenylether	10	-	-	-	-	-	-	-	-	(-)	-	-
Hexachlorobenzene	10	-	-	-	-	-	-	-	-	(-)	-	-
Pentachlorophenol	50	-	-	-	-	-	-	-	-	(-)	-	-
Phenanthrene	10	-	-	-	-	-	-	-	-	(-)	-	8 J
Anthracene	10	-	-	-	-	-	-	-	-	(-)	-	-
Di-n-Butylphthalate	10	-	-	-	-	-	-	-	-	(-)	-	2 J
Fluoranthene	10	-	-	-	-	-	-	-	-	(-)	-	3 J
Pyrene	10	-	-	-	-	-	-	-	-	(-)	-	3 J
Butylbenzylphthalate	10	-	-	-	-	-	-	-	-	(-)	-	-
3,3'-Dichlorobenzidine	20	-	-	-	-	-	-	-	-	(-)	-	-
Benzo(a)Anthracene	10	-	-	-	-	-	-	-	-	(-)	-	-
Chrysene	10	-	-	-	-	-	-	-	-	(-)	-	-
bis(2-Ethylhexyl Phthalate	10	-	4 J	-	-	4 J	-	-	8 J	(4 J)	-	-
Di-n-Octyl Phthalate	10	-	-	-	-	-	-	-	-	(-)	-	-
Benzo(b)Fluoranthene	10	-	-	-	-	-	-	-	-	(-)	-	-
Benzo(k)Fluoranthene	10	-	-	-	-	-	-	-	-	(-)	-	-
Benzo(a)Pyrene	10	-	-	-	-	-	-	-	-	(-)	-	-
Indeno(1,2,3-cd)Pyrene	10	-	-	-	-	-	-	-	-	(-)	-	-
Dibenz(a,h)Anthracene	10	-	-	-	-	-	-	-	-	(-)	-	-
Benzo(g,h,i)Perylene	10	-	-	-	-	-	-	-	-	(-)	-	-

Notes: 1) Shallow, mid-level and deep sampling points at MW locations are identified by suffixes S, M & D, respectively.
2) Letter suffixes following concentrations are explained in Table 4.1 .
3) Dash symbol indicates that compound was not detected.
4) Values in parentheses are results of a duplicate sample (MW-3DA) obtained from location MW-3D.

Table 4.10 (Continued)

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

Groundwater Samples
Semi-Volatile Organic Analysis

CLP COMPOUNDS	Sample Locations & Concentrations (ug/l)										
	MW-1S	MW-1M	MW-1D	MW-2S	MW-2M	MW-3S	MW-3M	MW-3D		MW-4	MW-5
Additional Peaks*											
Thiocyanic acid, phenyl methyl ester	8 J	-	-	8 J	-	-	-	-	(-)	-	-
Ethanol, 2-chloro-, phosphate	-	-	-	14 J	-	-	-	-	(-)	-	-
Dodecanamide, N,N-bis	-	-	-	-	-	-	10 J	-	(-)	-	-
Substituted Benzene	-	-	-	-	-	-	-	-	(-)	-	11 J
Unknown Compounds **	-	1 *** 8 J	1 *** 46 J	-	-	10 *** 8J-14J	10 *** 8J-20J	2 *** 10J,14J	2 ** 8J,14J	1 *** 18 J	1 *** 13 J
TOTALS											
CLP Compounds	-	12	-	-	4	5	9	8	4	-	80
Additional Peaks	8	8	46	22	-	98	138	24	22	18	24

* = Identification of additional peaks present in sample.
** = Unknown Compounds = Additional peaks whose spectrum has no valid match to compounds in EPA/NIH/NBS Mass Spectral Data Base.
*** = Number of unknown compounds listed in lab report. When more than two unknown compounds are indicated, the range of concentrations is presented.

Notes:
1) Shallow, mid-level and deep sampling points at MW locations are identified by suffixes S, M & D, respectively.
2) Letter suffixes following concentrations are explained in Table 4.1 .
3) Dash symbol indicates that compound was not detected.
4) Values in parentheses are results of a duplicate sample (MW-3DA) obtained from location MW-3D.

however, this also was found in the laboratory blank analysis. Most notably, Table 4.9 shows that the sample from location MW-5 contained a wide variety of compounds at relatively low concentrations. The compounds present constitute a class of material known as Polynuclear Aromatic Hydrocarbons (PNA's). PNA's can be formed by hydrocarbon combustion processes and may also be released from oil spills. Their presence would be consistent with visual and olfactory field observations of creosote like material in the soil sample as well as the immediate proximity of an auto wrecking facility.

A few additional SVOC peaks were also identified. These also occurred in the MW-5 sample and have the same base compounds as the PNA's identified. A few unknown compounds were present in each of the soil samples collected.

According to NYSDEC, the unofficial cleanup guideline for soil contaminated with semi-volatile is five times the detection limit (Table 4.4). The laboratory data show that none of the compounds detected exceeded respective detection limits. In addition, the New Jersey ECRA Soil Action Limits for total Base-Neutrals or PNA's is 10,000 ug/kg. In any one particular soil sample, total semi-volatiles did not exceed 3,180 ug/kg, which is well below the ECRA prescribed action level.

The groundwater analyses (See Table 4.10) closely parallel the results of the soil analyses. Most of the compounds detected occurred in the sample from MW-5 and included generally the same PNA's as well as some Benzoic Acid. A few minor PNA concentrations and Benzoic Acid were also detected at MW-3 (downgradient well). Furthermore, some additional compounds peaks were detected, at low levels, in most of the samples.

A comparison of the water analyses to applicable State and Federal standards, Table 4.4 shows that the observed concentrations did not exceed prescribed levels. In addition to contaminant specific standards, the regulations state that the sum of volatile and semi-volatile organics (excluding Vinyl Chloride and Trihalomethanes) should not exceed 100 ug/l. The data show that the sum of the volatile and semi-volatile organics, without considering the unknown compounds listed under additional peaks, exceed a concentration of 100 ug/l in sample MW-1M (4612 ug/l) and MW-5 (103 ug/l). However, both of these samples were collected from wells located upgradient of the site. The concentration of the unknowns were excluded in this evaluation due to the uncertain nature of the compounds.

4.3.3 <u>Pesticide and PCB Analysis</u>

Pesticide and PCB analysis of soil and groundwater samples are presented in Tables 4.11 and 4.12, respectively. The data show that PCB's were not present in either soil or groundwater samples collected.

Only one pesticide, Beta-BHC, was detected in soil and groundwater samples. This compound was found in three upgradient soil samples (MW-1S, MW-1M and MW-5), one upgradient water sample (MW-2S) and in three downgradient water samples (MW-3S, MW-3M, MW-3D).

The highest Beta-BHC concentration observed in the soil sample was 29 ug/kg (0.029 ppm). This is well below the NYSDEC unofficial soil clean-up standard for pesticides of 1.0 ppm (Table 4.5). The compound was detected in a upgradient sample as well as downgradient groundwater samples which lends support for an upgradient off-site source. However, the concentrations observed are all below current drinking water standards (Table 4.5).

TABLE 4.11

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

Soil Samples
Pesticide/PCB Analysis

CLP COMPOUNDS	Contract Required Detection Limit* (ug/kg)	Sample Locations & Concentrations (ug/kg)									
		MW-1S	MW-1M	MW-1D	MW-2S	MW-2M	MW-3S	MW-3M	MW-3D	MW-4	MW-5
Pesticides											
alpha-BHC	9.1-10	-	-	-	-	-	-	-	-	-	-
beta-BHC	9.1-10	8.1 J	29	-	-	-	-	-	-	-	27
delta-BHC	9.1-10	-	-	-	-	-	-	-	-	-	-
Lindane	9.1-10	-	-	-	-	-	-	-	-	-	-
Heptachlor	9.1-10	-	-	-	-	-	-	-	-	-	-
Aldrin	9.1-10	-	-	-	-	-	-	-	-	-	-
Heptachlor epoxide	9.1-10	-	-	-	-	-	-	-	-	-	-
Endosulfan I	9.1-10	-	-	-	-	-	-	-	-	-	-
Dieldrin	18-20	-	-	-	-	-	-	-	-	-	-
4,4'-DDE	18-20	-	-	-	-	-	-	-	-	-	-
Endrin	18-20	-	-	-	-	-	-	-	-	-	-
Endosulfan II	18-20	-	-	-	-	-	-	-	-	-	-
4,4'-DDD	18-20	-	-	-	-	-	-	-	-	-	-
Endosulfan sulfate	18-20	-	-	-	-	-	-	-	-	-	-
4,4'-DDT	18-20	-	-	-	-	-	-	-	-	-	-
Methoxychlor	91-100	-	-	-	-	-	-	-	-	-	-
Endrin ketone	18-20	-	-	-	-	-	-	-	-	-	-
alpha-Chlordane	91-100	-	-	-	-	-	-	-	-	-	-
beta-Chlordane	91-100	-	-	-	-	-	-	-	-	-	-
Toxaphene	180-200	-	-	-	-	-	-	-	-	-	-
PCB's											
Aroclor-1016	91-100	-	-	-	-	-	-	-	-	-	-
Aroclor-1221	91-100	-	-	-	-	-	-	-	-	-	-
Aroclor-1232	91-100	-	-	-	-	-	-	-	-	-	-
Aroclor-1242	91-100	-	-	-	-	-	-	-	-	-	-
Aroclor-1248	91-100	-	-	-	-	-	-	-	-	-	-
Aroclor-1254	180-200	-	-	-	-	-	-	-	-	-	-
Aroclor-1260	180-200	-	-	-	-	-	-	-	-	-	-

* = Detection limit varied due to correction for dilution and percent moisture.

Notes:
1) Shallow, mid-level and deep sampling points at MW locations are identified by suffixes S, M & D, respectively. Samples were collected at or near level of well screen.
2) Letter suffix following concentration is explained in Table 4.1 .
3) Dash symbol indicates that compound was not detected.

TABLE 4.12

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

Groundwater Samples
Pesticide/PCB Analysis

CLP COMPOUNDS	Contract Required Detection Limit (ug/l)	Sample Locations & Concentrations (ug/l)										
		MW-1S	MW-1M	MW-1D	MW-2S	MW-2M	MW-3S	MW-3M	MW-3D		MW-4	MW-5
Pesticides												
alpha-BHC	0.050	-	-	-	-	-	-	-	-	(-)	-	-
beta-BHC	0.050	-	-	-	0.033 JX	-	0.065 X	0.043 JX	-	(0.18 X)	-	-
delta-BHC	0.050	-	-	-	-	-	-	-	-	(-)	-	-
Lindane	0.050	-	-	-	-	-	-	-	-	(-)	-	-
Heptachlor	0.050	-	-	-	-	-	-	-	-	(-)	-	-
Aldrin	0.050	-	-	-	-	-	-	-	-	(-)	-	-
Heptachlor epoxide	0.050	-	-	-	-	-	-	-	-	(-)	-	-
Endosulfan I	0.050	-	-	-	-	-	-	-	-	(-)	-	-
Dieldrin	0.10	-	-	-	-	-	-	-	-	(-)	-	-
4,4'-DDE	0.10	-	-	-	-	-	-	-	-	(-)	-	-
Endrin	0.10	-	-	-	-	-	-	-	-	(-)	-	-
Endosulfan II	0.10	-	-	-	-	-	-	-	-	(-)	-	-
4,4'-DDD	0.10	-	-	-	-	-	-	-	-	(-)	-	-
Endosulfan sulfate	0.10	-	-	-	-	-	-	-	-	(-)	-	-
4,4'-DDT	0.10	-	-	-	-	-	-	-	-	(-)	-	-
Methoxychlor	0.050	-	-	-	-	-	-	-	-	(-)	-	-
Endrin ketone	0.10	-	-	-	-	-	-	-	-	(-)	-	-
alpha-Chlordane	0.050	-	-	-	-	-	-	-	-	(-)	-	-
beta-Chlordane	0.050	-	-	-	-	-	-	-	-	(-)	-	-
Toxaphene	1.0	-	-	-	-	-	-	-	-	(-)	-	-
PCB's												
Aroclor-1016	0.50	-	-	-	-	-	-	-	-	(-)	-	-
Aroclor-1221	0.50	-	-	-	-	-	-	-	-	(-)	-	-
Aroclor-1232	0.50	-	-	-	-	-	-	-	-	(-)	-	-
Aroclor-1242	0.50	-	-	-	-	-	-	-	-	(-)	-	-
Aroclor-1248	0.50	-	-	-	-	-	-	-	-	(-)	-	-
Aroclor-1254	1.0	-	-	-	-	-	-	-	-	(-)	-	-
Aroclor-1260	1.0	-	-	-	-	-	-	-	-	(-)	-	-

Notes:
1) Shallow, mid-level and deep sampling points at MW locations are identified by suffixes S, M and D, respectively.
2) Letter suffixes following concentrations are explained in Table 4.1 .
3) Dash symbol indicates that compound was not detected.
4) Values in parentheses are results of a duplicate sample (MW-3DA) obtained from location MW-3D.

4.3.4 Metals and Cyanide Analysis

Tables 4.13 and 4.14 present laboratory analyses of metals and Cyanide for the soil and groundwater samples collected, respectively. During the groundwater sampling effort, a mix-up in glassware occurred resulting in no analysis of metals for well MW-1M and no Cyanide analysis for well MW-1D. In addition, due to a laboratory error, the Cyanide analysis for soil sample MW-2M was analyzed 20 days outside of the analytical procedures holding time. However, as shown on Table 4.13 Cyanide was not detected in any of the soil samples collected.

The laboratory results on Table 4.13 show that generally the same constituents are present in each soil sample analyzed. However, concentrations of specific metals varied from sample to sample. The data suggest that maximum upgradient concentrations were not substantially different from maximum downgradient concentrations, being generally within a factor of two or three apart with the downgradient values being higher than those upgradient. The data also show that other upgradient concentrations exceed some downgradient values. For the most part, concentrations found in the soil sample were low and only Aluminum, Chromium, Iron, Lead, Manganese, Silver and Zinc exceeded respective contract required detection limits. Currently, New York State does not have official soil standards for metals by which to compare the laboratory analyses. According to unofficial DEC soil cleanups standards (Table 4.6), metals should not be greater than background concentrations. If upgradient locations are considered as "background" in this industrial area then the data suggest that concentrations are fairly consistent throughout the site. Comparing the data to NJ ECRA soil cleanup action levels, it is shown that metal concentrations present are below each of the respective level with the exception of Silver at Site MW-5. However, this is an upgradient or "background" site.

TABLE 4.13

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

Soil Samples
Metals & Cyanide Analysis

CLP ANALYTES	Contract Required Detection Limit (mg/kg)	Sample Locations and Concentrations (mg/kg)									
		MW-1S	MW-1M	MW-1D	MW-2S	MW-2M	MW-3S	MW-3M	MW-3D	MW-4	MW-5
Aluminum	40	263 *	228 *	802 *	272 *	291 *	339 *	440 *	2080 *	532 *	299 *
Antimony	12	-	0.95 BW	1.1 BW	-	-	-	0.98 BW	-	-	1.0 BW
Arsenic	2	-	-	1.2 B	-	-	-	-	-	-	-
Barium	40	-	-	-	-	-	-	-	12.1 B	-	-
Beryllium	1	-	-	0.34 B	0.4 B	-	-	-	-	-	-
Cadmium	1	-	-	-	-	-	-	-	-	-	-
Calcium	1000	254 B	168 B	267 B	55.4 B	48.7 B	98.7 B	541 B	448 B	645 B	137 B
Chromium	10	-	9.5 N*	7.1 N*	-	-	27.5 N*	3.7 N*	-	4.3 N*	-
Cobalt	10	-	-	-	-	-	-	7.3 B	-	-	-
Copper	5	-	-	2 B	-	-	-	-	1.9 B	-	-
Iron	20	729 *	757 *	2490 *	598 *	646 *	723 *	572 *	4090 *	664 *	605 *
Lead	1	8.8 *+N	6.6 *SN	2.4 *SN	6.1 *+N	1.6 *SN	3.6 *SN	-	2.6 U*SN	0.77 B*SN	0.78 B*WN
Magnesium	1000	57.9 B	66.6 B	268 B	65.3 B	55 B	111 B	124 B	699 B	129 B	61.6 B
Manganese	3	19.6	43.2	40.6	10.4	7.5	16.7	15.7	83.9	19.7	10.9
Mercury	0.04	-	-	-	-	-	-	-	-	-	-
Nickel	8	-	-	-	-	-	-	-	-	-	-
Potassium	1000	-	-	102 B	-	-	-	38.7 B	316 B	-	-
Selenium	1	-	-	-	-	-	-	-	-	-	-
Silver	2	-	-	-	-	-	-	-	-	-	8.1 N
Sodium	1000	25.5 B	20 B	29.9 B	205 B	148 B	193 B	251 B	57.8 B	226 B	18.4 B
Thallium	2	-	0.69 B	0.77 B	-	-	-	-	0.78 B	-	-
Vanadium	10	-	-	-	-	-	-	-	4.3 B	-	-
Zinc	10	29.9+N	26.8*N	43.6*N	37.1*N	57.4*N	73.2*N	71.3*N	44.6*N	46.8*N	59.2*N
Cyanide	2	-	-	-	-	-	-	-	-	-	-

Notes:
1) Shallow, Mid-level and deep sampling points at MW locations are identified by suffixes S, M & D, respectively. Samples were collected at or near level of well screen.
2) Letter suffixes following concentrations are explained in Table 4.2 .
3) Dash symbol indicates that analyte was not detected (less than instrument detection limit).

Therefore, through onsite explorative borings, it is apparent that the Gardiners Clay is not present beneath Hubbard Sand and Gravel and the thin layer (less than 8 inches) of silty material would not be considered a significant aquifer confining clay layer.

4.6 Grain Size Analysis

The split-spoon samples collected from each of the borings were reviewed along with the boring contractors soil log to select representative samples for grain size analysis. A total of 24 samples representing different layers of material with similar characteristics were sent to Johnson Soils Laboratory for analysis according to ASTM-422 "Particle-Size Analysis of Soils". The samples analyzed were:

MW-1 15', 35', 40', 55', 80', 125', 138' and 142',
MW-2 20', 30', 50', 105' and 119',
MW-3 10', 30', 50', 103', 111', 115' and 125',
MW-4 50', 80', 112' and 118'.

In addition, due to the nature of the material encountered, samples MW-1 138', MW-1 142', MW-2 119', MW-3 111', MW-4 112' and MW-4 118' were subjected to hydrometer testing to determine the amount of clay in the samples. The laboratory results of these analyses are presented in Appendix G.

The sieve analyses show that the soils underlying the project site are mostly fine to coarse sands with some gravel and traces of silt. Hydrometer testing of selected samples showed that the fine materials passing the No. 200 Sieve consisted primarily of silt with minor amounts of clay. This further supports the fact that a Gardiners Clay layer is not present beneath the site.

The sieve analyses results and boring logs were used to determine onsite soil permeabilities and groundwater velocities. The gradation curves generated by the sieve analysis were used to determine the classification of soil type, relative density, porosity, and saturated permeability. The average in-situ saturated permeability was estimated to be 2.5 ft/hr.

Rate of groundwater flow was determined by use of the following equation (Pluhowski, et.al):

$$V = \frac{\text{Psat } I}{7.48\ n}$$

where: V = Velocity (ft/day)
Psat = Saturated Permeability (gal. per day per square foot)
I = Hydraulic Gradient
n = Porosity

At Hubbard, site conditions provided the following values:

$$\text{Psat} = 2.5 \text{ ft/hr} = 449 \text{ gallons/day/ft}^2$$

$$I \text{ (MW-5 to MW-3)} = \frac{\text{46.0 ft msl-44.1 ft/msl}}{\text{1460 feet}} = 1.3 \times 10^{-3}$$

$$n = 0.35$$

Applying these values to the equation above yields a groundwater velocity at HSGC of approximately 0.22 ft/day.

4.7 Gamma Ray Logging

After installation of the groundwater monitoring wells was completed, gamma ray logging was conducted. It was desired that logging be accomplished on the two deep wells (MW-1D, MW-3D) placed on site. However, at MW-3D, the instrument sensor was unable to be lowered past an apparent bend in the well casing. This prevented the well from being surveyed. Therefore, in order to gain additional information from the site, gamma logging was performed on MW-3M and MW-2M. Copies of the gamma log strip chart recordings for each of the wells evaluated are presented in Appendix H.

In order to produce useful results, the logs were generated using an instrument log speed of 20 feet per minute, time constant (TC) of 3 seconds and range of 50 counts per second.

The purpose of conducting gamma ray logging on the wells was to help determine the nature of material beneath the site along with the observations of material in the split spoon samples obtained. The gamma log strip chart recordings show a relatively flat response in the curves generated. For MW-2M and MW-3M, the larger fluctuation in curves were found to occur within the range of 5 to 15 counts per second. For MW-1D, a range of 10 to 20 counts per second was observed. This data indicates the presence of a sand and gravel formation beneath the site. If clay layers were present, the recording would have indicated tracings in excess of 25 counts per second. This magnitude of activity was not observed on any of the logs. The logs are, therefore, consistent with observation of sand present in the split spoon samples.

4.8 Drum Samples

During the field investigation, observations of a creosote type odor were encountered while augering at Site MW-5. Therefore, auger cuttings and development water were retained in 55-gallon drums. Subsequently, samples of the drummed soil and water material were sent for laboratory analysis to determine if special disposal needs would be required. The samples were collected by Marine Pollution Control Environmental Services on September 27, 1989 and delivered for analysis to Volumetric Techniques, Ltd. on September 28, 1989. The results of this laboratory analysis are shown in Appendix I.

The analytical data indicates that the material is not considered hazardous. Therefore, since special disposal requirements were not necessary, the materials were removed from the drums and left on-site.

5.0 UNCONTROLLED HAZARDOUS WASTE SITE RANKING SYSTEM (HRS)

The U.S. Environmental Protection Agency's (EPA) Uncontrolled Hazardous Waste Site Ranking System (HRS) was applied to data generated from this investigation in order to determine the relative hazard that this site possesses to human health and/or the environment. The HRS procedure requires, among other data, the identification of groundwater wells within a three (3) mile radius of the site. According to records of the NYSDEC - Division of Water - Water Supply Unit, there are forty-nine (49) Suffolk County Water Authority public water supply wells within a three (3) mile radius of the site. Up to nine (9) of these wells are located at a total of fourteen (14) different well fields. Well identification numbers, bearing and distance, with respect to the site, are presented in Table 5-1.

TABLE 5-1

Suffolk County Water Authority Public Water Supply Wells Within A Three Mile Radius of Hubbard Sand & Gravel

Well Numbers	Bearing* (Degrees)	Distance* (Miles)
S-15898, S-16175, S-36460	295	0.63
S-13534, S-16176, S-18566, S-38192, S-71083	80	0.79
S-46235, S-50546	145	1.17
S-61, S-62, S-24846, S-43088	20	1.58
S-23046, S-25617, S-36714, S-55463	250	1.63
S-59347, S-72917	220	1.83
S-40497, S-46830	295	1.88
S-4015, S-4017, S-4019, S-4020, S-4022, S-12142, S-20566, S-26535, S-71038	170	1.92
S-32412, S-20318, S-16608	10	2.17
S-73063	50	2.17
S-2063, S-26490, S-39406, S-45839, S-64847	80	2.42
S-19048, S-21244, S-42762	175	2.50
S-55733, S-55734, S-66429	210	2.63
S-22389, S-21366, S-39024	230	2.63

* From Hubbard Sand & Gravel

In addition, over 140 private wells, greater than or equal to 4 inches in diameter, are located within this area. For computation of the HRS, a public supply well is of greater significance than a private well due to the size of the population potentially affected by contamination.

Application of the evaluation procedure generated an HRS score of 1.8 points. This value is primarily the result of considering metals in groundwater as the major contamination emanating from the site. Volatile organic compound analyses were not used in the HRS procedure because as stated previously, VOC's detected in the downgradient samples were either (1) also seen in the upgradient samples, (2) considered to be a biotransformation product of an upgradient contaminant or (3) present at insignificant concentrations. The HRS procedure considers the public supply well closest to the site even though the well field is located upgradient of the site and is currently closed due to contamination by VOC's. The worksheets and supporting documents used to compute the HRS score are presented in Appendix J.

6.0 CONCLUSIONS

In conclusion, based on data from the Phase II Field Investigation, the following can be said:

1) Groundwater at the site flows from northwest to southeast.

2) Upgradient and downgradient groundwater water samples showed the presence of some similar volatile organics, semi-volatile organics (PNA's), the pesticide Beta-BHC and significant levels of various metals.

3) A significant concentration of 1,1,1-Trichloroethane (4,100 ug/l) in groundwater was noted upgradient but not downgradient.

4) Concentrations of Chloroethane, Carbon Disulfide and Chlorobenzene were observed downgradient but not upgradient. The drinking water standards for Carbon Disulfide and Chlorobenzene were not exceeded. The downgradient presence of Chloroethane in groundwater may reflect the biotransformation of 1,1,1-Trichloroethane observed upgradient.

5) Several metals indicative of landfill leachate were detected in downgradient water samples.

6) PCB's were not detected in either upgradient or downgradient water samples.

7) Several upgradient and downgradient concentrations of volatile organics and metals in groundwater exceeded drinking water standards.

8) Chromium waste was reportedly disposed of in the landfill. However, upgradient groundwater concentrations of Chromium exceeded those observed downgradient. In addition, concentrations of Chromium present were less than the New York State drinking water standard.

9) The highest concentration of contaminants were generally observed in the mid-level wells (51 to 56 feet below grade) installed on site.

10) Soil samples collected were not observed to be contaminated with volatile organics.

11) Semi-volatile organics present in soil samples occurred primarily in an upgradient sample (MW-5). Concentrations present did not exceed suggested cleanup guidelines.

12) Minimal levels of the pesticide Beta-BHC were detected in upgradient soil samples.

13) Generally, the same metal constituents were observed in upgradient and downgradient soil samples.

14) Subsurface geology of the site was determined to consist of primarily various sands. Some deep samples also contained silt. Samples collected for evaluation did not show evidence of Gardiners Clay being present under the site.

15) An HRS score of 1.8 points was computed for the site.

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Like the soil samples, the water samples analyses (See Table 4.14) showed the presence of similar metals in each sample. Many of the metals were detected at significant concentrations (i.e. exceeding the respective contract required detection limits). The data show that Aluminum, Chromium, Copper, Lead, and Vanadium were generally higher in the upgradient samples. Downgradient samples showed higher values of Arsenic, Calcium, Iron, Magnesium, Manganese, Potassium and Sodium, most of which would be indicators of landfill leachate. It is interesting to note that elevated levels of Calcium, Iron, Magnesium and Potassium were also evidenced at site MW-5 which is adjacent and downgradient of an auto wrecking facility and former Town of Islip landfill.

A comparison of the data to available New York State and Federal drinking water standards (Table 4.6) showed that Beryllium, Copper, Iron, Lead, Manganese, Sodium and Zinc exceeded the respective standards in upgradient samples and Iron, Magnesium, Manganese, Sodium, and Zinc exceeded the standards in downgradient samples.

Allegedly, the former landfill onsite accepted Chromium waste from Olin Chemical Company. However, the water sample analyses showed higher concentrations of Chromium in upgradient wells than in downgradient. At any rate, the Chromium concentrations detected were below the drinking water standard.

4.4 QA/QC Water Sample Analyses

The analytical results of the field blank, trip blank, bailer blank and purge pipe blank QA/QC water samples are presented in Table 4.15. The QA/QC data for the truck tank samples are given in Tables 4.15 through 4.18. Analytical results of the duplicate groundwater sample collected

TABLE 4.15

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

QA/QC Samples
Volatile Organic Analysis

CLP COMPOUNDS	Contract Required Detection Limit (ug/l)	Samples & Concentrations (ug/l)						
		Field Blank (8/10/89)	Trip Blank (8/10/89)	Truck Tank (8/17/89)	Field Blank (8/23/89)	Trip Blank (8/23/89)	Bailer Blank (9/6/89)	Purge Pipe (9/7/89)
Chloromethane	10	-	-	-	-	-	-	-
Bromomethane	10	-	-	-	-	-	-	-
Vinyl Chloride	10	-	-	-	-	-	-	-
Chloroethane	10	-	-	-	-	-	-	-
Methylene Chloride	5	-	2 J	2 J	4 BJ	4 BJ	8 B	4 BJ
Acetone	10	-	-	-	-	-	-	-
Carbon Disulfide	5	-	-	-	-	-	-	-
1,1-Dichloroethene	5	-	-	-	-	-	-	-
1,1-Dichloroethane	5	-	-	-	-	-	-	-
1,2-Dichloroethene (total)	5	-	-	-	-	-	-	-
Chloroform	5	-	-	-	1 BJ	2 BJ	2 BJ	6 B
1,2-Dichloroethane	5	-	-	-	-	-	-	-
2-Butanone	10	-	-	-	-	-	-	-
1,1,1-Trichloroethane	5	-	-	-	-	-	-	-
Carbon Tetrachloride	5	-	-	-	-	-	-	-
Vinyl Acetate	10	-	-	-	-	-	-	-
Bromodichloromethane	5	-	-	-	-	-	-	-
1,2-Dichloropropane	5	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	5	-	-	-	-	-	-	-
Trichloroethene	5	-	-	-	-	-	-	-
Dibromochloromethane	5	-	-	1 J	-	-	-	-
1,1,2-Trichloroethane	5	-	-	-	-	-	-	-
Benzene	5	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	5	-	-	-	-	-	-	-
Bromoform	5	-	-	-	-	-	-	-
4-Methyl-2-Pentanone	10	-	-	-	-	-	-	-
2-Hexanone	10	-	-	-	-	-	-	-
Tetrachloroethene	5	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	5	-	-	-	-	-	-	-
Toluene	5	-	-	-	-	-	-	-
Chlorobenzene	5	-	-	-	-	-	-	-
Ethylbenzene	5	-	-	-	-	-	-	-
Styrene	5	-	-	-	-	-	-	-
Xylene (total)	5	-	-	-	-	-	-	-

Notes: 1) Dash symbol indicates that compound was not detected.
2) Letter suffixes following concentrations are explained in Table 4.1 .

Table 4.16

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

QA/QC Samples
Semi-Volatile Organic Analysis

CLP COMPOUNDS	Contract Required Detection Limit (ug/l)	Location & Concentration (ug/l)
		Truck Tank (8/17/89)
Phenol	10	-
bis(2-Chloroethyl)Ether	10	-
2-Chlorophenol	10	-
1,3-Dichlorobenzene	10	-
1,4-Dichlorobenzene	10	-
Benzyl Alcohol	10	-
1,2-Dichlorobenzene	10	-
2-Methylphenol	10	-
bis (2-Chloroisopropyl)Ether	10	-
4-Methylphenol	10	-
N-Nitroso-Di-n-Propylamine	10	-
Hexachloroethane	10	-
Nitrobenzene	10	-
Isophorone	10	-
2-Nitrophenol	10	-
2,4-Dimethylphenol	10	-
Benzoic Acid	50	-
bis(2-Chloroethoxy)Methane	10	-
2,4-Dichlorophenol	10	-
1,2,4-Trichlorobenzene	10	-
Naphthalene	10	-
4-Choloraniline	10	-
Hexachlorobutadiene	10	-
4-Chloro-3-Methylphenol	10	-
2-Methylnaphthalene	10	-
Hexachlorocyclopentadiene	10	-
2,4,6-Trichlorophenol	10	-
2,4,5-Trichlorophenol	50	-
2-Chloronaphthalene	10	-
2-Nitroaniline	50	-
Dimethyl Phthalate	10	-
Acenaphthylene	10	-
2,6-Dinitrotoluene	10	-

NOTE: Dash symbol indicates that compound was not detected.

Table 4.16 (Continued)

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATIONS

QA/QC Samples
Semi-Volatile Organic Analysis

CLP Compounds	Contract Required Detection Limit (ug/l)	Sample & Concentration (ug/l) Truck Tank (8/17/89)
3-Nitroaniline	50	-
Acenaphthene	10	-
2,4-Dinitrophenol	50	-
4-Nitrophenol	50	-
Dibenzofuran	10	-
2,4-Dinitrotoluene	10	-
Diethyphthalate	10	-
4-Chlorophenyl-phenylether	10	-
Fluorene	10	-
4-Nitroaniline	50	-
4,6-Dinitro-2-Methylphenol	50	-
N-Nitrosodiphenylamine (1)	10	-
4-Bromophenyl-phenylether	10	-
Hexachlorobenzene	10	-
Pentachlorophenol	50	-
Phenanthrene	10	-
Anthracene	10	-
Di-n-Butylphthalate	10	-
Fluoranthene	10	-
Pyrene	10	-
Butylbenzylphthalate	10	-
3,3'-Dichlorobenzidine	20	-
Benzo(a)Anthracene	10	-
Chrysene	10	-
bis(2-Ethylhexyl)Phthalate	10	3 BJ
Di-n-Octyl Phthalate	10	-
Benzo(b)Fluoranthene	10	-
Benzo(k)Fluoranthene	10	-
Benzo(a)Pyrene	10	-
Indeno(1,2,3-cd)Pyrene	10	-
Dibenz(a,h)Anthracene	10	-
Benzo(g,h,i)Perylene	10	-

NOTE: (1) Dash symbol indicates that compound was not detected.
(2) Letter suffixes following concentation are explained in Table 4.1 .

Table 4.17

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

QA/QC Samples
Pesticides/P.C.B.'s

CLP COMPOUNDS	Contract Required Detection Limit (ug/l)	Sample & Concentration (ug/l)
		Truck Tank (8/17/89)
Pesticides		
alpha-BHC	0.050	-
beta-BHC	0.050	-
delta-BHC	0.050	-
Lindane	0.050	-
Heptachlor	0.050	-
Aldrin	0.050	-
Heptachlor epoxide	0.050	-
Endosulfan I	0.050	-
Dieldrin	0.10	-
4,4'-DDE	0.10	-
Endrin	0.10	-
Endosulfan II	0.10	-
4,4'-DDD	0.10	-
Endosulfan sulfate	0.10	-
4,4'-DDT	0.10	-
Methoxychlor	0.050	-
Endrin ketone	0.10	-
alpha-Chlordane	0.050	-
beta-Chlordane	0.050	-
Toxaphene	1.0	-
PCB's		
Aroclor-1016	0.50	-
Aroclor-1221	0.50	-
Aroclor-1232	0.50	-
Aroclor-1242	0.50	-
Aroclor-1248	0.50	-
Aroclor-1254	1.0	-
Aroclor-1260	1.0	-

Note: Dash symbol indicates that compound was not detected.

Table 4.18

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

QA/QC Samples
Metals

CLP ANALYTES	Contract Required Detection Limit (ug/l)	Sample & Concentrations (ug/l) Truck Tank (8/17/89)
Aluminum	200	-
Antimony	60	4.8 B
Arsenic	10	-
Barium	200	-
Beryllium	5	1.3 B
Cadmium	5	-
Calcium	5000	10,900 E
Chromium	50	-
Cobalt	50	-
Copper	25	-
Iron	100	1180 N
Lead	5	2.6 BW
Magnesium	5000	686 B
Manganese	15	18.2
Mercury	0.2	-
Nickel	40	-
Potassium	5000	536 B
Selenium	5	-
Silver	10	-
Sodium	5000	3490 BE
Thallium	10	-
Vanadium	50	-
Zinc	50	818 N*E
Cyanide	10	-

Notes: 1) Dash symbol indicates that compound was not detected.
2) Letter suffixes following concentrations and explained in Table 4.2 .

from MW-3D are presented along with the other groundwater monitoring well sample results in Tables 4.8, 4.10, 4.12 and 4.14.

The truck tank and MW-3D (duplicate) samples were analyzed for full CLP parameters. The other samples were analyzed for CLP volatile organics only.

With the exception of the duplicate groundwater monitoring well sample from MW-3, volatile organic analyses of the QA/QC samples show a significant absence of compounds. As with the VOC analysis of groundwater monitoring well samples, the QA/QC data show that low levels of Methylene Chloride and Chloroform were present in most samples, however, they were also detected in laboratory blanks. As mentioned previously, this indicates a source of contamination originating in the laboratory. Aside from these two compounds, a minor concentration (1 ug/l) of Dibromochloromethane was estimated to be present in the truck tank sample. Although this compound was not detected in any of the groundwater monitoring well samples, the concentration present is extremely low and not considered significant. Evaluation of the truck tank sample analyses showed that semi-volatile organics, pesticides and PCB's were not detected. A few metals were present in the truck tank sample, however, only Calcium, Iron, Manganese and Zinc exceeded the contract required detection limits. These metals are not considered to be contaminates introduced by the truck tank container as these and other compounds were detected at elevated concentrations in each of the groundwater samples where truck tank water was not employed.

The MW-3D duplicate sample analysis showed close correspondence to all results of the first sample obtained from this well. This indicates consistency in the sampling and analytical procedures conducted.

4.5 Gardiners Clay

According to information provided by the USGS, the Gardiners Clay was expected to exist below the Hubbard Sand & Gravel site. The USGS data indicates that the Gardiners Clay extends northward from the south shore of Long Island in an irregular finger shape pattern and that one of these "fingers" underlies the site.

In the vicinity of Hubbard, the clay is suggested to be about 0 to 10 feet thick and exist at a depth of approximately 60 feet below mean sea level, which is about 115 to 130 feet below the surface of the site from south to north, respectively.

To investigate the presence of the Gardiners Clay, borings at locations MW-1, MW-2 MW-3 and MW-4 were advanced to depths where the clay was expected to exist. As the suspect depth was approached, continuous split spoon sampling was conducted in order to accurately sample the formation. As shown in the listing of soil boring observations (Appendix C), some clay-like samples were present in borings MW-1, MW-2, MW-3 and MW-4 at depths from the surface to about 126', 119', 111' and 110', respectively. The sample depths closely correspond to the depth of the Gardiners Clay suggested by the USGS report. However, in any one sample the material was no thicker than 8 inches.

A sample from each of these levels was collected and subjected to an evaluation of Gardiners Clay characteristics (mineralogy, marine fossils, diatoms, pollen and spores) in order to accurately verify the material encountered. The results of this evaluation are presented in Appendix F. The analysis shows that the materials collected were predominantly sand in a silt-clay matrix and do not possess characteristics indicative of the Gardiners Clay. The sample from MW-1 had a minor amount of clay present.

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

PART II

SECOND ROUND SAMPLING

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

TABLE OF CONTENTS

PART II

(Appendices A-R are listed and referenced in PART I of this Document)

LIST OF FIGURES

LIST OF TABLES

1.0 Introduction

Based on an initial New York State Department of Conservation (NYSDEC) review of Part I of this document, the agency requested (Jamie Ascher-NYSDEC; November 19, 1990 and February 8, 1991), that a second round of groundwater samples be collected at the Hubbard Sand & Gravel Corporation (HSGC) site, Bay Shore.

The purpose of the second round sampling was to verify the findings of the first round (described in Part I). According to NYSDEC guidance, the second round groundwater samples were analyzed for Volatile Organic Compounds (VOCs). The samples were collected and analyzed using the same methodologies employed during the first round of sampling. A field blank and trip blank were also collected. In addition, well casing elevations were checked and the location of the monitoring wells were surveyed for inclusion on a detailed plan of the site.

2.0 Results

The second round of groundwater samples were collected on May 7, 1991. The sampling was conducted with the authorization of HSGC and was witnessed by a NYSDEC representative.

Groundwater Flow Direction

Prior to sampling, water level measurements in each well were obtained and four standing volumes of water were removed Table 2-1(II). The water level readings indicate that groundwater beneath the site flows from northwest to southeast (Figure 2-1(II). This confirms the results obtained from the first round of sampling. In addition, the data indicates that water levels across the site have risen slightly (up to 0.54 feet) between the two sampling events.

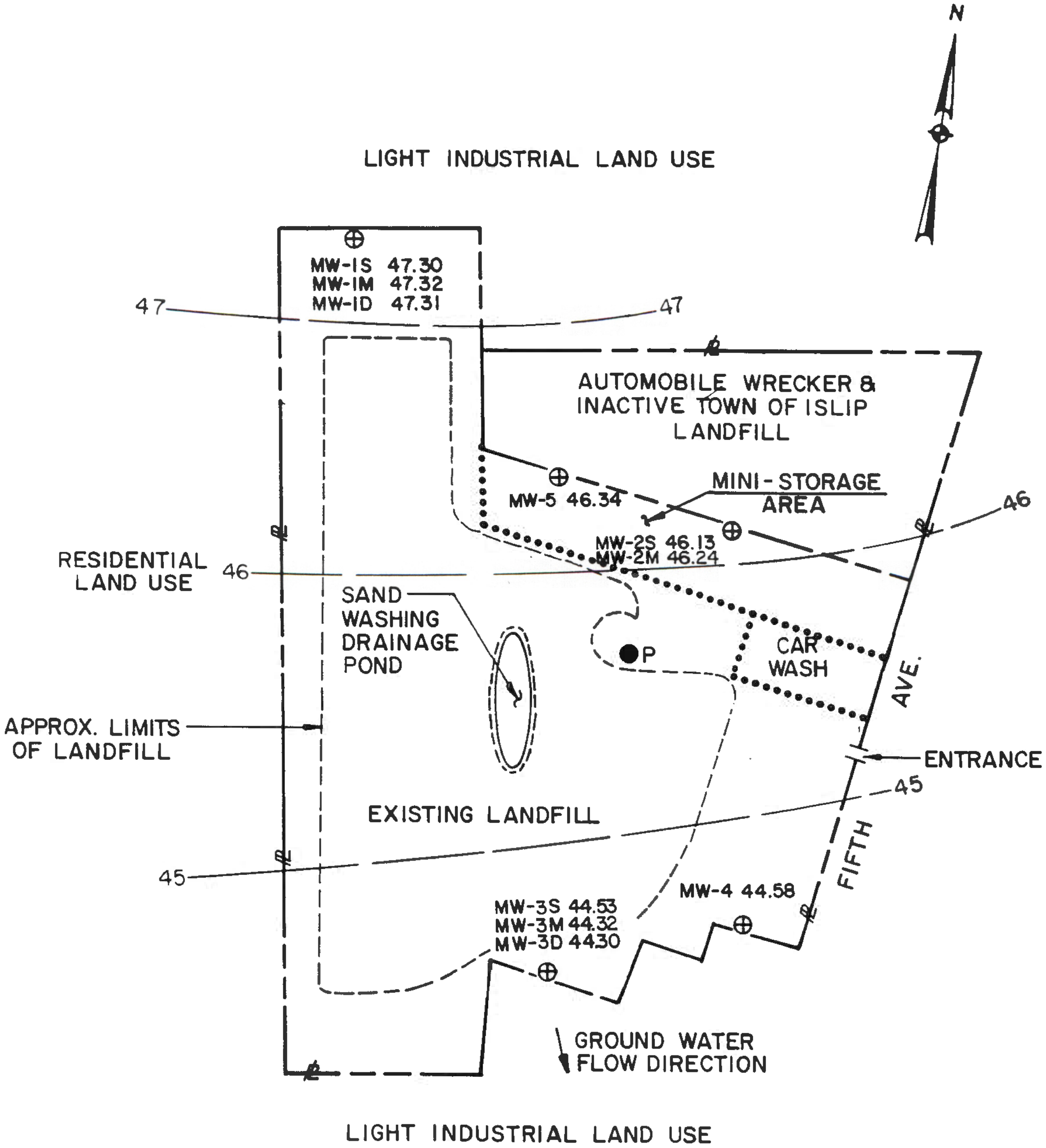
TABLES 2-1(II)

HUBBARD SAND & GRAVEL
PHASE II SUBSURFACE INVESTIGATION

Groundwater Monitoring Well Sampling - May 7, 1991

Monitoring Well #	Elevation at Top of Well Casing (Ft. MSL)	Depth of Water Below Top of Casing (Ft.)	Water Level Elevations Before Purging (Ft. MSL)	Well Purge Volumes Before Sampling (Gals/#Standing Vols.)
MW-1S	74.38	27.08	47.30	7/4X
MW-1M	74.45	27.13	47.32	20/4X
MW-1D	74.43	27.12	47.31	65/4X
MW-2S	71.70	25.57	46.13	8/4X
MW-2M	71.93	25.69	46.24	19/4X
MW-3S	64.91	20.38	44.53	8/4X
MW-3M	64.77	20.45	44.32	21/4X
MW-3D	64.87	20.57	44.30	62/4X
MW-4	68.02	23.44	44.58	20/4X
MW-5	70.71	24.37	46.34	8/4X

NOTE: Shallow, Mid-level and Deep monitoring wells are identified by suffixes S, M and D, respectively.



● P PROCESS WATER WELL FOR SAND WASHING OPERATIONS

⊕ PHASE II MONITORING WELL LOCATIONS AND GROUNDWATER ELEVATIONS (FT. MSL)

—— —— APPROXIMATE WATER TABLE CONTOUR LINES (FT. MSL) (MAY 7, 1991)

SCALE: 1" = 400'

FIGURE 2-1 (II)

LKB JOB #5005-02

GROUNDWATER ELEVATIONS

Chemical Analysis

Complete CLP analytical results of the second round VOC samples are presented in Appendix S (provided under separate cover). Appendices A through R are listed and referenced in Part I of this document. For evaluation purposes, the second round VOC results from each of the 10 wells sampled have been summarized in Table 2-2(II). VOC data from the first sampling round can be found summarized in Table 4.8 of Part I.

A comparison of the two tables shows extremely similar results. Generally, significant concentrations of a few compounds were detected in upgradient samples and a few minor concentrations of the same or different compounds were detected in downgradient samples. Most notably, 1,1,1Trichloroethane (up to 10,000 ug/l at MW-1M) and 1,1-Dichloroethene (370 ug/l at MW-1M) continued to be present in significant quantities upgradient. Most of the second round samples show the presence of Acetone, which did not appear in the first round samples. The highest concentration (4,200 ug/l) was observed upgradient (MW-2M). However, the presence of this compound is felt to be artificial since Acetone was used in the required cleaning procedure of the sampling equipment.

With the exception of Acetone, compounds observed in second round samples from upgradient wells (MW-1S, MW-1M, MW-1D, MW-2S, MW-2M, and MW-5) included:

1,1-Dichloroethene	(370 ug/l MW-1M)
1,1-Dichoroethane	(66 ug/l MW-1S)
	(7 ug/l MW-5)
1,1,1-Trichloroethane	(860 ug/l MW-1S)
	(10,000 ug/l MW-1M)
	(8 ug/l MW-1D)

TABLE 2-2(II)

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

Groundwater Samples
Volatile Organic Analysis

SECOND ROUND - 5/7/91

CLP COMPOUNDS	Contract Required Detection Limit (ug/l)	Sample Locations & Concentrations (ug/l)									
		+ MW-1S	* MW-1M	MW-1D	MW-2S	@ MW-2M	MW-3S	+ MW-3M	MW-3D	+ MW-4	MW-5
Chloromethane	10	-	-	-	-	-	-	-	-	-	-
Bromomethane	10	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride	10	-	-	-	-	-	-	-	-	-	-
Chloroethane	10	-	-	-	-	-	6J	22J	15	-	-
Methylene Chloride	5	-	-	-	-	-	-	-	-	-	-
Acetone	10	-	-	130	26	4200E	120	300	110	880	31
Carbon Disulfide	5	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	5	-	370Y	-	-	-	-	-	-	-	-
1,1-Dichloroethane	5	66	-	-	-	-	-	-	7	-	7
1,2-Dichloroethene (total)	5	-	-	-	-	-	-	-	5	-	-
Chloroform	5	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	5	-	-	-	-	-	-	-	-	-	-
2-Butanone	10	-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane	5	860	10,000E	8	-	-	-	-	-	-	-
Carbon Tetrachloride	5	-	-	-	-	-	-	-	-	-	-
Vinyl Acetate	10	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	5	-	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	5	-	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	5	-	-	-	-	-	-	-	-	-	-
Trichloroethene	5	-	-	-	-	29J	-	-	3J	-	-
Dibromochloromethane	5	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	5	-	-	-	-	-	-	-	-	-	-
Benzene	5	-	-	-	-	-	-	-	1J	-	6
trans-1,3-Dichloropropene	5	-	-	-	-	-	-	-	-	-	-
Bromoform	5	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-Pentanone	10	-	-	-	-	-	-	-	-	-	-
2-Hexanone	10	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	5	-	-	-	-	-	-	-	1J	-	-
1,1,2,2-Tetrachloroethane	5	-	-	-	-	-	-	-	-	-	-
Toluene	5	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	5	-	-	-	-	-	4J	-	-	-	-
Ethylbenzene	5	-	-	-	-	-	-	-	-	-	-
Styrene	5	-	-	-	-	-	-	-	-	-	-
Xylene (total)	5	-	-	-	-	-	-	-	-	-	-
Total		926	10,370	138	26	4229	130	322	142	880	44

+ Detection limits for these samples were elevated by a factor of 5.
* Detection limits for this sample were elevated by a factor of 50.
@ Detection limits for this sample were elevated by a factor of 20.

Notes: 1) Shallow, mid-level and deep sampling points at MW locations are identified by suffixes S, M and D, respectively.
2) Letter suffixes following concentrations are explained in Table 4.1 of Part I.
3) Dash symbol indicates that compound was not detected.

Trichloroethene	(29 ug/l MW-2M)
Benzene	(6 ug/l MW-5)

These same compounds also appeared in first round upgradient samples, although the magnitude of concentrations and specific upgradient wells identified varied. This data substantiates the previous claim that significant concentrations of several compounds are migrating onto the HSGC site from sources further upgradient. One compound (1,2-Dichlorethene) observed previously did not appear in any of the upgradient samples the second time around.

As with the upgradient samples, the downgradient samples (from wells MW-3S MW-3M, MW-3D and MW-4) also exhibited similar trends between the two data sets. Discounting Acetone, the following compounds were detected in second round downgradient samples:

Chloroethane	(6 ug/l MW-3S, 22 ug/l MW-3M, 15 ug/l MW-3D)
1,1-Dichloroethane	(7 ug/l MW-3D)
1,2-Dichlorethene	(5 ug/l MW-3D)
Trichloroethene	(3 ug/l MW-3D)
Benzene	(1 ug/l MW-3D)
Tetrachloroethene	(1 ug/l MW-3D)
Chlorobenzene	(4 ug/l MW-3S)

Of these, only the 1,2-Dichloroethene and Benzene were not detected previously. In addition, previously observed downgradient concentrations of Carbon Disulfide and Toluene were not detected the second time around.

TABLE 2-3(II)

HUBBARD SAND & GRAVEL
PHASE II FIELD INVESTIGATION

QA/QC Samples
Volatile Organic Analysis

SECOND ROUND - 5/7/91

CLP COMPOUNDS	Contract Required Detection Limit (ug/l)	Samples & Concentrations (ug/l) Bailer/Field Blank (5/7/92)	Trip Blank (5/7/91)
Chloromethane	10	-	-
Bromomethane	10	-	-
Vinyl Chloride	10	-	-
Chloroethane	10	-	-
Methylene Chloride	5	-	-
Acetone	10	-	-
Carbon Disulfide	5	-	-
1,1-Dichloroethene	5	-	-
1,1-Dichloroethane	5	-	-
1,2-Dichloroethene (total)	5	-	-
Chloroform	5	-	-
1,2-Dichloroethane	5	-	-
2-Butanone	10	-	-
1,1,1-Trichloroethane	5	-	-
Carbon Tetrachloride	5	-	-
Vinyl Acetate	10	-	-
Bromodichloromethane	5	-	-
1,2-Dichloropropane	5	-	-
cis-1,3-Dichloropropene	5	-	-
Trichloroethene	5	-	-
Dibromochloromethane	5	-	-
1,1,2-Trichloroethane	5	-	-
Benzene	5	-	-
trans-1,3-Dichloropropene	5	-	-
Bromoform	5	-	-
4-Methyl-2-Pentanone	10	-	-
2-Hexanone	10	-	-
Tetrachloroethene	5	-	-
1,1,2,2-Tetrachloroethane	5	-	-
Toluene	5	-	-
Chlorobenzene	5	-	-
Ethylbenzene	5	-	-
Styrene	5	-	-
Xylene (total)	5	-	-

Note: Dash symbol indicates that compound was not detected.

In second round samples, compounds observed solely in downgradient samples included:

Chloroethane	(up to 22 ug/l MW-3M)
1,2-Dichloroethene	(5 ug/l MW-3D)
Tetrachloroethane	(1 ug/l MW-3D)
Chlorobenzene	(4 ug/l MW-3S)

With the exception of Chloroethane, these downgradient concentrations were less than or equal to respective Federal or State drinking water standards. As with first round samples, Chloroethane was detected in concentrations above the drinking water standard which (as explained previously in Part I, Section 4.3.1) is felt to be a transformation product of 1,1,1-Trichloroethane observed in upgradient well samples.

Quality Assurance/Quality Control

Two Quality Assurance//Quality Control (QA/QC) samples were also obtained and analyzed for VOCs. A trip blank sample originated from the analytical laboratory and accompanied the laboratory supplied glassware to and from the site. A Bailer/Field Blank was obtained by collecting distilled water that was poured into a field cleaned bailer. Analytical results, summarized in Table 2-3(II), shows that VOCs were not detected in either of the QA/QC samples.

3.0 Conclusions

In conclusion, based on data from the second round of groundwater sampling of the Phase II Field Investigation, the following can be said:

1) As determined from the first round of sampling, groundwater at the site flows from northwest to southeast.

2) Upgradient and downgradient groundwater water samples showed the presence of some similar volatile organics.

3) A comparison of VOCs present in the first and second rounds of groundwater samples shows extremely similar results.

4) A significant concentration of 1,1,1-Trichloroethane (10,000 ug/l MW-1M) and 1,1-Dichloroethene (370 ug/l MW-1M) in groundwater was noted upgradient but not downgradient.

5) Upgradient and most downgradient concentrations of volatile organics in groundwater exceeded drinking water standards.

6) Concentrations of Chloroethane, 1,2-Dichloroethene, Tetrachloroethane and Chlorobenzene were observed downgradient but not upgradient. The drinking water standards for 1,2-Dichloroethene, Tetrachloroethane and Chlorobenzene were not exceeded. The downgradient presence of Chloroethane in groundwater may reflect the biotransformation of 1,1,1-Trichloroethane observed upgradient.

7) The highest concentration of contaminants were generally observed in the mid-level wells (51 to 56 feet below grade) installed on site.

Additional conclusions pertaining to the entire Phase II Investigation are presented in Part I, Section 6.0 of this document.

APPENDIX A

NYS DEC Inactive Hazardous Waste Disposal Sites Listing

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS WASTE REMEDIATION
INACTIVE HAZARDOUS WASTE DISPOSAL REPORT

CLASSIFICATION CODE: 2a REGION: 1 SITE CODE: 152008
EPA ID: NYD005923677

NAME OF SITE : Hubbard-Wilson Landfill
STREET ADDRESS: 1612 North 5th Avenue
TOWN/CITY: Bay Shore
COUNTY: Suffolk
ZIP: 11706

SITE TYPE: Open Dump- Structure- Lagoon- Landfill-X Treatment Pond-
ESTIMATED SIZE: 19 Acres

SITE OWNER/OPERATOR INFORMATION:
CURRENT OWNER NAME....: Hubbard Sand and Gravel
CURRENT OWNER ADDRESS.: 1612 North 5th Ave., Bay Shore, NY
OWNER(S) DURING USE...: Hubbard Sand & Gravel Corp.
OPERATOR DURING USE...: Hubbard Sand & Gravel Corp.
OPERATOR ADDRESS......: 1612 North 5th Ave., Bay Shore, NY
PERIOD ASSOCIATED WITH HAZARDOUS WASTE: From To

SITE DESCRIPTION:
Site is a private landfill investigated by DEC in August of 1984.
Groundwater samples were taken.
Responsible party Phase II work plan completed.

PRP work will be conducted in 1989. (C&D)site.

HAZARDOUS WASTE DISPOSED: Confirmed- Suspected-X

TYPE	QUANTITY (units)
Unknown	

SITE CODE: 152008

ANALYTICAL DATA AVAILABLE:
Air- Surface Water- Groundwater-X Soil- Sediment-

CONTRAVENTION OF STANDARDS:
Groundwater-X Drinking Water-X Surface Water- Air-

LEGAL ACTION:

TYPE..: Consent Order State- X Federal-
STATUS: Negotiation in Progress- Order Signed- X

REMEDIAL ACTION:

Proposed- Under design- In Progress- Completed-
NATURE OF ACTION:

GEOTECHNICAL INFORMATION:
SOIL TYPE: Sand
GROUNDWATER DEPTH:

ASSESSMENT OF ENVIRONMENTAL PROBLEMS:

Contamination of groundwater.

ASSESSMENT OF HEALTH PROBLEMS:

New York State Department of Environmental Conservation
Division of Hazardous Waste Remediation (DHWR)
Bureau of Hazardous Site Control

SELECTIVES FROM THE OVERSIGHT GUIDANCE

This document provides guidance for the minimum requirements when conducting Division oversight of Phase II investigations of inactive hazardous waste sites.

Part I

General:

1) The consultant's representative must be in the immediate environs of the drill rig at all times during drilling of the well or other soil borings. If he/she is required to leave the site, then operations of the drill rig must cease until he/she returns.

   Two drill rig operators must run the rig at all times when it is in operation. The consultant's representative may not substitute for the chief operator, unless it can be proven that the representative is a certified drill operator.

2) The consultant's representative is required to obtain permits necessary to conduct the Phase II field work. One such written permit or verbal permission should be for the use of a water hydrant for potable water needed in mixing grout or rock drilling. Obtaining permits and locating necessary services and location of underground utility lines must be done by the consultant prior to the arrival of the drill rig on the site.

Specific Chores

1) The consultant's personnel must be on site. (Hydrogeologist/Engineer/Geologist).

2) The drillers must be supervised by the consultant's representative as required by the contract. An up-to-date work plan must be on site, and must be the same as your copy.

3) The reduced geophysical data must be available on site, and must be used to locate the wells, unless that data has been reviewed by Central Office and approved, and agreement has been reached on well location.

APPENDIX B

NYS DEC Phase II Oversight Guidance

4) The number of wells being installed must follow the scope of work. There should not be any variations without written approval from DEC.

5) No drilling fluid is to be used in the ongoing procedure. Only potable water may be introduced into the well. One sample of the water must be obtained from the tank truck, or other water reservoir.

6) If the wells cannot be completed in a single day, proper precautions must be taken to protect the integrity of the well, e.g., steel plates may be used to cover the wells; locks must be installed on the wells before the contractor leaves the site.

7) Safety equipment specified in the contract must be in use.

8) Sampling During Well Drilling

a) The consultant's representative must perform upwind and downwind air monitoring of the site with a HNu, OVA or Photovac. If OVA, multiple readings must be taken with and without a filter for methane. Calibration must be done on site each day prior to use!

b) Equipment must be properly cleaned and/or dedicated. All drilling and sampling equipment (augers, drills, spoons, bailers, etc.), including all PVC well screens and riser pipes, must be brushed, washed with potable water and steam cleaned <u>or</u> washed with Alquinox detergent, rinsed properly with clean potable water, given an acetone wash, then followed with a final hexane wash and air dried. All equipment <u>must</u> be steam cleaned or chemically washed prior to drilling a new well, i.e., before the first well on a site is commenced and thereafter between each well on the same site. All cleaning of equipment is to be done on site unless it is absolutely impossible.

The consultant is <u>required</u> to place all down-hole equipment, instruments and tools in a specially-designated staging area. This staging area can be made of pallets. The purpose is to ensure that all items to be used in the hole are kept off the ground and out of mud and any other material that may potentially contaminate the well.

Use of ground sheets, tarpaulins, or any woven fibrous organic or inorganic mats laid on the ground around the work area is unacceptable. Plastic sheets may be used only if the thickness is great enough to withstand heavy duty work, i.e., the sheet must not be cut through at anytime during its use.

There are times when drilling equipment has to be withdrawn from the hole for various reasons, then re-inserted in the hole. In such instances, the equipment (e.g., auger or rod) may be lowered onto clean plywood or some other item specifically intended for keeping the equipment off the ground and out of mud. If the equipment is to be broken into sections then reassembled and used in the hole, each section must be stored in the specially-designated staging area.

c) When taking split spoon samples, the sample must be placed in the sample container as soon as possible! These samples must be checked for volatiles immediately.

9) During drilling operations and especially well construction, no foreign matter should be introduced into the hole. For example, a tape may be used in measuring the depth of the hole, or length of PVC well casing. It must be demanded of the consultant's representative that the tape be placed in a bucket of clean water after each use to ensure that it is not left lying on the ground. Lubricating grease may not be used on the auger or rods except that vegetable shortening as CRISCO may be allowed.

10) In constructing the wells, at least a 2" layer of medium grade sand must be placed at the bottom of the hole, then followed by the well screen and casing. A grade of sand sufficiently large not to pass the well screen slot size and sufficient to exclude the fines from the natural formations must be placed around the well screen up to a 2 ft. level above the well screen with the use of a TREMIE. Since silicosis could result from worker's exposure to dust in working with sand, the consultant's representative must ensure that inhalation of such dust by the workers does not occur during well construction. Provision of dust masks may be one solution.

Following this, a bentonite seal of at least 5 ft. in thickness must be placed on top of the sand by means of a TREMIE. A seal of a cement-bentonite mixture should then be introduced from the top of the bentonite seal up to grade. This must also be placed with a TREMIE.

The volume of sand pack from the bottom of the hole to the desired 2 ft. above the well screen should be calculated; likewise, the volumes of bentonite pellets and cement/bentonite mix required should be calculated. These will give a reasonable approximation that bridging has not occurred.

11) Only threaded, flush-joint, NSF-approved PVC pipes are to be used as well screens and casings. No PVC glue is to be used!

If DEC personnel is not satisfied with the performance of the sampling staff, make careful notes of the causes, and try to have them rectified. If there is no improvement, you are authorized to shut down the sampling episode.

Part II

A. Sampling should not be allowed under the conditions specified below:

1) High winds

2) Rain

3) Dust clouds

4) Freezing temperatures

B. **Well Sampling**

1) Prior to obtaining a groundwater sample from a well, at least 4 to 10 bore volumes of water must be pumped or bailed from a well of high yielding formation. Conversely, if the yield is low, the well may be purged of all its water, then sampling commenced as soon as the well recovers. The bore is the hole in which the PVC pipe stands and volume is calculated from $(pi)(d^2)(h)/4$, where $pi = 3.14$, d = diameter of borehole and h = height of water column from bottom of the well to the surface of water in the well. Four to ten volumes

are required to minimize turbidity and to ensure that a representative sample from the aquifer of concern is obtained. The turbidity of the well water must be 50 NTU's or less. If greater than 50 NTU's, further development of the well must be carried out.

In pumping the well (bladder pumps only), the pump should not be lowered directly to the bottom of the well, if the transmissivity of the aquifer is high (high water yield in a well), and especially since Phase II wells are screened at the bottom of the casing. If the pumping is done from the bottom of the well, one cannot be certain that the column of water above is being removed; the pumped water could be coming from the aquifer.

The preferred method is to pump or bail the well dry. Other methods are 1) to monitor the water level in the well while pumping or bailing and when the level has "stabilized", most is not all of the water being removed is coming from the aquifer, or 2) to monitor temperature, specific conductance of pH of the water. When these three pieces of data "stabilize", it is probable that little or no water is coming from casing storage. Purging devices may include bailers, above-ground suction pumps and gas displacement pumps, or down-hole bladder pumps.

After purging of the well is completed, sampling is not to be undertaken until the well has recovered, i.e., the water has returned to the level prior to purging, or the known elevation of the water table.

2) i) Since Phase II analysis covers a wide range of analytes (cf.(A)(1) above) in trace quantities, the use of oil-lubricated pumps, tygon and rubber tubing is not allowed in obtaining samples, because of potential contamination or adsorption of samples by the tubing.

Materials that may be used are:

- polyethylene or teflon tubing;
- bladder pumps made of polyethylene or teflon;

- PVC, polyethylene, stainless steel or teflon bailers; and
- suction lift pumps (as peristaltic) but limited to shallow wells of about 25 feet.

Pumps that may <u>not</u> be used especially for organic samples are submersible pumps and air lift or gas displacement pumps, due to potential volatilization and air entrainment of samples.

We require the use of a separate or dedicated bailer for each well. This is not demanded for pumps due to the expenses involved. If dedicated equipment is not planned or evident, then both the inside and exterior of each piece of equipment used in obtaining a sample must be washed with a detergent, rinsed properly with clean, potable water, given an acetone wash, then followed with a final hexane wash and air dried.

Under no circumstances may the rope or string used for lowering equipment into the well be used in another well. Each well must have a dedicated rope.

ii) At least one water sample <u>must</u> be taken from each well. Samples for metal analysis should be fixed through the addition of acid provided by the laboratory. No filtration of any sample is allowed! The samples must be transferred immediately into their shipping bottles and placed in the shipping container. Refrigeration must also be immediate, i.e., ice cubes or frozen packets of "blue ice" should be on site prior to sampling.

If ice cubes are used, it is preferable that the sample bottles are packaged in "Ziploc" or "Baggies" bags to isolate them from meltwater to protect labels.

C. <u>Surface Water Sampling</u>

Samples may be obtained by means of an open-mouth container dipped into the water for a grab sample. If the container is not raised and lowered by a string or handle, the person sampling must ensure that his/her gloved hand remain on the outside of the sampling device. If samples are to be obtained from varying depths, a kemerer sampler or a weighted bottle with a cork may be used. The bottle is lowered to the desired depth then the cork pulled by an attached string, rope or chain.

D. Drum or Tank Sampling

For aqueous or liquid samples, a Composite Liquid Waste Sampler (COLIWASA) should be used. This is usually made of glass or PVC tubing and is constructed by means of a sampling tube of 1-2" i.d. A rod with a stopper large enough to block the 1-2" i.d. sampling tube on one end is pushed through the sampling tube. A T-handle is attached to the other end of the rod for control purposes (The T-bar is optional since rods have been used successfully without this item).

The COLIWASA is lowered into the drum or tank, then the rod pulled up to ensure that the stopper at the other end of the rod has closed the mouth of the larger, sampling tube. The entire system with a representative sample is then taken from the drum or tank, and the sample transferred immediately to a sample container. This is done by inserting the stoppered end into the container then working the stopper loose by pushing on the rod.

A simple glass tube may also be used to obtain samples of viscous liquids from drums or tanks, i.e., if the protected finger is used as a stopper for the upper end and the liquid will not flow out of the opened, lower end when the tube is removed from the drum or tank.

E. Soil or Sediment Sampling

Soil core samples may be obtained by means of an unpainted/untreated trowel or scoop (types used in a home garden), sample trier, soil auger or Veihmeyer sampler.

- Sample trier is usually made from a long tube with a slot extending almost its entire length. Picture a 0.5-1" stainless steel tube split down the longitudinal axis and one half of the split removed. A T-handle is usually constructed on the end containing the remaining whole tube. The lower half-open end and edges are shaped and sharpened to allow the trier to cut a core of material to be sample, when rotated after insertion into the material.

- A soil auger is usually made from a hard metal central shaft and sharpened spiral blades. When the tool is rotated clockwise by its T-handle, it cuts the soil as it moves forward and discharges most of the loose soil upwards. Cutting diameter is about two inches, length about 40 inches which can be extended to 80 inches.

- A Veihmeyer soil sampler resembles a split spoon sampler and has various types of cutting heads for sampling different types of soil. The Veihmeyer sampler carries a weight which is used to drive the end with the cutting edge into the soil. Unlike a split spoon sampler, the Veihmeyer is not opened, but tapped on the side to release the sample into polyethylene tubes or other containers. Sediment cores may be obtained by some of the same methods described above (trowel, scoop, sample trier, PVC tubes or Veihmeyer sampler) but also where necessary, due to water depth or access, a ponar dredge may have to be used.

  A ponar dredge is a clam shell type device which can be lowered through an indefinite depth of water limited by your length of rope and fast currents. The dredge is open mouth facing down and spring loaded so that it closes upon impact with a relatively hard surface.

F. Waste Pile Sampling

Waste piles may be sampled using a trier (see preceding item for description).

General

A. The shipment container must be secured either with a padlock, or wire and lead seal, or taped shut with evidence tape at all access points. Shipping containers must not be left lying around the site or in the back of a vehicle but must be delivered the same day by courier to the laboratory, unless there are facilities for overnight, refrigerated storage at or near the site.

B. Bottles and containers in which the samples will be sent to the laboratory must be inspected for cleanliness.

Oversight_Table

1. Cleaning_Methods:
   (Specify how equipment was cleansed, i.e., whether by steam cleaning or chemically washed. If steam cleaned, use thermometer provided to ensure water temperature is a minimum of 212_F.)

2. All_PVC_Well_Screens_&_Riser_Pipes_Steam_Cleaned_on Site_Prior_to_Use:
   (Both Inside and Outside of all Screens and Pipes must be Cleansed.)

3. Hands_and_Gloves:
   (Drillers hands and gloves must be cleansed of grease and dirt between wells.)

4. Bentonite_Pellets:
   (If above water table, many gallons of potable water to be poured on pellets continuously. Allow minimum of six hours for setting before adding cement/bentonite slurry.)

5. National_Sanitation_Foundation_(NSF)_Approved_PVC_Well Screens_and_Riser_Pipes_as_Indicated_on_the_Pipes:
   (Flush-threaded joints for screens and risers. NO_PVC GLUE_ALLOWED! Plug in bottom of well screen and cap on top of well. Minimum of 3 feet stick-up of riser pipe from grade elevation.)

6. Steel_Pipe_for_Protecting_Well_Inserted_Minimum_of_3_ft._into_Grout_Below_Ground:

7. Cap_and_Padlock._The_Cover_for_the_Steel_Pipe_Must_be Welded_Onto_the_Pipe_and_Not_Attached_by_Screws:

8. Ice_Cubes_On_Site:
   (If "Blue Ice" used, you must hand check each container to ensure that it is solidly frozen. Reject the ones that are soft. A minimum of five packets frozen "Blue Ice" or a greater quantity sufficient to provide adequate cooling must accompany each large cooler back to the laboratory. If this is not met, the sampler must buy ice cubes and pack with the samples. As soon as the samples are taken, they must be packed in the cooler with ice cubes or "Blue Ice". This applies for all samples.)

SELECTIVES FROM THE OVERSIGHT GUIDANCE

Oversight Table

9. Consultant Representative Has a Bucket of Known Capacity for Measuring Total Gallons Bailed:

10. Sheet of Clean Plastic With Hole in Middle and Placed Over Well and on Ground to Ensure Bailer and Rope do Not Contact the Ground:

11. Stream Sampling:
(To ensure good downstream samples, the upstream conditions should be undisturbed. Therefore, stream sampling should begin with the last downstream location, then move upstream.)

12. Soil Sampling:
(Usually a soil sample should be obtained at least 4.5 ft. below the surface.)

13. No Compositing of Samples:
(Compositing of samples is unacceptable for a Phase II-type investigation, unless approved in the workplan.)

14. Icing of Samples:
(Ensure that samples are immediately placed in the coolers and covered with ice cubes.)

15. Abandoned borings should be filled up to grade with a soil-bentonite or equal quality grout.

APPENDIX C

Soil Boring Observations

HUBBARD SAND & GRAVEL

PHASE II FIELD INVESTIGATION

SOIL BORING LOG

SITE: MW-1S

DEPTH* (FT.)	TIP READING (PPM)	OBSERVATIONS
15	0.1	Light brown sand and stone, no odor
25	-	Approximate level of groundwater
31	0.1	Tan & light brown sand, med. grade, no odor, sample collected for laboratory analysis
36**	-	Light brown sand, all grade

* = Depth in feet from grade to top of split spoon sample.
** = Bottom of boring.

HUBBARD SAND & GRAVEL

PHASE II FIELD INVESTIGATION

SOIL BORING OBSERVATIONS

SITE: MW-1M

DEPTH* (FT.)	TIP READING (PPM)	OBSERVATIONS
15	0.1	Tan/brown sand, med. grade, no odor or staining
25	-	Approximate level of groundwater
30	0.0	Light brown sand, fine texture, no odor
50	0.0	Coarse light brown/grey sand, gravel, no odor, sample collected for laboratory analysis
55**	-	-

* = Depth in feet from grade to top of split spoon sample.
** = Bottom of boring.

HUBBARD SAND & GRAVEL

PHASE II FIELD INVESTIGATION

SOIL BORING OBSERVATIONS

SITE: MW-1D

DEPTH* (FT.)	TIP READING (PPM)	OBSERVATIONS
5	0.1	Dark brown, organic, some fine sand, no odor or staining
10	0.1	Tan and brown sand, med. grade, some gravel, no odor, methane = 0.0%
15	0.1	Tan sand, some brown, med. coarse grade, no odor
20	0.2	Tan, grey, brown sand, some orange, med. grade, no odor or staining
25	0.0	light brown, some tan wet sand, med. grade, some gravel, no odor, approximate level of groundwater
30	0.1	Light brown sand, some tan, med. coarse grade, some gravel, no odor
35	0.0	Light brown sand, med-fine grade, no odor
40	0.0	Light brown sand, med-fine grade, no odor
45	0.1	Light brown sand, coarse at bottom med. at top, gravel, no odor
50	0.1	Light brown sand, med. grade, no odor
55	0.1	Light brown sand, med. grade, no odor
60	0.1	Light brown sand, med. grade, no odor
65	0.1	Light brown sand, med. grade, no odor

* = Depth in feet from grade to top of split spoon sample.

HUBBARD SAND & GRAVEL

PHASE II FIELD INVESTIGATION

SOIL BORING OBSERVATIONS

SITE: MW-1D

DEPTH (FT.)	TIP READING (PPM)	OBSERVATIONS
70	0.1	Light brown sand, fine-med. grade, no odor or staining
75	0.0	Light brown sand, fine-med. grade, no odor
80	0.0	Light brown sand, fine-med. grade, no odor
85	0.0	Light brown sand, fine-med. grade, no odor
90	0.0	Light brown sand, fine-med. grade, no odor
95	0.1	Small sample (washed out), light brown sand, no odor
100	0.1	Light brown sand, fine to coarse, no odor or staining
105	0.1	Light brown sand, fine to coarse, no odor or staining
110	0.1	Light brown sand, fine to coarse, no odor or staining
115	0.0	Med. brown, coarse to fine, no odor or staining, some mica
120	0.1	Med. brown, coarse to fine, no odor or staining, some mica
125	0.1	Med. brown, fine to med. texture, no odor or staining some mica. Sample collected for lab analysis.
127	0.1	Med. brown, fine to med. texture, grey silt on bottom
130	0.1	Med-fine textures, layers of grey silt, med. brown & orange sand, no odor or staining

* = Depth in feet from grade to top of split spoon sample.

HUBBARD SAND & GRAVEL

PHASE II FIELD INVESTIGATION

SOIL BORING OBSERVATIONS

SITE: MW-1D

DEPTH* (FT.)	TIP READING (PPM)	OBSERVATION
135	0.1	Med-fine textures, layers of grey silt, med. brown & orange sand, no odor or staining
138	0.1	Med-fine textures, layers of grey silt, med. brown & orange sand, no odor or staining
140	0.1	Med-fine textures, med. brown sand, some layers of grey silt, no odor or staining
142**	0.1	Fine white sand w/black layers

* = Depth in feet from grade to top of split spoon sample.
** = Bottom of boring.

HUBBARD SAND & GRAVEL

PHASE II FIELD INVESTIGATION

SOIL BORING OBSERVATIONS

SITE: MW-2S

DEPTH* (FT.)	TIP READING (PPM)	OBSERVATIONS
15	0.1	Light brown sand, med. grade, no odor or staining
24	-	Approximate level of groundwater
28	0.1	Light brown sand, med-fine grade, no odor, sample collected for laboratory analysis
34**	-	-

* = Depth in feet from grade to top of split spoon sample.
** = Bottom of boring.

HUBBARD SAND & GRAVEL

PHASE II FIELD INVESTIGATION

SOIL BORING OBSERVATIONS

SITE: MW-2M

DEPTH* (FT.)	TIP READING (PPM)	OBSERVATIONS
10	0.1	Light brown/tan sand, med-coarse some gravel, no odor, methane = 0.0%
15	0.0	Light brown sand, fine-med., no odor
20	0.0	Light grey/white sand, fine-med no odor or staining, moist
24	-	Approximate level of groundwater
25	0.1	Light brown sand, med. grade, no odor approx. 22', no odor
30	0.0	Light brown sand, med. grade, no odor or staining
35	0.1	Light brown sand, med. grade, no odor
40	0.0	Light brown sand, med. grade, no odor
45	0.0	Light brown sand, med. grade, no odor
50	0.0	Light brown sand, med. grade, no odor
55	0.0	Light brwon sand, med. grade, no odor, Sample taken for laboratory analysis
60	0.1	Light brown sand, med. grade, no odor or staining
65	0.1	Light brown sand, med. grade, no odor or staining
70	0.1	Light brown sand, med.-coarse grade, no odor

* = Depth in feet from grade to top of split spoon sample.

HUBBARD SAND & GRAVEL

PHASE II FIELD INVESTIGATION

SOIL BORING OBSERVATIONS

SITE: MW-2M

DEPTH* (FT.)	TIP READING (PPM)	OBSERVATIONS
75	0.0	Light brown sand, med. grade, no odor
80	0.1	Light brown sand, some gravel, no odor
85	0.1	Light brown sand, fine-med. grade, no odor
90	0.1	Light brown sand, med-fine grade, no odor or staining
95	0.1	Light brown sand, fine, no odor
100	0.1	Light brown sand, fine-med. grade, no odor
105	0.1	Brown sand, fine, some silt, no odor or staining
110	0.0	Brown sand, med-fine grade, no odor
115	0.0	Brown sand and silt, no odor
117	0.0	Brown silt / clay and sand, no odor
119**	0.0	Silt at top of spoon (6-8"). Brown/green silt/clay, dense, approx. 8" in middle of spoon. Gravel and fine sand at bottom of spoon

* = Depth in feet from grade to top of split spoon sample.
** = Bottom of boring.

HUBBARD SAND & GRAVEL

PHASE II FIELD INVESTIGATION

SOIL BORING OBSERVATIONS

SITE: MW-3S

DEPTH* (FT.)	TIP READING (PPM)	OBSERVATIONS
5	0.5	Light brown, med. sand, no odor or staining
10	0.1	Light brown sand, no odor or staining, Methane reading = 0.0%
15	0.5	Med. brown sand, some fines, no odor or staining
19		Approximate level of groundwater
20	0.1	Light brown sand (Med. to coarse,) no odor or staining
23	0.1	Med. brown sand, no odor or staining, sample collected for laboratory analysis
28**	-	Hit stone, no sample

* = Depth in feet from grade to top of split spoon sample.
** = Bottom of boring

HUBBARD SAND & GRAVEL

PHASE II FIELD INVESTIGATION

SOIL BORING OBSERVATIONS

SITE: MW-3M

DEPTH* (FT.)	TIP READING (PPM)	OBSERVATION
5	0.1	No odor or staining, med. brown sand (fine to coarse) with some gravel
10	0.1	No odor or staining, light brown sand (med. coarse), with stone
15	0.1	Methane 0.0%, light brown sand, all grades with some stones
19	-	Approximate level of groundwater
20	0.1	No odor, light brown sand, all grades, some stone
25	0.1	Grey sand, all grades, some stone, faint indistinguishable odor (leachate?)
30	0.1	Grey sand, all grades, faint indistinguishable odor, no staining
35	0.1	Grey sand, all grades, some indistinguishable odor
40	0.1	Grey sand, all grades, some indistinguishable odor
45	0.1	Grey sand, all grades, some indistinguishable odor, sample collected for laboratory analysis
50**	0.1	Grey sand, all grades with some stones, some indistinguishable odor

* = Depth in feet from grade to top of split spoon sample.
** = Bottom of boring.

HUBBARD SAND & GRAVEL

PHASE II FIELD INVESTIGATION

SOIL BORING OBSERVATIONS

SITE: MW-3D

DEPTH* (FT.)	TIP READING (PPM)	OBSERVATIONS
5	0.1	Light brown sand, some stone, no odor or staining
10	0.1	Light brown sand, some stone, no odor or staining
15	0.2	Methane = 0.0%, light brown sand, no odor or staining
19	-	Approximate level of groundwater
20	0.0	Light brown med. to coarse sand, no odor or staining
25	0.1	Fine to coarse, light brown sand, no odor or staining
30	0.1	Fine-med. grey sand with small stone, no odor or staining
35	0.1	Fine-med. grey sand with small stone & pebbles, no odor or staining
40	0.1	Fine to coarse grey sand with small stone & pebbles, faint undistinguishable odor.
45	0.1	Fine to coarse grey sand with small pebbles, undistinguishable odor
50	0.1	Fine to coarse grey sand with small pebbles, undistinguishable odor
55	0.1	Fine to coarse grey sand with small pebbles, faint undistinguishable odor
60	0.1	Fine-med. grey/brown sand, some small pebbles, no odor

* = Depth in feet from grade to top of split spoon sample.

HUBBBARD SAND & GRAVEL

PHASE II FIELD INVESTIGATION

SOIL BORING OBSERVATIONS

SITE: MW-3D

DEPTH* (FT.)	TIP READING (PPM)	OBSERVATIONS
65	0.1	Fine-med. grey/brown sand, no odor
70	0.1	Fine-med. grey/brown sand, no odor
75	0.1	Fine-med. light grey/brown sand, no odor
80	0.1	Fine-med. light grey/brown sand, no odor
85	0.1	Fine-med. light grey/brown sand, no odor
90	0.1	Fine-med. light grey/brown sand, no odor
95	0.1	Fine-med. light grey/brown sand, no odor
97	0.1	Fine-med. light grey/brown sand, no odor
99	0.1	Fine-med. light grey/brown sand, no odor
101	0.1	Fine-med. light grey/brown sand, no odor
103	0.1	Fine-light grey/brown sand, some greenish grey silty sand on bottom of spoon, no odor
105	0.1	Fine-light grey/brown sand, no odor, no greenish grey sand
107	0.1	Fine grey/brown sand and silt, no odor, some mica, material balls together when pressed, sample collected for laboratory analysis
109	0.1	Fine grey/brown sand and silt, no odor, some mica, material balls together

* = Depth in feet from grade to top of split spoon sample.
** = bottom of boring.

HUBBARD SAND & GRAVEL

PHASE II FIELD INVESTIGATION

SOIL BORING OBSERVATIONS

SITE: MW-3D

DEPTH* (FT.)	TIP READING (PPM)	OBSERVATIONS
111	0.1	Red/brown dense silt/clay at bottom of split spoon (6" thick), greenish brown silt/clay & mica in bottom 1" of spoon
115	0.1	Tan med. sand, no odor, no clay
120	0.1	White sand with some grey silt/clay & mica at bottom
125**	0.1	White sand with layers of lignite

* = Depth in feet from grade to top of split spoon sample.
** = bottom of boring.

HUBBARD SAND & GRAVEL

PHASE II FIELD INVESTIGATION

SOIL BORING OBSERVATIONS

SITE: MW-4

DEPTH* (FT.)	TIP READING (PPM)	OBSERVATION
5	0.1	Tan, coarse sand & stone, no odor or staining,
10	0.7	Tan/white med. coarse sand, no odor or staining, Methane = 0.0%
15	0.2	Tan sand, med. grade, no odor, tip of spoon wet
20	0.1	Light brown sand, med. grade, no odor
21	-	Approximate level of groundwater
25	0.1	Light brown sand, med. grade, no odor
30	0.1	Brown sand, med. grade, no odor
35	0.0	Brown/grey sand, med. grade, no odor or staining
40	0.0	Light brown sand, med. grade, no odor or staining
45	0.1	Light brown sand, med. grade, no odor or staining
50	0.1	Light brown fine-med. sand, no odor
55	0.0	Light brown/grey sand, med. grade, no odor, sample collected for laboratory analysis
60	0.1	Light brown/grey sand, med. grade, no odor

* = Depth in feet from grade to top of split spoon sample.

HUBBARD SAND & GRAVEL

PHASE II FIELD INVESTIGATION

SOIL BORING OBSERVATIONS

SITE: MW -5

DEPTH* (FT.)	TIP READING (PPM)	OBSERVATIONS
5	19.3 (In Auger cuttings)	Auger encounter landfill material, strong creosote type odor, methane = 0.0% TIP in breathing zone = 2.2 ppm TIP downwind = 0.1 ppm Auger cuttings drummed
15	0.9	Brown sand, all grades, some staining, slight solvent type odor
22	-	Approximate level of groundwater
28	1.3	Grey sand, slight creosote & leachate odor, sample collected for laboratory analysis
34**	-	Brown sand, all grades

* = Depth in feet from grade to top of split spoon sample.
** = Bottom of boring.

APPENDIX D

Soil Boring Logs/NYS DEC Well Completion Reports

MW 2 / D

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

County SUFFOLK

Well Number S95004

COMPLETION REPORT—LONG ISLAND WELL

OWNER
HUBBARD SAND + GRAVEL

ADDRESS
16-12 5 AVE BAYSHORE L.I.

LOCATION OF WELL
16-12 5 AVE BAYSHORE L.I.

DEPTH OF WELL BELOW SURFACE 125-0

DEPTH TO GROUNDWATER FROM SURFACE 28-0

CASINGS

DIAMETER 2 in. | in. | in. | in.

LENGTH 117'-0 ft. | ft. | ft. | ft.

SEALING CEMENT - BENTONITE

CASINGS REMOVED

SCREENS

MAKE PVC

OPENINGS .10

DIAMETER 2 in. | in. | in. | in.

LENGTH 10-0 ft. | ft. | ft. | ft.

DEPTH TO TOP FROM TOP OF CASING 117-0

PUMPING TEST

DATE

TEST OR PERMANENT PUMP?

DURATION OF TEST days | hours

MAXIMUM DISCHARGE gallons per min.

STATIC LEVEL PRIOR TO TEST ft. | in. below top of casing

LEVEL DURING MAXIMUM PUMPING | in. below top of casing

MAXIMUM DRAWDOWN ft.

Approximate time of return to normal level after cessation of pumping hours | min.

PUMP INSTALLED

TYPE

MAKE

MODEL NUMBER

MOTIVE POWER

MAKE

H.P.

CAPACITY g.p.m. against | ft. of discharge head

NUMBER OF BOWLS OR STAGES | ft. of total head

DROP LINE

DIAMETER in.

LENGTH ft.

SUCTION LINE

DIAMETER in.

LENGTH ft.

METHOD OF DRILLING
☐ rotary ☐ cable tool ☒ other AUGER

USE OF WATER

WORK STARTED 8/22/89

COMPLETED 8/22/89

DATE 8/22/89

DRILLER

LICENSE NUMBER 1629

*LOG

Ground Surface

EL. ______ ft. above sea

∧ ______ ft.
∨

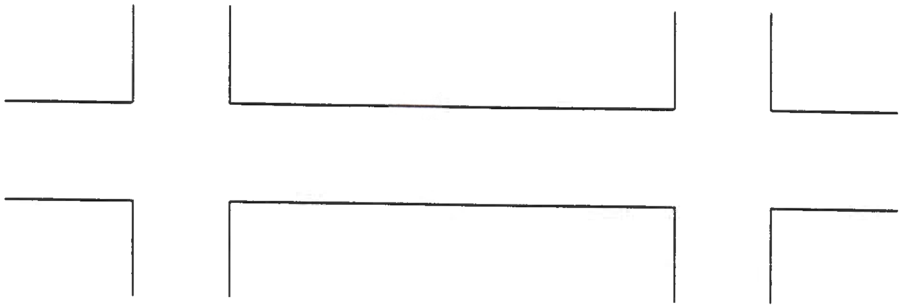
TOP OF WELL

2'-0	LOAM SAND CLAY
20'	LT BR SAND STONES
28-0	S.W.L.
100'	LIGHT BROWN SAND FINE MED CR
125'-0	MED BROWN SAND FINE CR
138'	FINE MED GRAVEL SAND GRAY SILT
142	WHITE SAND LIGNITE

* **NOTE:** Show log of well materials encountered, with depth below ground surface, water bearing beds and water levels in each, casings, screens, pump, additional pumping tests and other matters of interest. Describe repair job. See instructions as to Well Driller's License and Reports. Page 5-7.

DUPLICATE—Retain

SKETCH OF LOCATION



Locate well with respect to at least two streets or roads, showing distance from corner and front of lot.

Show North Point

CHECK THE TOWN IN WHICH THE PROJECT IS LOCATED:

Nassau County:

- ☐ Hempstead
- ☐ North Hempstead
- ☐ Oyster Bay

Suffolk County:

- ☐ Babylon
- ☐ Brookhaven
- ☐ East Hampton
- ☐ Huntington
- ☐ Islip
- ☐ Riverhead
- ☐ Shelter Island
- ☐ Smithtown
- ☐ Southampton
- ☐ Southold

MW-1S

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

County SUFFOLK

Well Number

COMPLETION REPORT—LONG ISLAND WELL

OWNER
HUBBARD SAND & GRAVEL

ADDRESS
16-12 5 AVE BAYSHORE L.I.

LOCATION OF WELL
16-12 5' AVE BAYSHORE L.I.

DEPTH OF WELL BELOW SURFACE 36-0

DEPTH TO GROUNDWATER FROM SURFACE

CASINGS

DIAMETER 2" in.	in.	in.	in.
LENGTH 28-0 ft.	ft.	ft.	ft.

SEALING CEMENT - BENTONITE

CASINGS REMOVED

SCREENS

MAKE PVC

OPENINGS .10

DIAMETER 2" in.	in.	in.	in.
LENGTH 15-0' ft.	ft.	ft.	ft.

DEPTH TO TOP FROM TOP OF CASING 28'-0

PUMPING TEST

DATE

TEST OR PERMANENT PUMP?

DURATION OF TEST days | hours

MAXIMUM DISCHARGE gallons per min.

STATIC LEVEL PRIOR TO TEST ft. | in. below top of casing

LEVEL DURING MAXIMUM PUMPING | in. below top of casing

MAXIMUM DRAWDOWN ft.

Approximate time of return to normal level after cessation of pumping hours | min.

PUMP INSTALLED

TYPE

MAKE

MODEL NUMBER

MOTIVE POWER

MAKE

H.P.

CAPACITY g.p.m. against | ft. of discharge head

NUMBER OF BOWLS OR STAGES | ft. of total head

DROP LINE

DIAMETER in.

LENGTH ft.

SUCTION LINE

DIAMETER in.

LENGTH ft.

METHOD OF DRILLING
☐ rotary ☐ cable tool ☒ other AUGER

USE OF WATER

WORK STARTED 8/21/89

COMPLETED 8/21/89

DATE 9/5/89

DRILLER

LICENSE NUMBER 1629

*LOG

Ground Surface

EL. ____ ft. above sea

^ V ____ ft.

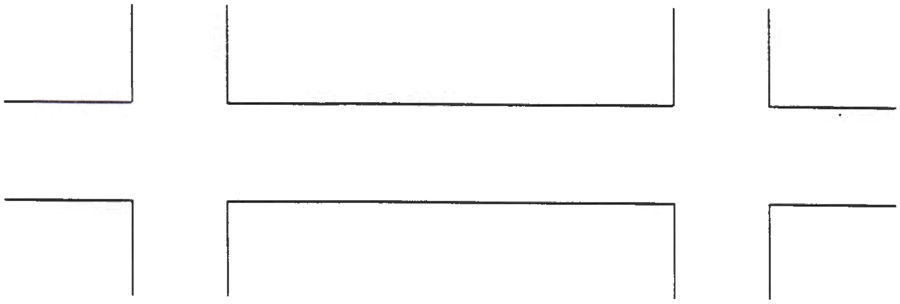
TOP OF WELL

2-0'		LOAM SAND
20		LT BROWN SAND + STONE
28	SWL	F MED CRS
36-0'		BR SAND

* NOTE: Show log of well materials encountered, with depth below ground surface, water bearing beds and water levels in each, casings, screens, pump, additional pumping tests and other matters of interest. Describe repair job. See instructions as to Well Driller's License and Reports. Page 5-7.

DUPLICATE—Retain

SKETCH OF LOCATION



Locate well with respect to at least two streets or roads, showing distance from corner and front of lot.

Show North Point

CHECK THE TOWN IN WHICH THE PROJECT IS LOCATED:

Nassau County:

☐ Hempstead
☐ North Hempstead
☐ Oyster Bay

Suffolk County:

☐ Babylon
☐ Huntington
☐ Shelter Island
☐ Southold
☐ Brookhaven
☐ Islip
☐ Smithtown
☐ East Hampton
☐ Riverhead
☐ Southampton

MW-II
-1M

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

County SUFFOLK

Well Number

COMPLETION REPORT—LONG ISLAND WELL

OWNER
HUBBARD SAND + GRAVEL

ADDRESS
16-12 5 AVE BAYSHORE L.I.

LOCATION OF WELL
16-12 5 AVE BAYSHORE L.I.

DEPTH OF WELL BELOW SURFACE 56-0

DEPTH TO GROUNDWATER FROM SURFACE

CASINGS

DIAMETER 2" in.	in.	in.	in.
LENGTH 48'-0 ft.	ft.	ft.	ft.

SEALING CEMENT - BENONITE

CASINGS REMOVED

SCREENS

MAKE P.V.C.

OPENINGS .10

DIAMETER 2" in.	in.	in.	in.
LENGTH 10'-0 ft.	ft.	ft.	ft.

DEPTH TO TOP FROM TOP OF CASING 48'-0

PUMPING TEST

DATE

TEST OR PERMANENT PUMP?

DURATION OF TEST days | hours

MAXIMUM DISCHARGE gallons per min.

STATIC LEVEL PRIOR TO TEST ft. | in. below top of casing

LEVEL DURING MAXIMUM PUMPING | in. below top of casing

MAXIMUM DRAWDOWN ft.

Approximate time of return to normal level after cessation of pumping hours | min.

PUMP INSTALLED

TYPE

MAKE

MODEL NUMBER

MOTIVE POWER

MAKE

H.P.

CAPACITY g.p.m. against | ft. of discharge head

NUMBER OF BOWLS OR STAGES | ft. of total head

DROP LINE

DIAMETER in.

LENGTH ft.

SUCTION LINE

DIAMETER in.

LENGTH ft.

METHOD OF DRILLING
☐ rotary ☐ cable tool ☐ other AUGER

USE OF WATER

WORK STARTED 8/21

COMPLETED 8/21/89

DATE 9/9/89

DRILLER

LICENSE NUMBER 1629

*LOG

Ground Surface

EL. ______ ft. above sea

Λ
V ______ ft.

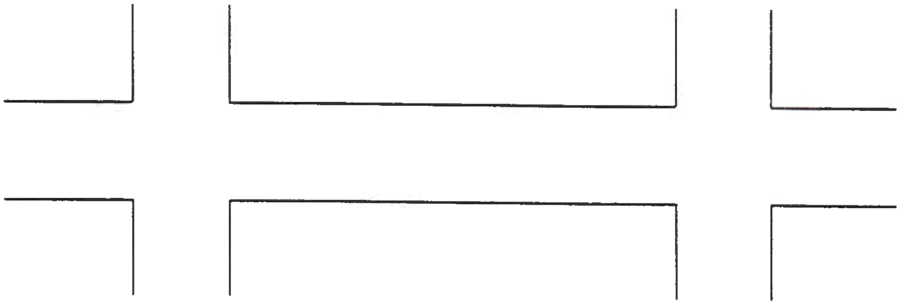
TOP OF WELL

2-0	LOAM SAND CLAY
20'	LT BR SAND + STONES
28'-0	SWL
	LT.BR. SAND FINE MED CR.
56'	

* NOTE: Show log of well materials encountered, with depth below ground surface, water bearing beds and water levels in each, casings, screens, pump, additional pumping tests and other matters of interest. Describe repair job. See instructions as to Well Driller's License and Reports. Page 5-7.

DUPLICATE—Retain

SKETCH OF LOCATION



Locate well with respect to at least two streets or roads, showing distance from corner and front of lot.

Show North Point

CHECK THE TOWN IN WHICH THE PROJECT IS LOCATED:

Nassau County:

☐ Hempstead ☐ North Hempstead ☐ Oyster Bay

Suffolk County:

☐ Babylon ☐ Brookhaven ☐ East Hampton
☐ Huntington ☐ Islip ☐ Riverhead
☐ Shelter Island ☐ Smithtown ☐ Southampton
☐ Southold

MW-2S

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

County SUFFOLK

Well Number

COMPLETION REPORT—LONG ISLAND WELL

OWNER HUBBARD SAND & GRAVEL

ADDRESS HUBBARD SAND & GRAVEL

LOCATION OF WELL 16-12 5 AVE BAYSHORE L.I.

DEPTH OF WELL BELOW SURFACE 34-0

DEPTH TO GROUNDWATER FROM SURFACE 24-0

CASINGS

DIAMETER 2" in. | in. | in. | in.

LENGTH 21'-0 ft. | ft. | ft. | ft.

SEALING CEMENT - BENTONITE

CASINGS REMOVED

SCREENS

MAKE PVC

OPENINGS .10

DIAMETER 2" in. | in. | in. | in.

LENGTH 15'-0 ft. | ft. | ft. | ft.

DEPTH TO TOP FROM TOP OF CASING 21-0

PUMPING TEST

DATE

TEST OR PERMANENT PUMP?

DURATION OF TEST days | hours

MAXIMUM DISCHARGE gallons per min.

STATIC LEVEL PRIOR TO TEST ft. | in. below top of casing

LEVEL DURING MAXIMUM PUMPING | in. below top of casing

MAXIMUM DRAWDOWN ft.

Approximate time of return to normal level after cessation of pumping hours | min.

PUMP INSTALLED

TYPE

MAKE

MODEL NUMBER

MOTIVE POWER

MAKE

H.P.

CAPACITY g.p.m. against | ft. of discharge head

NUMBER OF BOWLS OR STAGES | ft. of total head

DROP LINE

DIAMETER in.

LENGTH ft.

SUCTION LINE

DIAMETER in.

LENGTH ft.

METHOD OF DRILLING ☐ rotary ☐ cable tool ☐ other

USE OF WATER

WORK STARTED 8/23/89

COMPLETED 8/23/89

DATE 8/5/89

DRILLER

LICENSE NUMBER 1629

*NOTE: Show log of well materials encountered, with depth below ground surface, water bearing beds and water levels in each, casings, screens, pump, additional pumping tests and other matters of interest. Describe repair job. See instructions as to Well Driller's License and Reports. Page 5-7.

*LOG

Ground Surface

EL. ft. above sea

∧ ft.
∨

TOP OF WELL

1-0

SAND

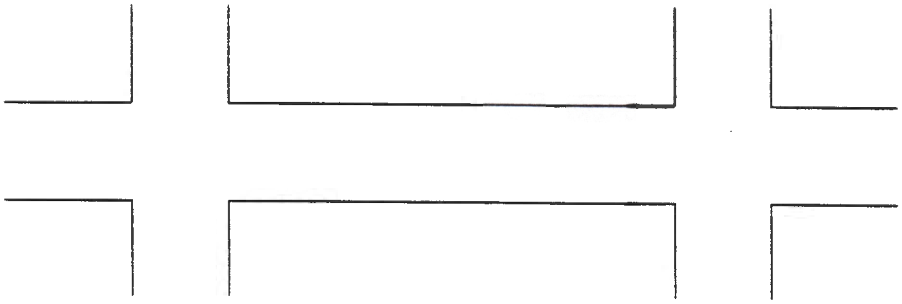
GR & FINE BR SAND

20'-0

34'-0

DUPLICATE—Retain

SKETCH OF LOCATION



Locate well with respect to at least two streets or roads, showing distance from corner and front of lot.

Show North Point

CHECK THE TOWN IN WHICH THE PROJECT IS LOCATED:

Nassau County:

- ☐ Hempstead
- ☐ North Hempstead
- ☐ Oyster Bay

Suffolk County:

- ☐ Babylon
- ☐ Huntington
- ☐ Shelter Island
- ☐ Southold
- ☐ Brookhaven
- ☐ Islip
- ☐ Smithtown
- ☐ East Hampton
- ☐ Riverhead
- ☐ Southampton

MW-2M

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

County SUFFOLK

Well Number S95005

COMPLETION REPORT—LONG ISLAND WELL

OWNER
HUBBARD SAND & GRAVEL

ADDRESS
16-12 5TH AVE BAYSHORE

LOCATION OF WELL
16-12 5 AVE BAYSHORE

DEPTH OF WELL BELOW SURFACE
53-0

DEPTH TO GROUNDWATER FROM SURFACE
24-0

CASINGS

DIAMETER 2" in. | in. | in. | in.

LENGTH 45'-0 ft. | ft. | ft. | ft.

SEALING
CEMENT BENTONITE

CASINGS REMOVED

SCREENS

MAKE
PVC.

OPENINGS
.10

DIAMETER 2" in. | in. | in. | in.

LENGTH 10'-0 ft. | ft. | ft. | ft.

DEPTH TO TOP FROM TOP OF CASING
45'-0

PUMPING TEST

DATE

TEST OR PERMANENT PUMP?

DURATION OF TEST days | hours

MAXIMUM DISCHARGE gallons per min.

STATIC LEVEL PRIOR TO TEST ft. | in. below top of casing

LEVEL DURING MAXIMUM PUMPING | in. below top of casing

MAXIMUM DRAWDOWN ft.

Approximate time of return to normal level after cessation of pumping hours | min.

PUMP INSTALLED

TYPE

MAKE

MODEL NUMBER

MOTIVE POWER

MAKE

H.P.

CAPACITY g.p.m. against | ft. of discharge head

NUMBER OF BOWLS OR STAGES | ft. of total head

DROP LINE

DIAMETER in.

LENGTH ft.

SUCTION LINE

DIAMETER in.

LENGTH ft.

METHOD OF DRILLING
☐ rotary ☐ cable tool ☒ other AUGER

USE OF WATER

WORK STARTED
8/17/89

COMPLETED
8/17/89

DATE
9/5/89

DRILLER

LICENSE NUMBER
1629

*LOG

Ground Surface

EL. ______ ft. above sea

> < ______ ft.

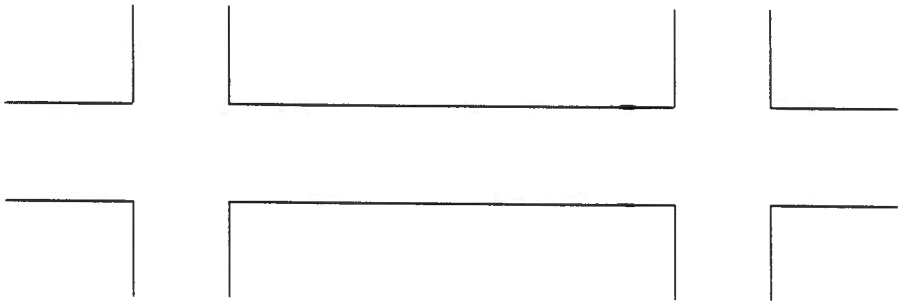
TOP OF WELL

1-0	TOP SOIL
10'-0	LT. BR. SAND CR-MED
15-0	LT BR SAND FI MED
20'-0	GRAY WH SAND FINE
30'	LT BR SAND MED
53'-0	LT BR SAND MED / CR

* NOTE: Show log of well materials encountered, with depth below ground surface, water bearing beds and water levels in each, casings, screens, pump, additional pumping tests and other matters of interest. Describe repair job. See instructions as to Well Driller's License and Reports. Page 5-7.

DUPLICATE—Retain

SKETCH OF LOCATION



Locate well with respect to at least two streets or roads, showing distance from corner and front of lot.

Show North Point

CHECK THE TOWN IN WHICH THE PROJECT IS LOCATED:

Nassau County:

- ☐ Hempstead
- ☐ North Hempstead
- ☐ Oyster Bay

Suffolk County:

- ☐ Babylon
- ☐ Huntington
- ☐ Shelter Island
- ☐ Southold
- ☐ Brookhaven
- ☐ Islip
- ☐ Smithtown
- ☐ East Hampton
- ☐ Riverhead
- ☐ Southampton

MW 3S

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

County SUFFOLK

Well Number S95006

COMPLETION REPORT—LONG ISLAND WELL

OWNER HUBBARD SAND & GRAVEL

ADDRESS 16-12 5' AVE BAYSHORE L.I.

LOCATION OF WELL 16-12 5' AVE BAYSHORE L.I.

DEPTH OF WELL BELOW SURFACE 31-3

DEPTH TO GROUNDWATER FROM SURFACE 21-3

CASINGS

DIAMETER 2" in.	in.	in.	in.
LENGTH 18'3 ft.	ft.	ft.	ft.

SEALING CEMENT - BENTONITE

CASINGS REMOVED

SCREENS

MAKE P.V.C.

OPENINGS .10

DIAMETER 2" in.	in.	in.	in.
LENGTH 15-0 ft.	ft.	ft.	ft.

DEPTH TO TOP FROM TOP OF CASING 18-3

PUMPING TEST

DATE

TEST OR PERMANENT PUMP?

DURATION OF TEST days | hours

MAXIMUM DISCHARGE gallons per min.

STATIC LEVEL PRIOR TO TEST ft. | in. below top of casing

LEVEL DURING MAXIMUM PUMPING | in. below top of casing

MAXIMUM DRAWDOWN ft.

Approximate time of return to normal level after cessation of pumping hours | min.

PUMP INSTALLED

TYPE	MAKE	MODEL NUMBER
MOTIVE POWER	MAKE	H.P.

CAPACITY g.p.m. against | ft. of discharge head

NUMBER OF BOWLS OR STAGES | ft. of total head

DROP LINE	SUCTION LINE
DIAMETER in.	DIAMETER in.
LENGTH ft.	LENGTH ft.

METHOD OF DRILLING ☐ rotary ☐ cable tool ☒ other AUGER

USE OF WATER

WORK STARTED 8/10/89

COMPLETED 8/10/89

DATE 9/5/89

DRILLER Joh Bam

LICENSE NUMBER 1629

*LOG

Ground Surface

EL. ____________ ft. above sea

^ ____________ ft.
v

TOP OF WELL

LT BR SAND & STONES

BROWN SAND

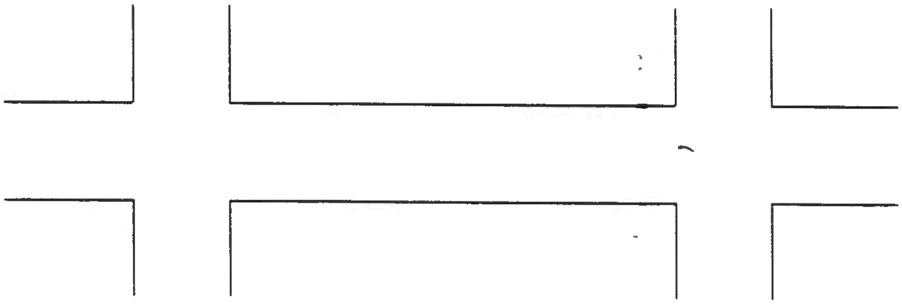
FI
↓
CR

31-3

* NOTE: Show log of well materials encountered, with depth below ground surface, water bearing beds and water levels in each, casings, screens, pump, additional pumping tests and other matters of interest. Describe repair job. See instructions as to Well Driller's License and Reports. Page 5-7.

DUPLICATE—Retain

SKETCH OF LOCATION



Locate well with respect to at least two streets or roads, showing distance from corner and front of lot.

Show North Point

CHECK THE TOWN IN WHICH THE PROJECT IS LOCATED:

Nassau County:

☐ Hempstead
☐ North Hempstead
☐ Oyster Bay

Suffolk County:

☐ Babylon
☐ Huntington
☐ Shelter Island
☐ Southold
☐ Brookhaven
☐ Islip
☐ Smithtown
☐ East Hampton
☐ Riverhead
☐ Southampton

3M

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

County SUFFOLK

Well Number MW-~~3I~~

S95007

COMPLETION REPORT—LONG ISLAND WELL

OWNER
HUBBARD SAND & GRAVEL

ADDRESS
16-12 5 AVE BAYSHORE L.I.

LOCATION OF WELL
16-12 5 AVE BAYSHORE L.I.

DEPTH OF WELL BELOW SURFACE 51-8	DEPTH TO GROUNDWATER FROM SURFACE 21-3

CASINGS

DIAMETER	2" in.	in.	in.	in.
LENGTH	43-8 ft.	ft.	ft.	ft.

SEALING CEMENT-BENTONITE	CASINGS REMOVED

SCREENS

MAKE PVC	OPENINGS .10

DIAMETER	2 in.	in.	in.	in.
LENGTH	10'-0 ft.	ft.	ft.	ft.

DEPTH TO TOP FROM TOP OF CASING
43-8

PUMPING TEST

DATE	TEST OR PERMANENT PUMP?
DURATION OF TEST days | hours	MAXIMUM DISCHARGE gallons per min.
STATIC LEVEL PRIOR TO TEST ft. | in. below top of casing	LEVEL DURING MAXIMUM PUMPING | in. below top of casing
MAXIMUM DRAWDOWN ft.	Approximate time of return to normal level after cessation of pumping hours | min.

PUMP INSTALLED

TYPE	MAKE	MODEL NUMBER
MOTIVE POWER	MAKE	H.P.

CAPACITY
g.p.m. against | ft. of discharge head

NUMBER OF BOWLS OR STAGES
| ft. of total head

DROP LINE	SUCTION LINE
DIAMETER in.	DIAMETER in.
LENGTH ft.	LENGTH ft.
METHOD OF DRILLING ☐ rotary ☐ cable tool ☒ other AUGER	USE OF WATER
WORK STARTED 8/14/89	COMPLETED 8/14/89

DATE 9/5/89	DRILLER	LICENSE NUMBER 1629

* NOTE: Show log of well materials encountered, with depth below ground surface, water bearing beds and water levels in each, casings, screens, pump, additional pumping tests and other matters of interest. Describe repair job. See instructions as to Well Driller's License and Reports. Page 5-7.

*LOG

Ground Surface

EL. ______ ft. above sea

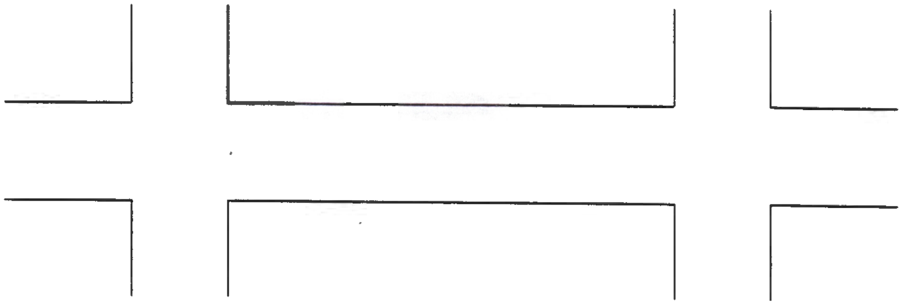
^ ______ ft.
v

TOP OF WELL

5-0	LT BR SAND
30'	BR SAND FI → CR
51'	GRAY SAND & STONES

ORIGINAL—Environmental Conservation Copy

SKETCH OF LOCATION



Locate well with respect to at least two streets or roads, showing distance from corner and front of lot.

Show North Point

CHECK THE TOWN IN WHICH THE PROJECT IS LOCATED:

Nassau County:

☐ Hempstead
☐ North Hempstead
☐ Oyster Bay

Suffolk County:

☐ Babylon
☐ Huntington
☐ Shelter Island
☐ Southold
☐ Brookhaven
☐ Islip
☐ Smithtown
☐ East Hampton
☐ Riverhead
☐ Southampton

MW~3D

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

County SUFFOLK

Well Number 595008

COMPLETION REPORT—LONG ISLAND WELL

OWNER HUBBARD SAND + GRAVEL

ADDRESS 16-12 5 AVE BAYSHORE L.I.

LOCATION OF WELL 16-12 5 AVE BAYSHORE L.I.

DEPTH OF WELL BELOW SURFACE 113-0

DEPTH TO GROUNDWATER FROM SURFACE 21-3

CASINGS

DIAMETER 2 in.	in.	in.	in.
LENGTH 105 ft.	ft.	ft.	ft.

SEALING CEMENT - BENT.

CASINGS REMOVED

SCREENS

MAKE PVC

OPENINGS .10

DIAMETER 2" in.	in.	in.	in.
LENGTH 10'-0 ft.	ft.	ft.	ft.

DEPTH TO TOP FROM TOP OF CASING 105'-0

PUMPING TEST

DATE

TEST OR PERMANENT PUMP?

DURATION OF TEST days | hours

MAXIMUM DISCHARGE gallons per min.

STATIC LEVEL PRIOR TO TEST ft. | in. below top of casing

LEVEL DURING MAXIMUM PUMPING | in. below top of casing

MAXIMUM DRAWDOWN ft.

Approximate time of return to normal level after cessation of pumping hours | min.

PUMP INSTALLED

TYPE	MAKE	MODEL NUMBER
MOTIVE POWER	MAKE	H.P.

CAPACITY g.p.m. against | ft. of discharge head

NUMBER OF BOWLS OR STAGES | ft. of total head

DROP LINE	SUCTION LINE
DIAMETER in.	DIAMETER in.
LENGTH ft.	LENGTH ft.

METHOD OF DRILLING ☐ rotary ☐ cable tool ☒ other AUGER

USE OF WATER

WORK STARTED 8/11/89

COMPLETED 8/11/89

DATE 9/5/89

DRILLER

LICENSE NUMBER 1629

*LOG

Ground Surface

EL. ______ ft. above sea

^ ______ ft.
V

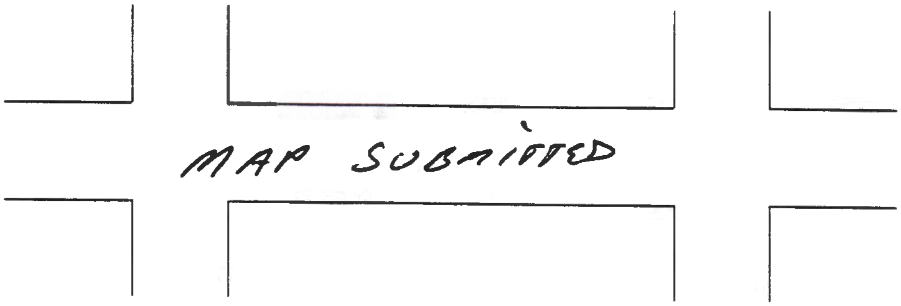
TOP OF WELL

5-0	LT BR SAND + STONES
30'	BR SAND FI CR
60'	GRAY SAND STONE + PEBBLES
105	FI-MED CR BR + GRAY SAND
107	GREEN GRAY SAND
111	GRAY SAND + SILT
115	BR + RED CLAY
120	LT BR SAND
	WHITE SAND GRAY CLAY

* NOTE: Show log of well materials encountered, with depth below ground surface, water bearing beds and water levels in each, casings, screens, pump, additional pumping tests and other matters of interest. Describe repair job. See instructions as to Well Driller's License and Reports. Page 5-7.

ORIGINAL—Environmental Conservation Copy

SKETCH OF LOCATION



MAP SUBMITTED

Locate well with respect to at least two streets or roads, showing distance from corner and front of lot.

Show North Point

CHECK THE TOWN IN WHICH THE PROJECT IS LOCATED:

Nassau County:

- ☐ Hempstead
- ☐ North Hempstead
- ☐ Oyster Bay

Suffolk County:

- ☐ Babylon
- ☐ Huntington
- ☐ Shelter Island
- ☐ Southold
- ☐ Brookhaven
- ☐ Islip
- ☐ Smithtown
- ☐ East Hampton
- ☐ Riverhead
- ☐ Southampton

MW-4

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

County SUFFOLK

Well Number S 95009

COMPLETION REPORT—LONG ISLAND WELL

OWNER
HUBBARD SAND & GRAVEL

ADDRESS
16-12 5 AVE BAYSHORE L.I.

LOCATION OF WELL
16-12 5 AVE BAYSHORE L.I.

DEPTH OF WELL BELOW SURFACE 53-1	DEPTH TO GROUNDWATER FROM SURFACE 23-0

CASINGS

DIAMETER	2 in.	in.	in.	in.
LENGTH	45-1 ft.	ft.	ft.	ft.

SEALING CEMENT - BENTONITE	CASINGS REMOVED

SCREENS

MAKE P.V.C.	OPENINGS .10

DIAMETER	2" in.	in.	in.	in.
LENGTH	10-0 ft.	ft.	ft.	ft.

DEPTH TO TOP FROM TOP OF CASING
45-1

PUMPING TEST

DATE	TEST OR PERMANENT PUMP?
DURATION OF TEST days | hours	MAXIMUM DISCHARGE gallons per min.
STATIC LEVEL PRIOR TO TEST ft. | in. below top of casing	LEVEL DURING MAXIMUM PUMPING | in. below top of casing
MAXIMUM DRAWDOWN ft.	Approximate time of return to normal level after cessation of pumping hours | min.

PUMP INSTALLED

TYPE	MAKE	MODEL NUMBER
MOTIVE POWER	MAKE	H.P.

CAPACITY
g.p.m. against | ft. of discharge head

NUMBER OF BOWLS OR STAGES
| ft. of total head

DROP LINE	SUCTION LINE
DIAMETER in.	DIAMETER in.
LENGTH ft.	LENGTH ft.
METHOD OF DRILLING ☐ rotary ☐ cable tool ☒ other AUGER	USE OF WATER
WORK STARTED 8/17/89	COMPLETED 8/17/89

DATE 9/5/89	DRILLER	LICENSE NUMBER 1629

* NOTE: Show log of well materials encountered, with depth below ground surface, water bearing beds and water levels in each, casings, screens, pump, additional pumping tests and other matters of interest. Describe repair job. See instructions as to Well Driller's License and Reports. Page 5-7.

*LOG

Ground Surface

EL. ______ ft. above sea

∧ ______ ft.
∨

TOP OF WELL

5-0

10'

LT BR SAND ME ↓ CR.

LT

30'

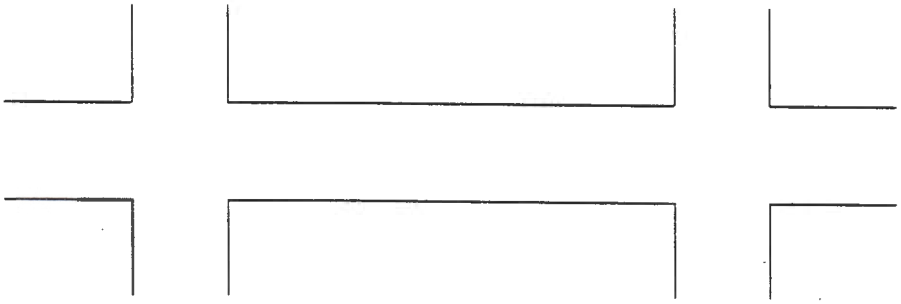
BROWN & GRAY SAND FI ↓ CR.

BROWN & GRAY SAND [illegible] SAND

53

DUPLICATE—Retain

SKETCH OF LOCATION



Locate well with respect to at least two streets or roads, showing distance from corner and front of lot.

Show North Point

CHECK THE TOWN IN WHICH THE PROJECT IS LOCATED:

Nassau County:

☐ Hempstead
☐ North Hempstead
☐ Oyster Bay

Suffolk County:

☐ Babylon
☐ Huntington
☐ Shelter Island
☐ Southold
☐ Brookhaven
☐ Islip
☐ Smithtown
☐ East Hampton
☐ Riverhead
☐ Southampton

MW~2A
5

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

County SUFFOLK

Well Number

COMPLETION REPORT—LONG ISLAND WELL

OWNER HUBBARD SAND + GRAVEL

ADDRESS 16-12 5 AVE BAYSHORE L.I.

LOCATION OF WELL 16-12 5 AVE BAYSHORE L.I.

DEPTH OF WELL BELOW SURFACE 34-0

DEPTH TO GROUNDWATER FROM SURFACE 24-0

CASINGS

DIAMETER 2" in.	in.	in.	in.
LENGTH 19' ft.	ft.	ft.	ft.

SEALING CEMENT-BENTONITE

CASINGS REMOVED

SCREENS

MAKE P.V.C.

OPENINGS .10

DIAMETER 2" in.	in.	in.	in.
LENGTH 15-0' ft.	ft.	ft.	ft.

DEPTH TO TOP FROM TOP OF CASING 19'-0

PUMPING TEST

DATE

TEST OR PERMANENT PUMP?

DURATION OF TEST days | hours

MAXIMUM DISCHARGE gallons per min.

STATIC LEVEL PRIOR TO TEST ft. | in. below top of casing

LEVEL DURING MAXIMUM PUMPING | in. below top of casing

MAXIMUM DRAWDOWN ft.

Approximate time of return to normal level after cessation of pumping hours | min.

PUMP INSTALLED

TYPE

MAKE

MODEL NUMBER

MOTIVE POWER

MAKE

H.P.

CAPACITY g.p.m. against | ft. of discharge head

NUMBER OF BOWLS OR STAGES | ft. of total head

DROP LINE

DIAMETER in.

LENGTH ft.

SUCTION LINE

DIAMETER in.

LENGTH ft.

METHOD OF DRILLING ☐ rotary ☐ cable tool ☒ other AUGER

USE OF WATER

WORK STARTED 8/23/89

COMPLETED 8/23/89

DATE 9/5/89

DRILLER

LICENSE NUMBER 1629

*LOG

Ground Surface

EL. ____ ft. above sea

Λ
V ____ ft.

TOP OF WELL

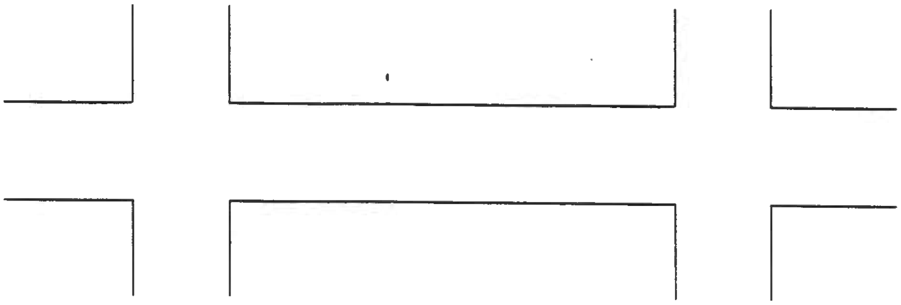
1'-0	SAND
8'-0	MIXED GARBAGE CAR PARTS HOUSEHOLD
20'	BR SAND MED ↓ CR
34'	LT BR SAND MED ↓ CR.

STRONG CREOSOTE ODOR

* NOTE: Show log of well materials encountered, with depth below ground surface, water bearing beds and water levels in each, casings, screens, pump, additional pumping tests and other matters of interest. Describe repair job. See instructions as to Well Driller's License and Reports. Page 5-7.

DUPLICATE—Retain

SKETCH OF LOCATION



Locate well with respect to at least two streets or roads, showing distance from corner and front of lot.

Show North Point

CHECK THE TOWN IN WHICH THE PROJECT IS LOCATED:

Nassau County:

☐ Hempstead
☐ North Hempstead
☐ Oyster Bay

Suffolk County:

☐ Babylon
☐ Brookhaven
☐ East Hampton
☐ Huntington
☐ Islip
☐ Riverhead
☐ Shelter Island
☐ Smithtown
☐ Southampton
☐ Southold

APPENDIX E

CAA Laboratory Letter Explaining Features of Analysis

Cambridge Analytical Associates
1106 Commonwealth Avenue / Boston, Massachusetts 02215 / (617) 232-2207

November 8, 1989

Mr. Andrew Speiser
Kockwood, Kessler & Bartlett, Inc.
One Aerial Way
Syosset, NY 11791

Re: Sample Analysis Data for Hubbard Sand & Gravel Site.

Dear Mr. Speiser:

Enclosed please find four packages of analytical data for the Hubbard site. The packages are divided into the soil and water sampling rounds, and each round is divided into organics and inorganics packages. The soil samples were received on August 9, 10, 14, 15, 16, 17, 21, 22 and 23, 1989. A few water samples consisting of trip and field blanks were received with the soils, and are reported with the soils. The soil samples were assigned CAA work order numbers 89-08-246 and 89-08-419. The water samples were received on September 6 and 7, 1989, and are assigned CAA work order numbers 89-09-098 and 89-09-108. All sample analyses were performed by EPA Contract Laboratory Program (CLP) protocols.

The following notes apply to the semivolatile organics analyses. Sample MW-4 (8909098-10) was reextracted due to low surrogate standard recovery (one acid <10%). The second analysis showed acceptable recovery for all surrogates (although one acid recovery was at 10%). This indicates a lab-related problem with the first extraction. Only the second extraction and analysis is reported in the data package. There were no other unusual problems with the semivolatile analyses.

The volatile organic analyses for samples MW-1D(125) (CAA # 8908419-03) and SS-1 (8908419-06) were repeated due to low recovery of internal standards in the initial analysis. The second analysis for SS-1 also had low internal standard recoveries, confirming the problem was related to the sample matrix. The second analysis for MW-1D(125) however had acceptable internal standard recoveries, indicating a lab-related problem with the initial analysis. For both samples, the initial and the second analysis are reported. The VOA vial for sample MW-3S(23) (CAA # 8908246-01) was broken, and a split sample was taken from the bottle used for the semivolatiles sample. The analysis of this sample detected a high concentration of acetone, which most likely was due to contamination from the semivolatiles extraction laboratory. We do not feel this level of acetone is native to this sample. Low levels of methylene chloride and chloroform present in a number of soil samples are most likely due to airborne laboratory contamination. There were no other unusual problems encountered during volatiles analyses.

The matrix spike analyses performed for the pesticide compounds in the soil samples showed inconsistent percent recoveries (one compound high and one compound low out of 6 compounds), but consistent relative percent differences. This is fairly common for soil samples, and indicates a slight matrix effect with this sample. The matrix spike analyses for the water sample showed both inconsistent recovery and relative percent difference on a number of compounds. This indicates a more variable difficulty with pesticides analysis for this sample. We don't feel there are major matrix effects with these samples as the surrogate standard recoveries are generally well within acceptance criteria. There were no other unusual problems encountered with the pesticide analyses.

Due to a laboratory mistake, the cyanide analysis for the soil sample MW-2(55) (CAA # 8908246-07) was analyzed 20 days outside of holding times. The value reported for this sample should be considered as an estimate. There were no other unusual problems encountered during metals or cyanide analyses.

Should you have any questions or require additional information, please do not hesitate to call me.

Sincerely,

Edward A Lawler

Edward A. Lawler
Project Manager

APPENDIX F

Gardiners Clay Soil Analysis

LES SIRKIN
Consulting Geologist

61 Kensington Rd
Garden City, NY 11530

Andrew B. Speiser
Lockwood, Kessler & Bartlett, Inc.
One Aerial Way
Syosset, NY 11791

Dear Mr. Speiser:

I have processed and analyzed the four samples (MW-1,2,3 and 4) that you sent to me. The samples were each evaluated for mineralogy, marine fossils (invertebrate shells, foraminifera tests), diatoms, and pollen and spores. The results are as follows.

Sample MW-1, 126'. This sample is composed mainly of light brown to gray, fine sand with silt, granules and minor clay. Sand grains are subangular in shape, and there are angular silt shards and some oxide stain. The sand is predominantly (more than 99%) quartz with less than 0.5% muscovite mica and traces of chlorite, hornblende, garnet, tourmaline, glassy and vesicular grains, and a trace of unidentified grains. Granules include vein quartz and granite or granite gneiss. No shells, shell fragments, foraminifera tests or diatoms were observed, and only two pollen grains, one each of oak and birch were counted.

Age and Origin: The results of the analyses suggest that this sample is not marine in origin. The angularity of the mineral grains as well as their fresh appearance indicate a terrestrial origin, perhaps from fluvial or glaciofluvial environments. The appearance and type of pollen indicates a Pleistocene age.

Sample MW-2, 119'. This sample is mineralogically similar to MW-1 but more light brown in color and with a silt-clay matrix. Granules have an oxide stain. There are abundant clay-bonded masses of silt and a trace of hornblende and biotite. No shells, diatoms or pollen were seen.

Age and Origin: similar to MW-1.

Sample Mw-3, 111'. This sample is made up of subangular sand and angular silt shards. It is light brown and has a trace of chlorite, hornblende, muscovite and garnet. No shells, tests, diatoms or pollen were found.

Age and origin: As above.

Sample MW-4, 118'. This sample is also light brown, and it has subangular to subrounded silt and sand in a silt-clay matrix. Oxide coatings and partings are common. Only a trace of mica was noted. While shells, tests and diatoms were not found, sufficient pollen were concentrated for analysis. The dominant pollen in this sample are spruce, pine, including small-sized pine, and birch. Several fern and Sphagnum spores were also counted.

Age and origin: The pollen assemblage indicates a boreal-type forest and associated shrubs that existed during a cool to cold climatic event. The spores suggest wet ground to fresh water bog conditions locally. This evidence suggests a cold postglacial or preglacial environment; possibly late Pleistocene in age.

Discussion:

The evidence derived from the four samples does not support a depositional equivalence with the marine, interglacial "Gardiner's Clay". None of the characteristic marine fossils or mineral species were seen. The angularity of the mineral grains is not necessarily a feature of a fine-grained marine deposit. In fact, these features, or lack of, indicate a terrestrial origin for the samples, which were probably deposited in a fresh water wetland during a pre- or postglacial environment. Deposition may have been during the late Pleistocene, prior to the last glaciation, before or after a preceding glaciation, and into a local wetland. The mineral content may have been derived from outwash deposits.

If you would like to discuss this evaluation please call.

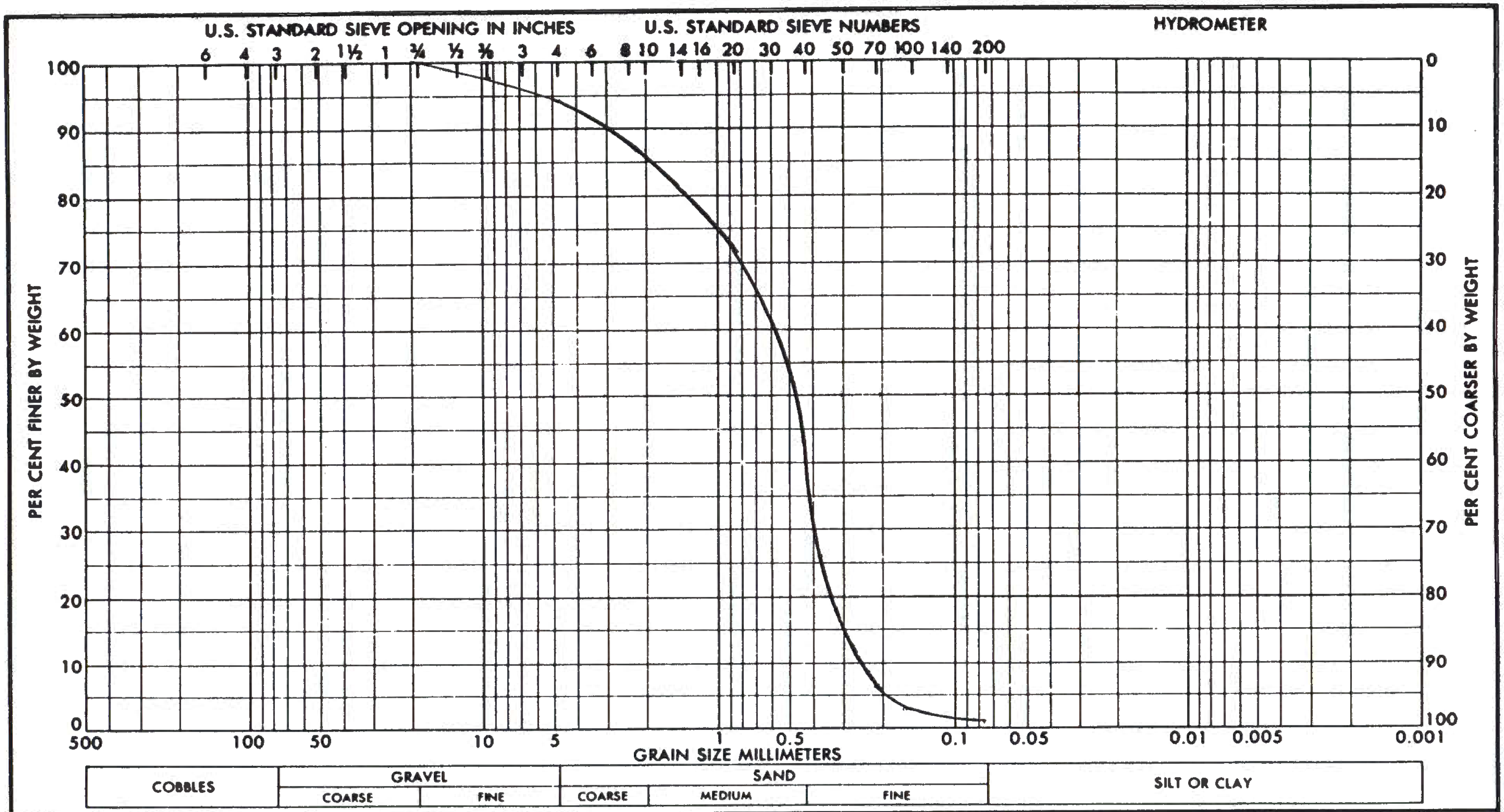
Yours truly,

Les Sirkin

Encl.: Statement

APPENDIX G

Soil Sample Grain Size Analysis



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	50'	Brown f/c SAND trace gravel				

GRADATION CURVES

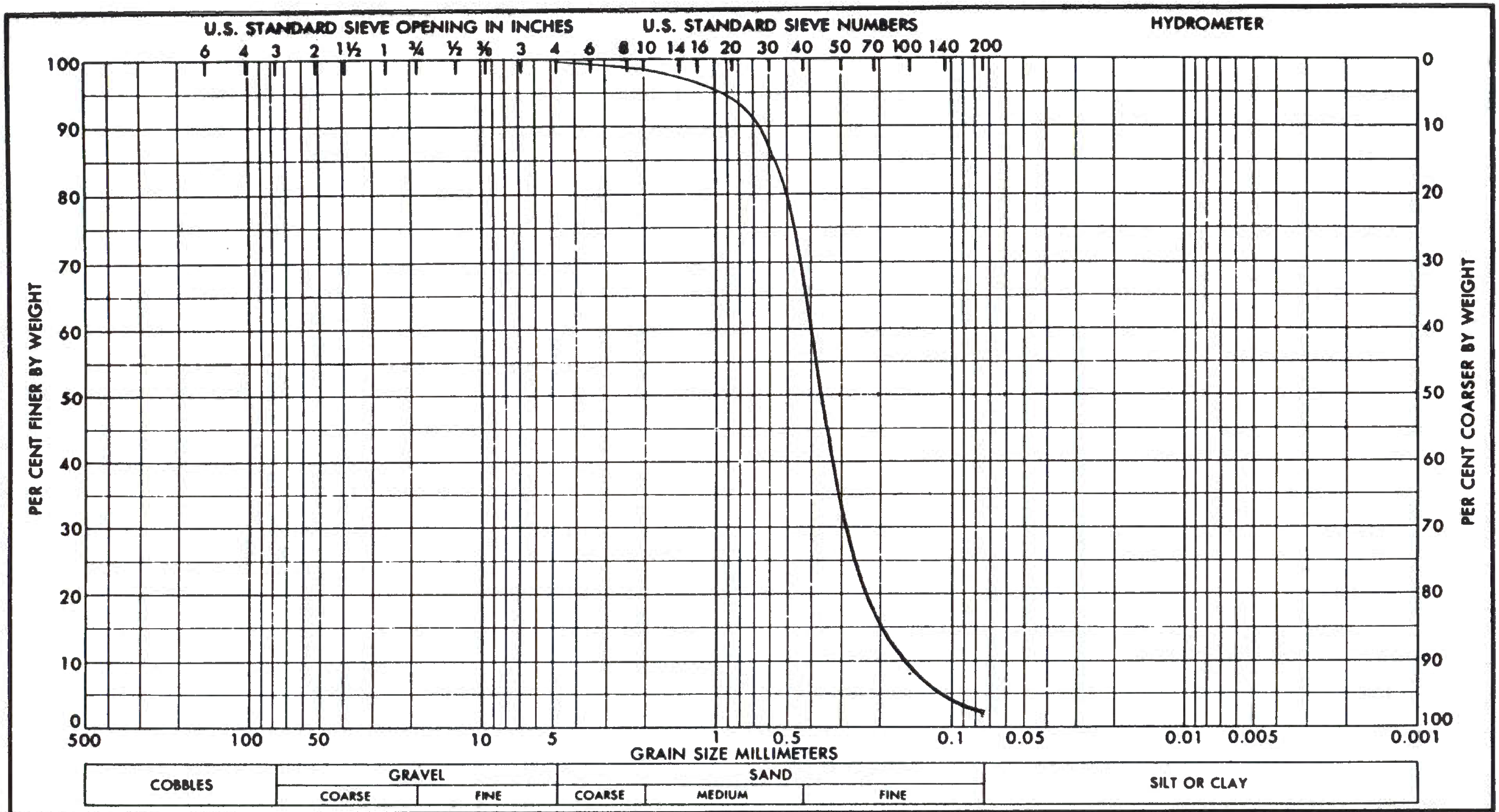
PROJECT LKB - # 5505-02

AREA

BORING NO. MW -2

DATE 4/13/90

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	105	Brown f/m SAND	23.0			
		trace silt				

PROJECT LKB - # 5505-02

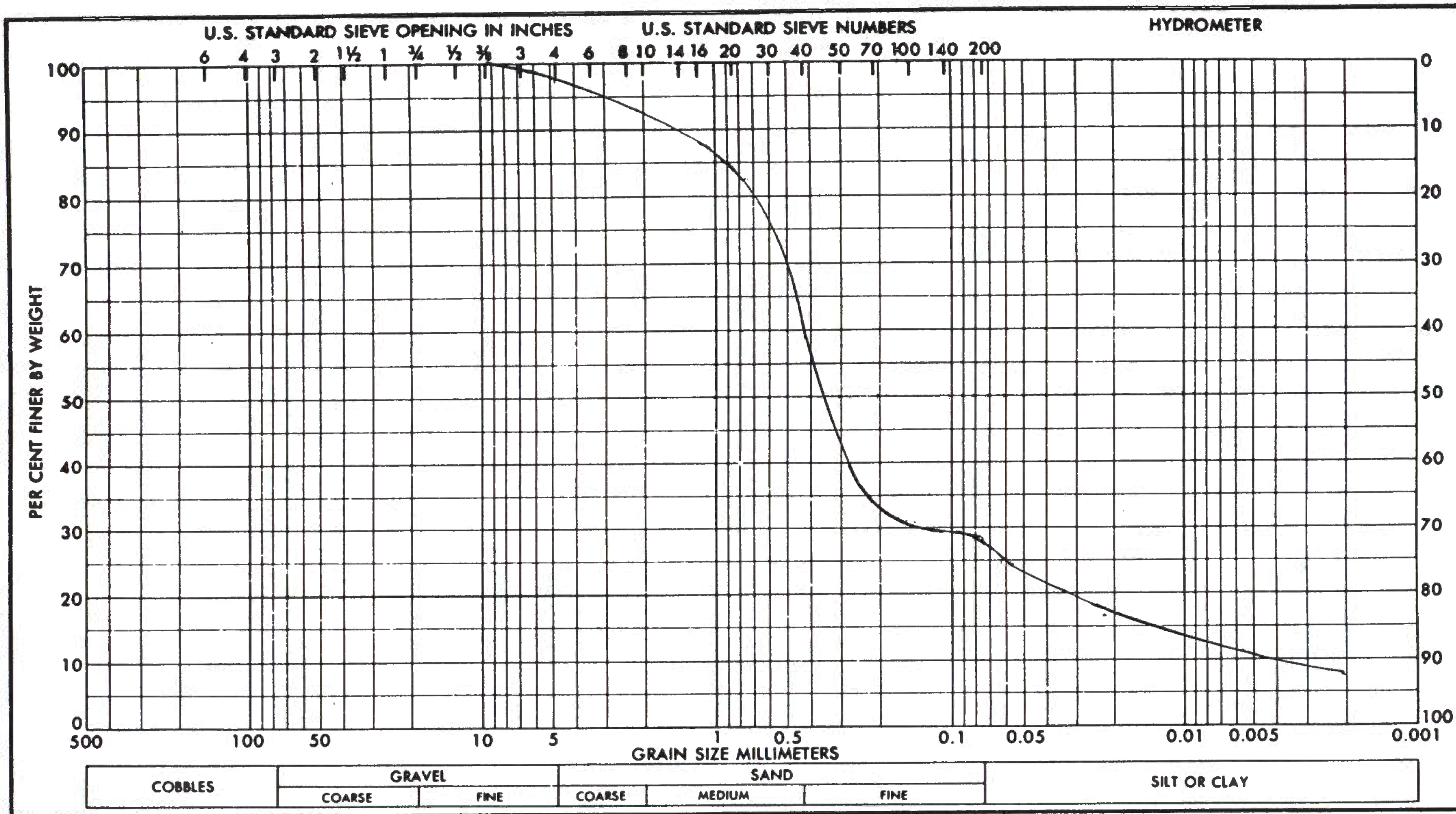
AREA

BORING NO. MW - 2

DATE 4/13/90

GRADATION CURVES

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	119'	Brown f/c SAND some silt trace fine gravel and clay	13.5			

PROJECT LKB # 5505-02

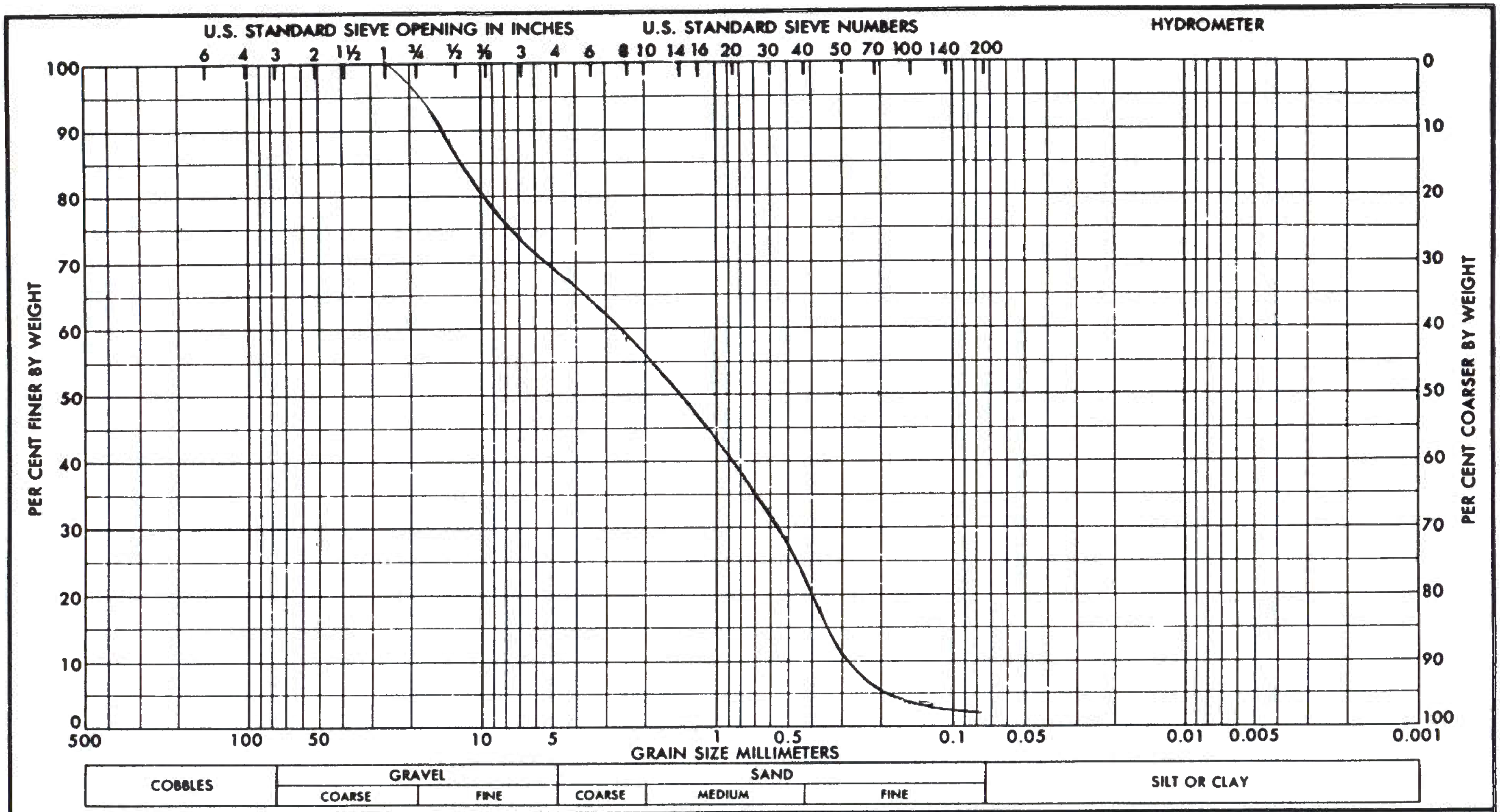
AREA

BORING NO. MW - 2

DATE 4/13/90

GRADATION CURVES

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	10'	Brown f/c SAND some gravel trace silt				

GRADATION CURVES

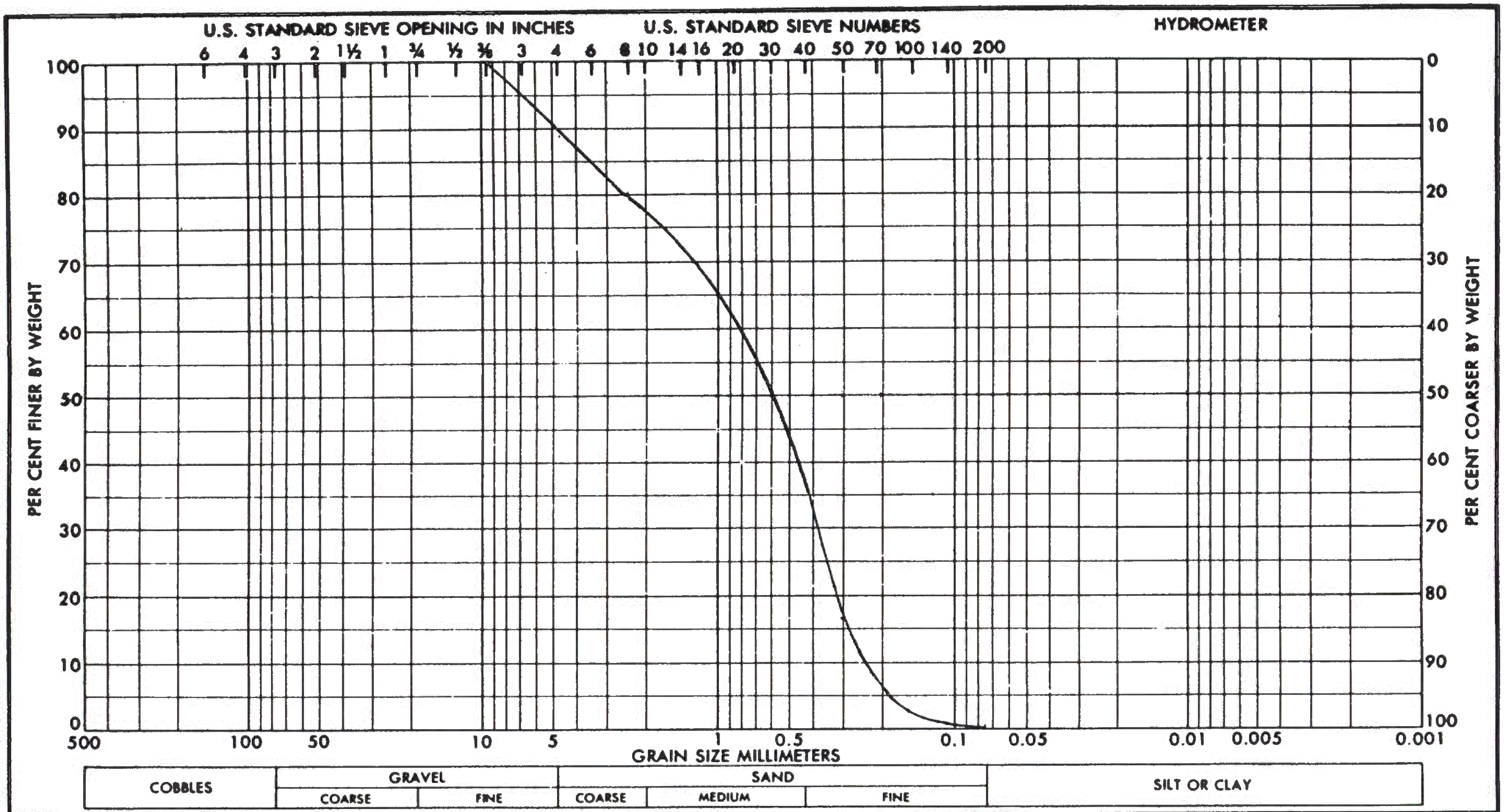
PROJECT LKB # 5505-02

AREA

BORING NO. MW -3

DATE 4/13/90

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	30'	Brown f/c SAND little gravel	15.3			

PROJECT LKB # 5505-02

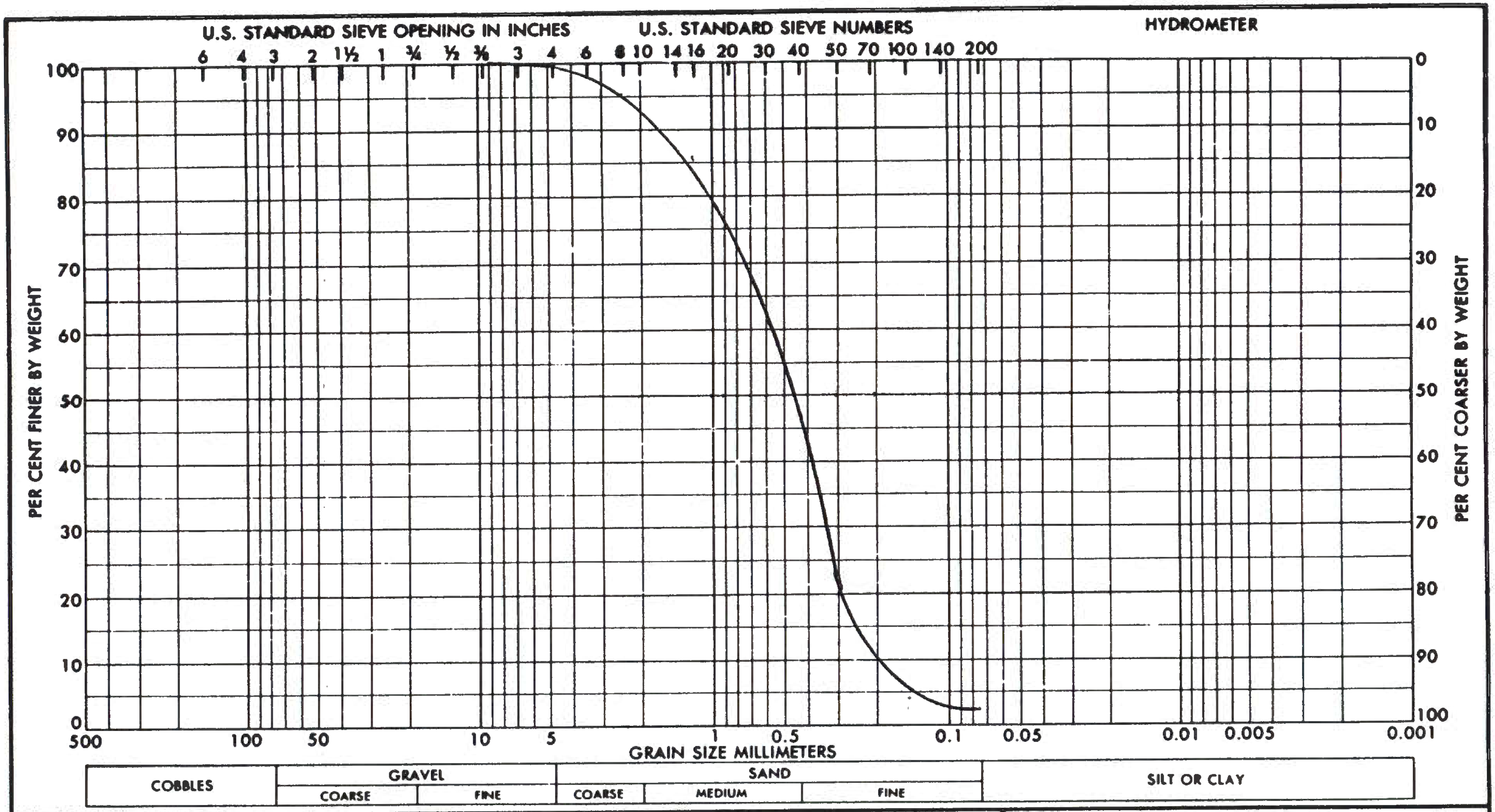
AREA

BORING NO. MW - 3

DATE 4/13/90

GRADATION CURVES

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	50'	Brown f/m SAND trace silt				

PROJECT LKB # 5505-02

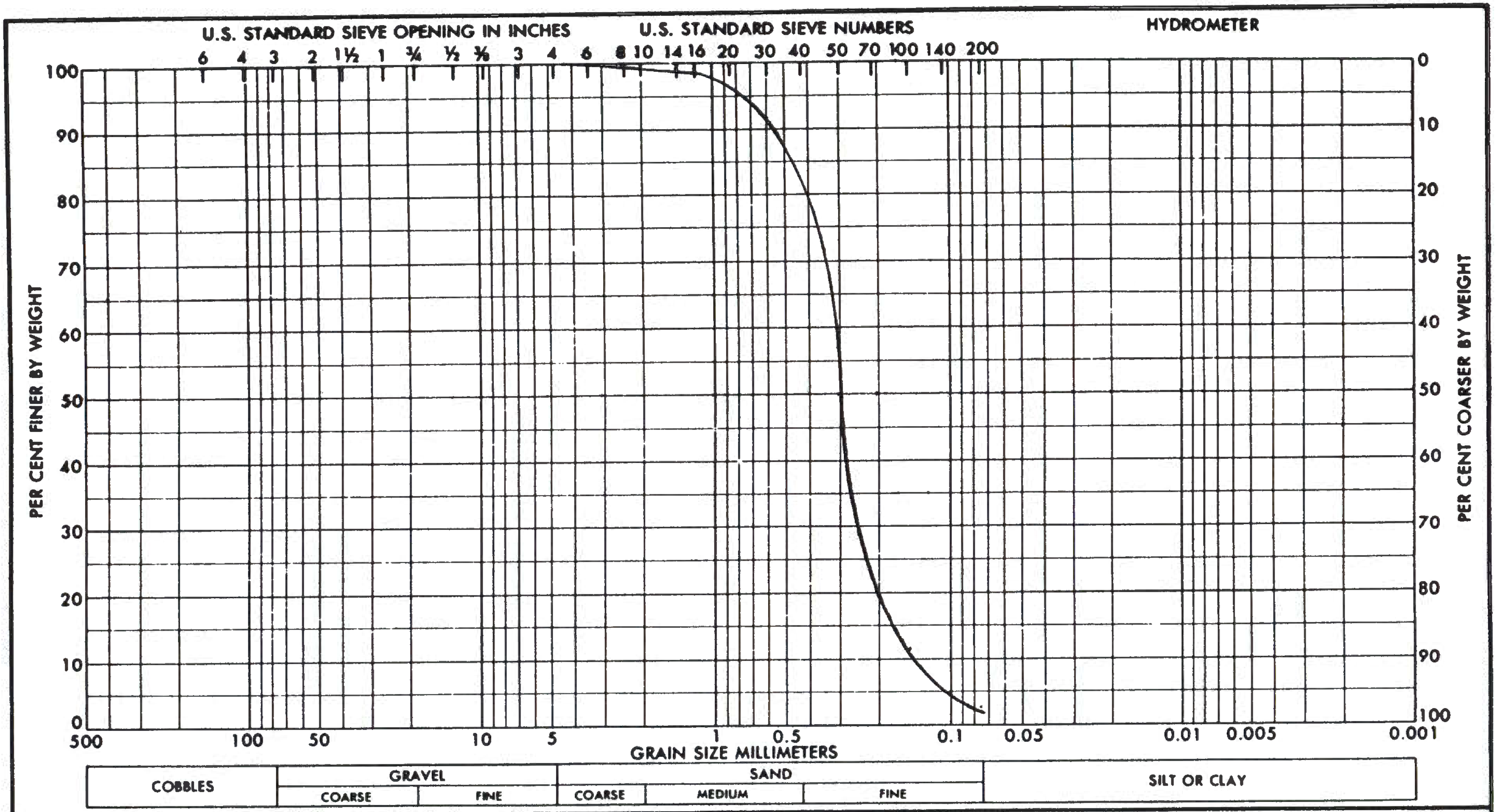
AREA

BORING NO. MW -3

DATE 4/13/90

GRADATION CURVES

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	103'	Brown f/m SAND	21.0			
		trace silt				

PROJECT LKB # 5505-02

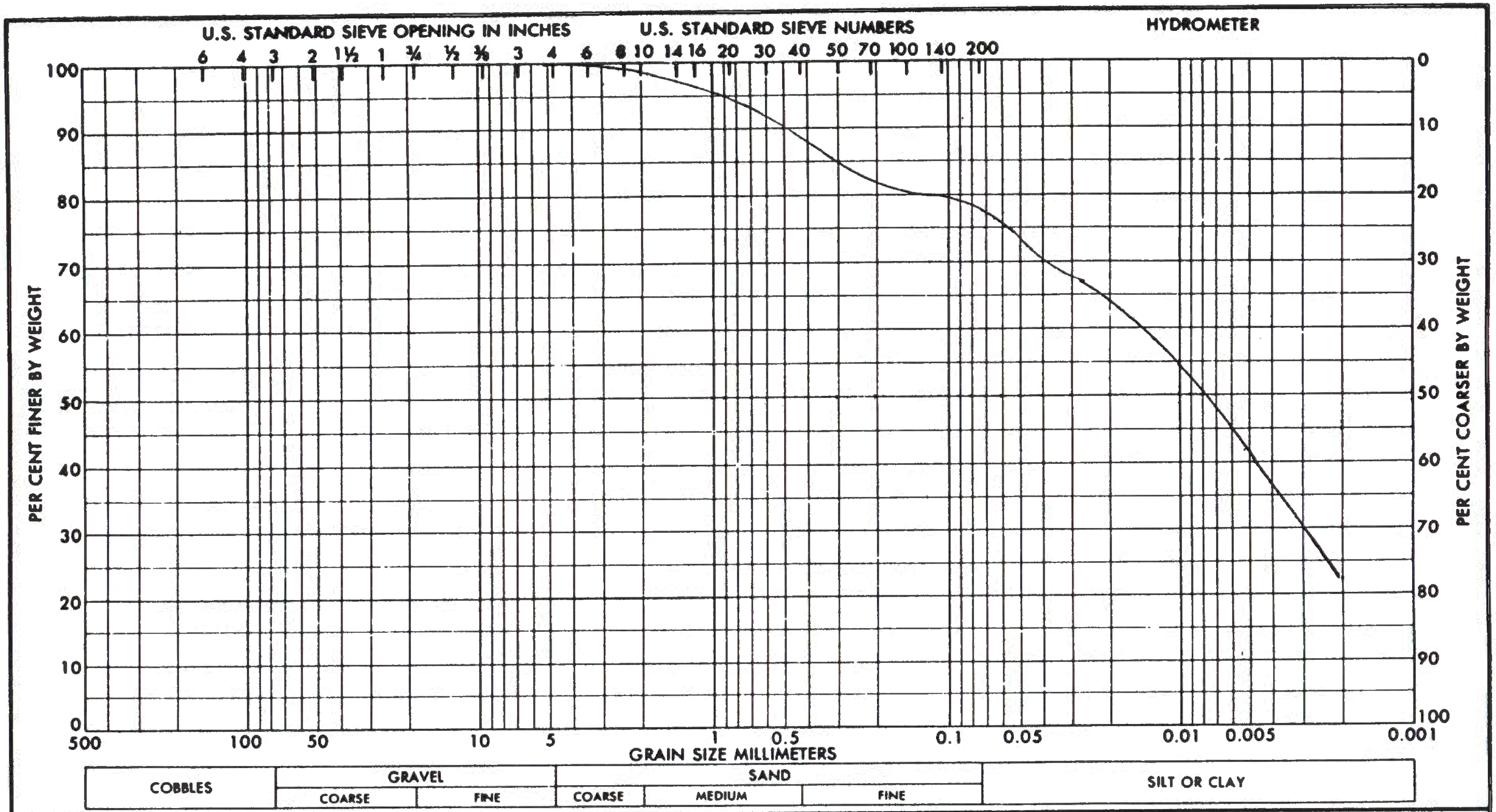
AREA

BORING NO. MW - 3

DATE 4/13/90

GRADATION CURVES

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	111'	Brown SILT some clay and sand				

PROJECT LKB # 5505-02

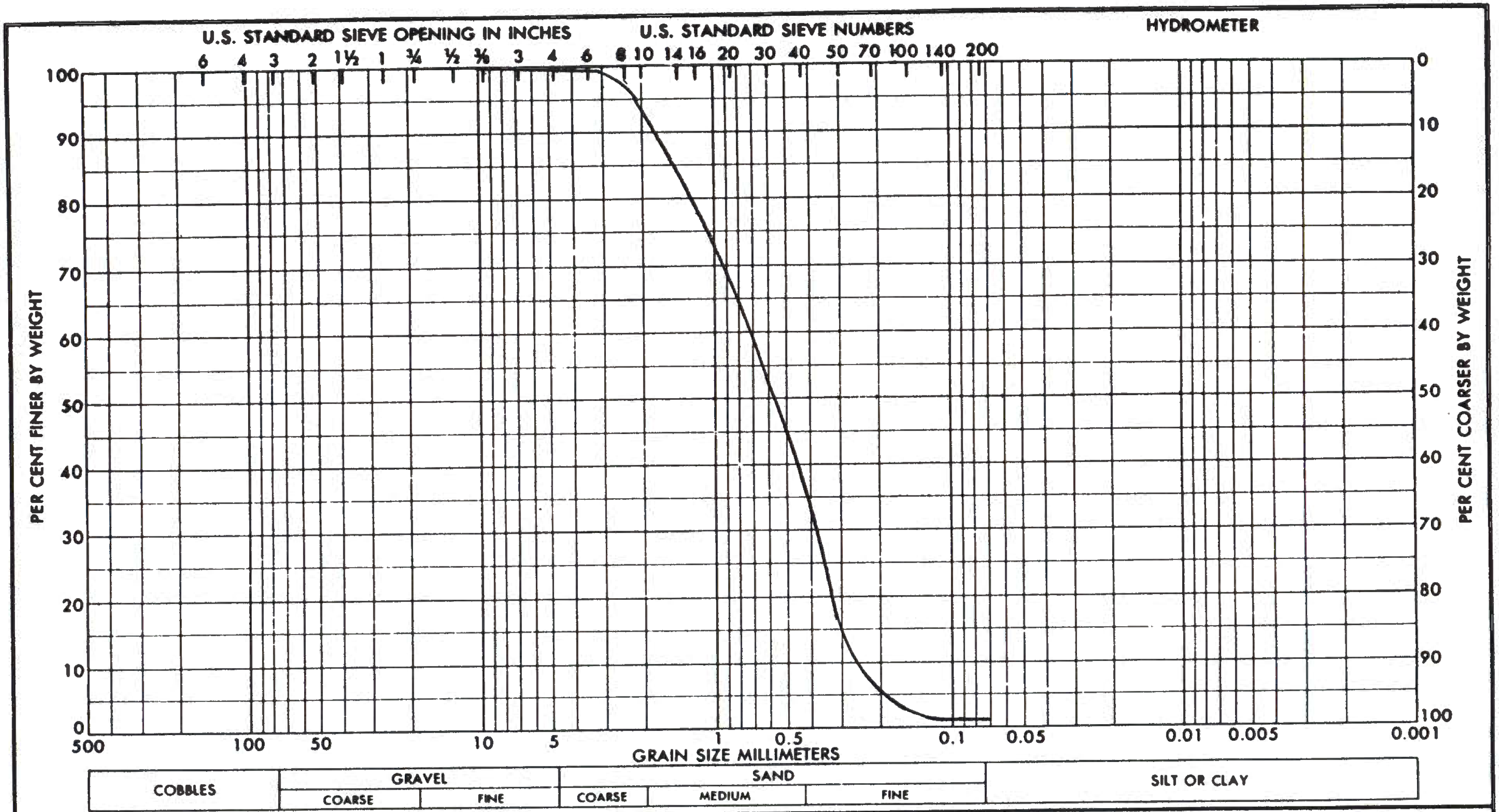
AREA

BORING NO. MW - 3

DATE 4/13/90

GRADATION CURVES

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	115'	BRown f/c SAND trace silt	16.4			

PROJECT LKB # 5505-02

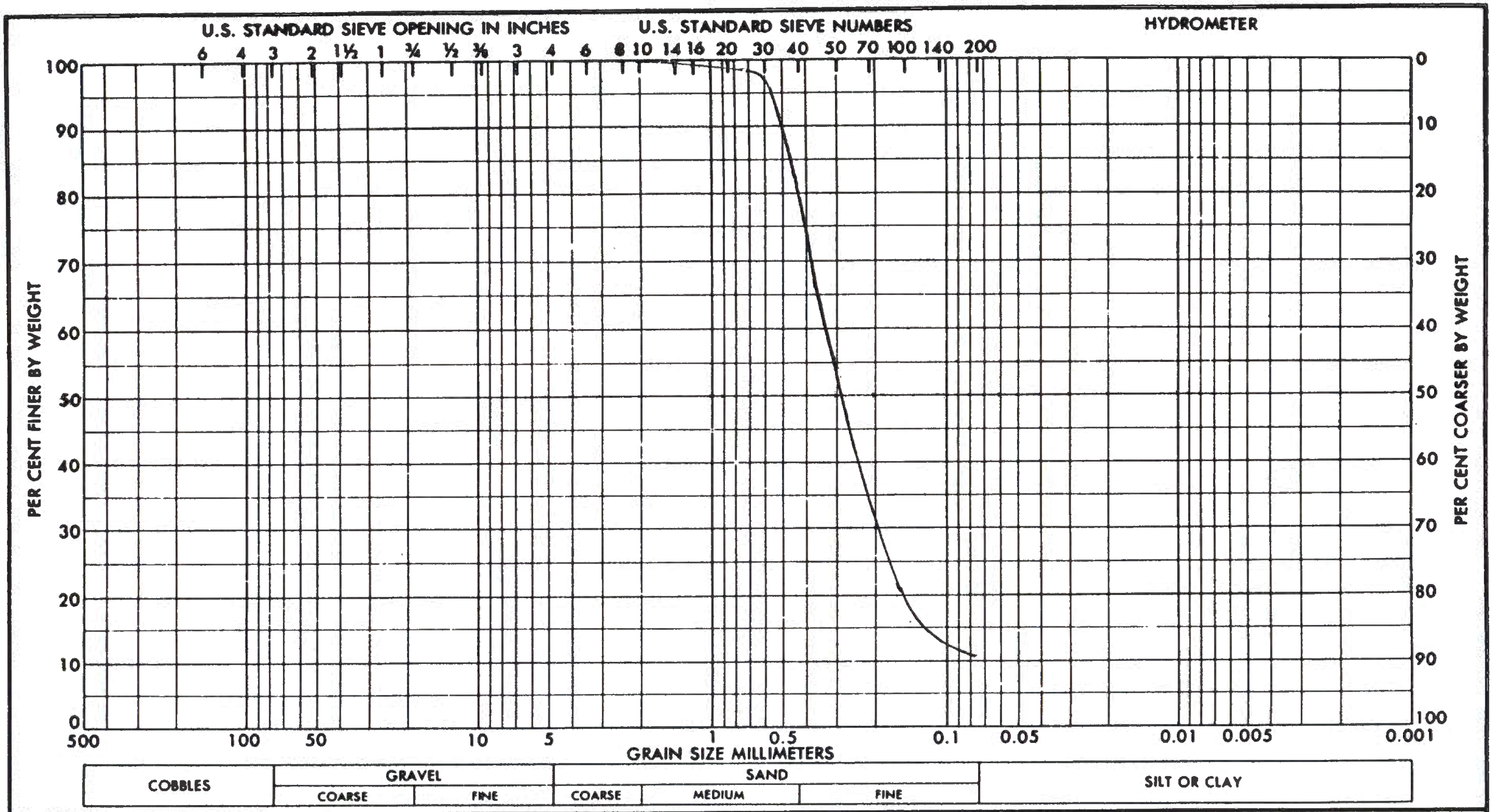
AREA

BORING NO. MW - 3

DATE 4/13/90

GRADATION CURVES

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	125'	Gray fine SAND little silt				

GRADATION CURVES

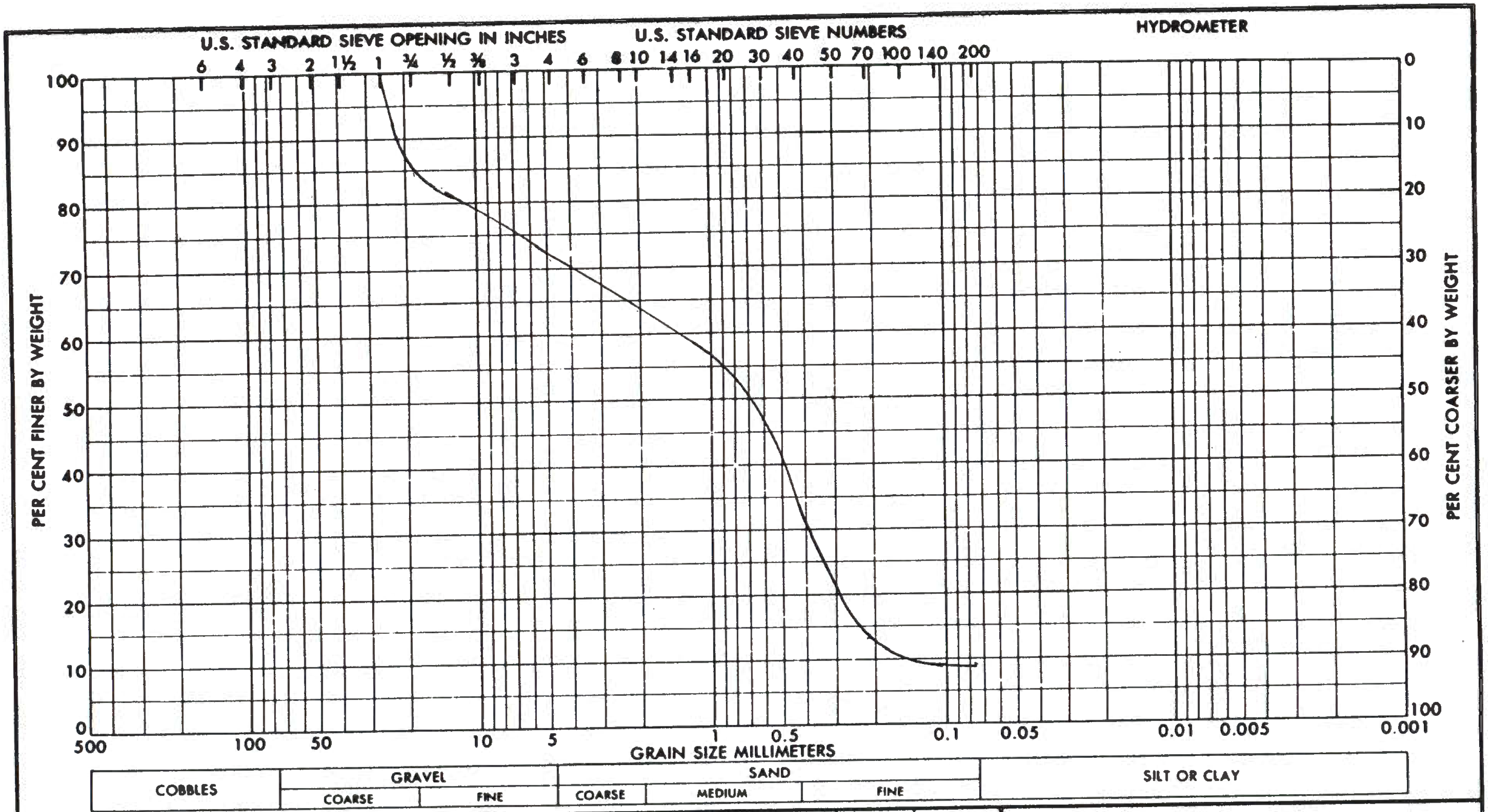
PROJECT LKB # 5505-02

AREA

BORING NO. MW - 3

DATE 4/13/90

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	15'	Brown f/c SAND some gravel , trace of silt	0.5			

GRADATION CURVES

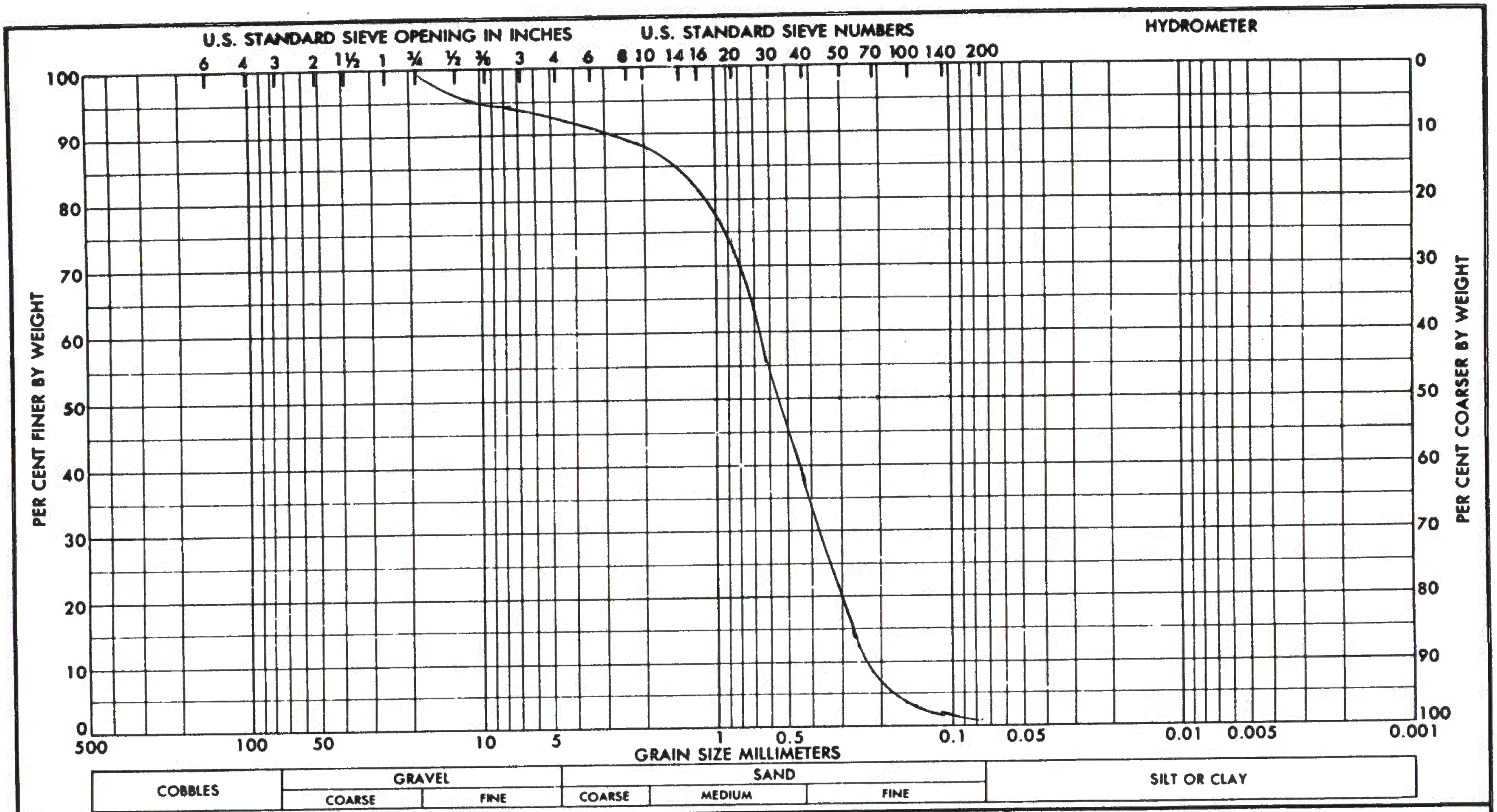
PROJECT LKB # 5505-02

AREA

BORING NO. MW - 1

DATE 4/13/90

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	35'	Brown f/c SAND trace gravel	18.1			

PROJECT LKB # 5505-02

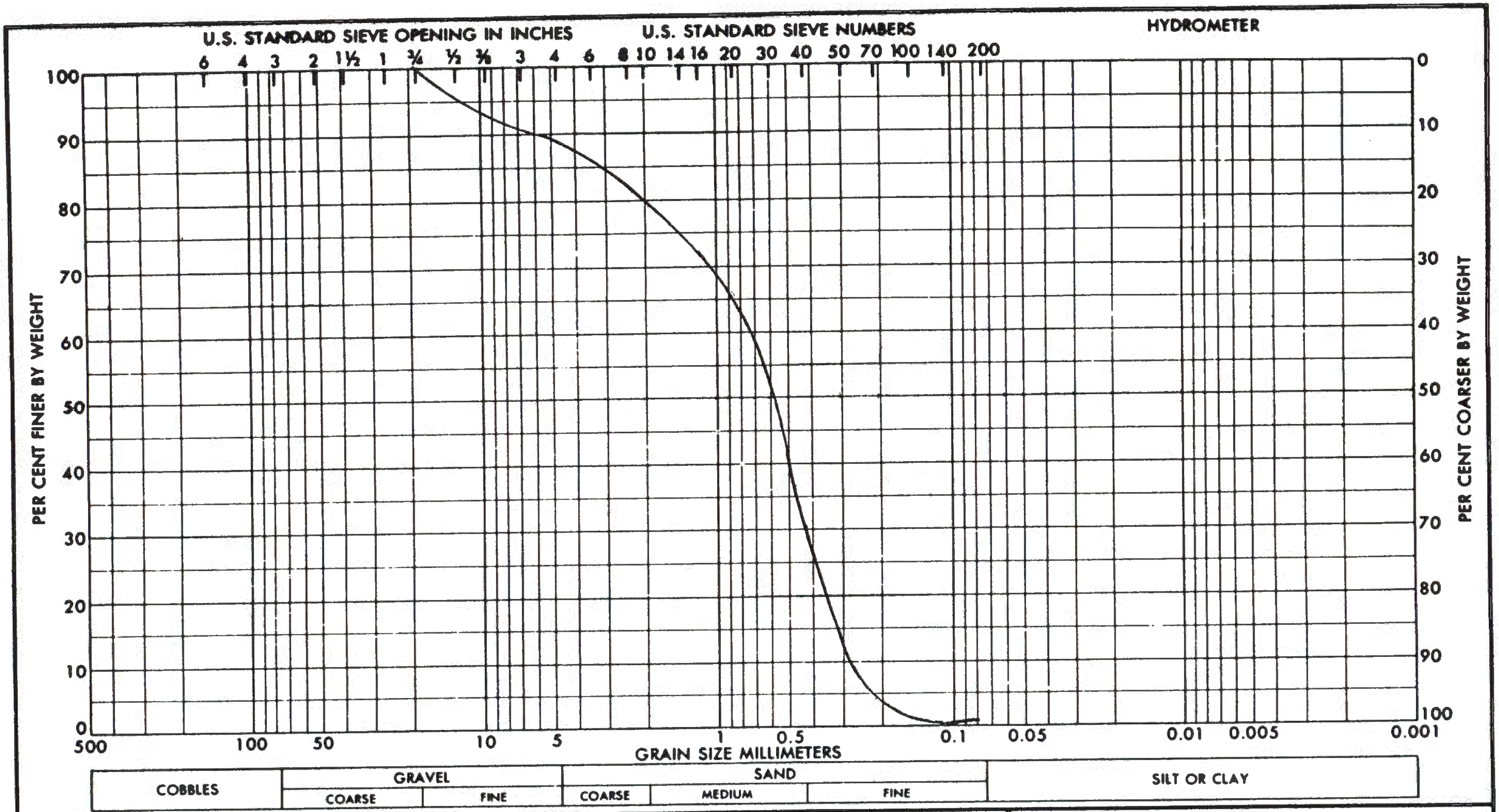
AREA

BORING NO. MW – 1

DATE 4/13/90

GRADATION CURVES

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	40'	Brown f/c SAND little gravel	18.1			

PROJECT LKB # 5505 - 02

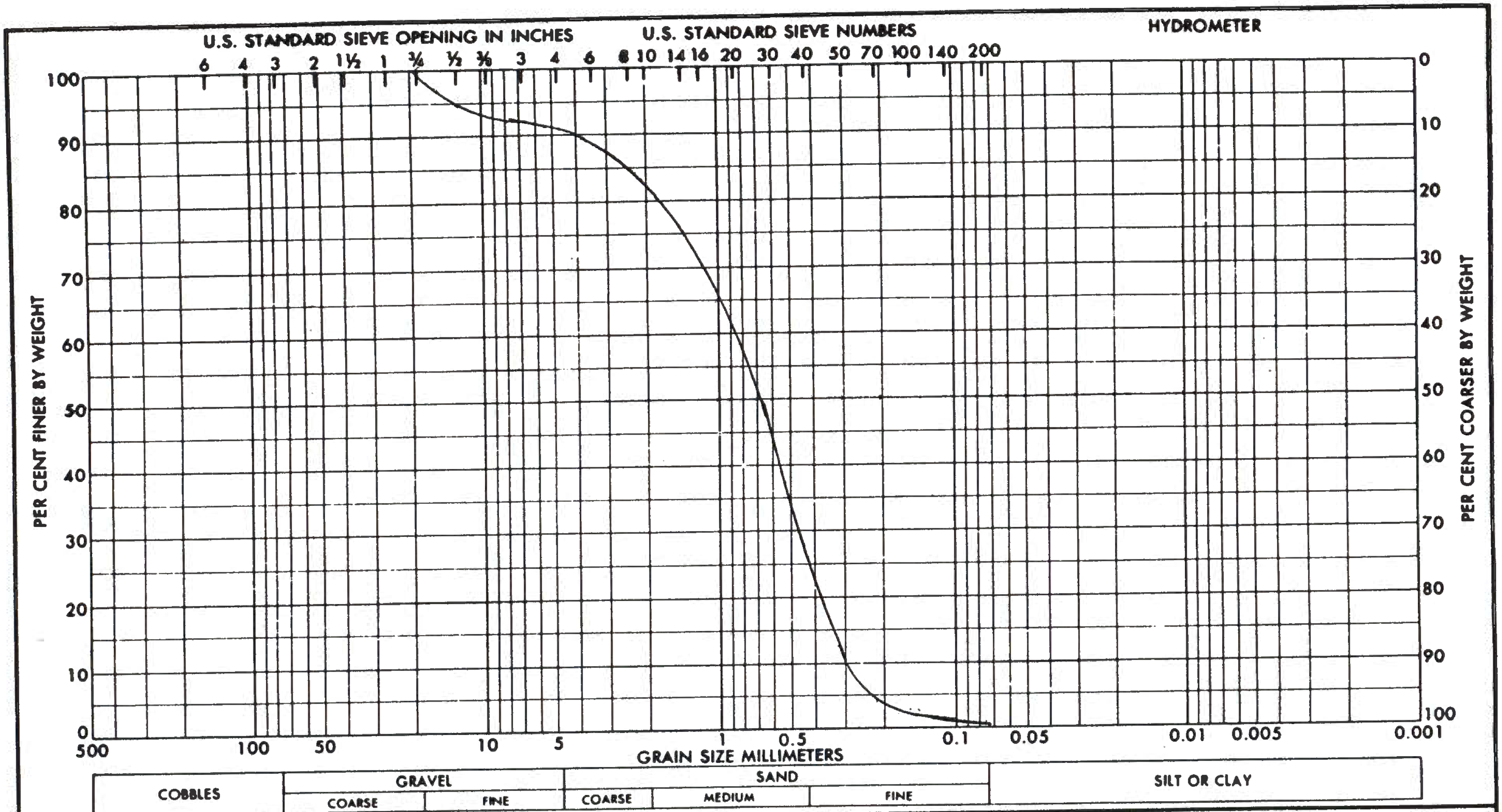
AREA

BORING NO. MW - 1

DATE 4/13/90

GRADATION CURVES

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	55'	Brown c/f SAND trace gravel	16.1			

PROJECT LKB # 5505-02

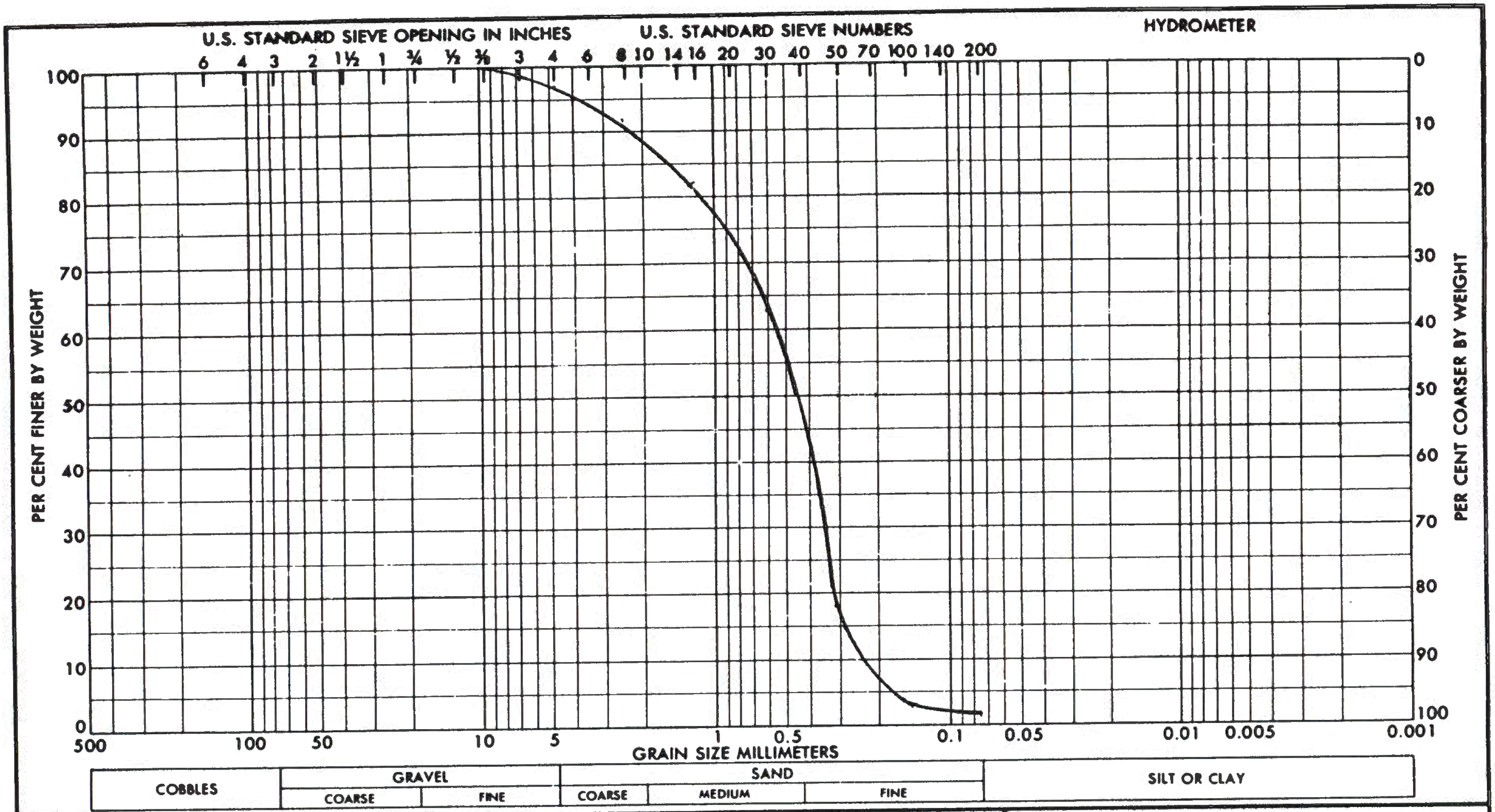
AREA

BORING NO. MW - 1

DATE 4/13/90

GRADATION CURVES

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	80'	Brown f/c SAND trace gravel	16.1			

PROJECT LKB # 5505-02

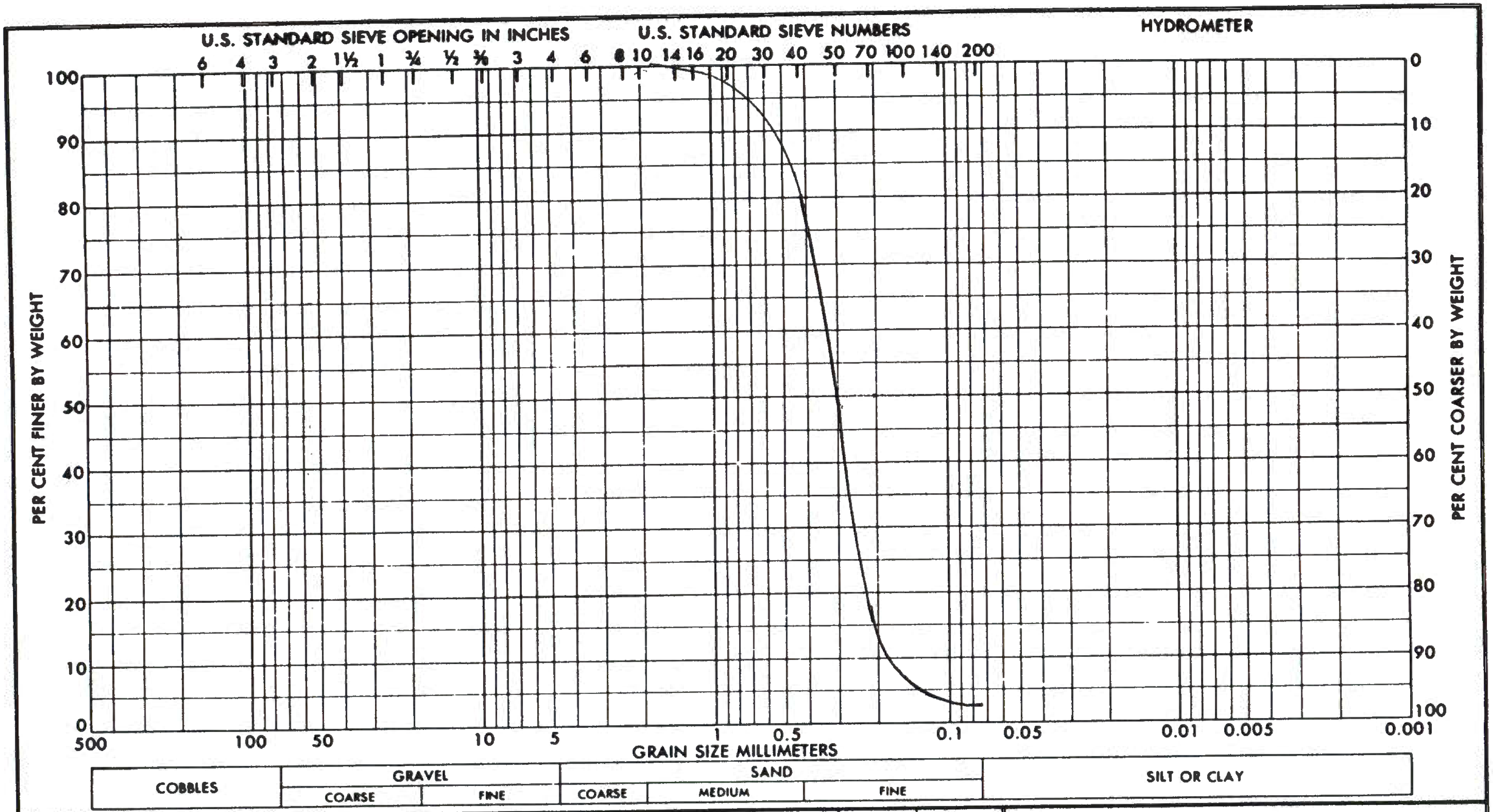
AREA

BORING NO. MW- 1

DATE 4/13/90

GRADATION CURVES

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	125'	Brown f/m SAND, trace silt	20.3			

PROJECT LKB # 5505-02

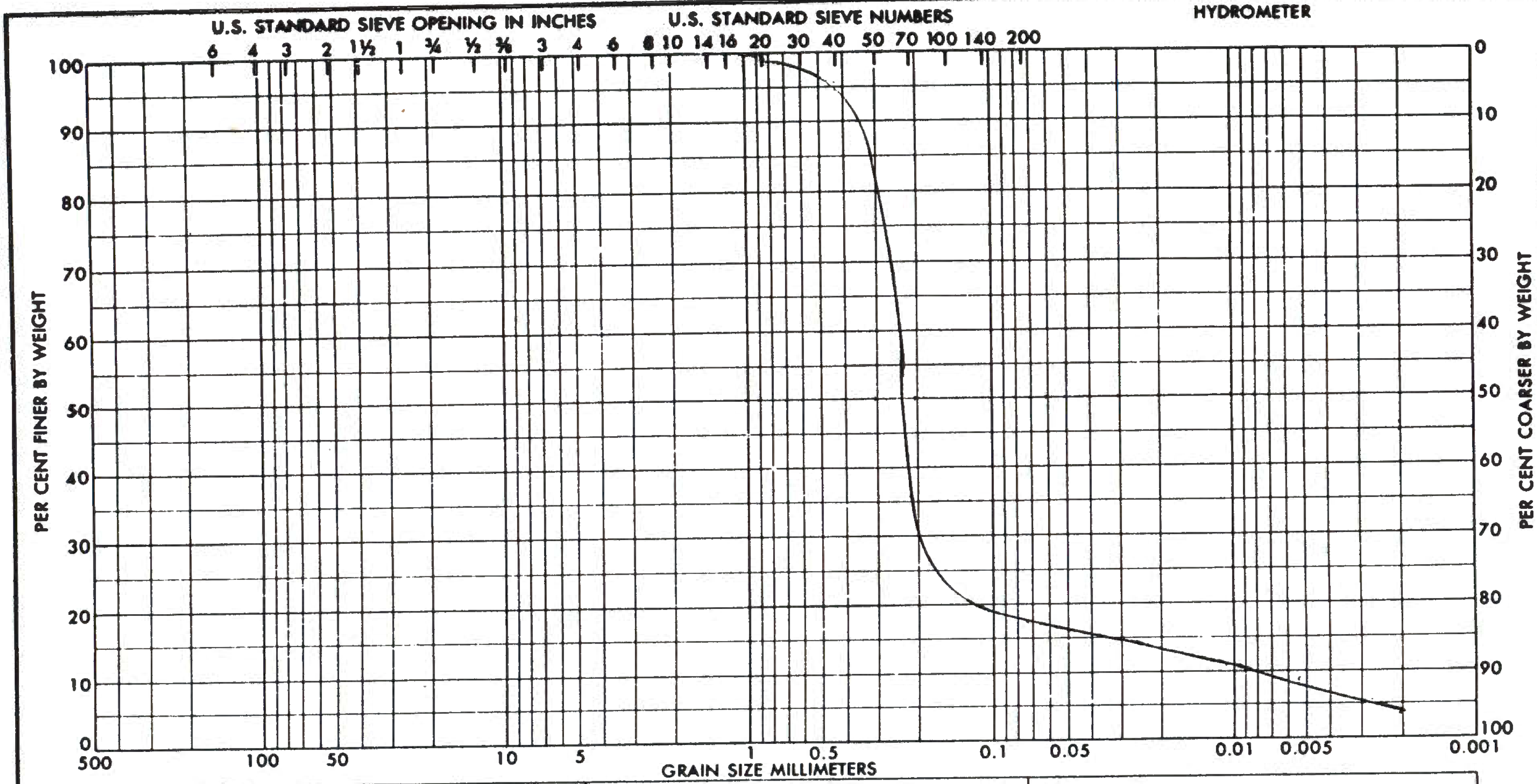
AREA

BORING NO. MW-1

DATE 4/13/90

GRADATION CURVES

JOHNSON SOILS ENGINEERING LABORATORY



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	138'	Gray-Brown fine SAND little silt trace clay				

PROJECT LKB # 5505-02

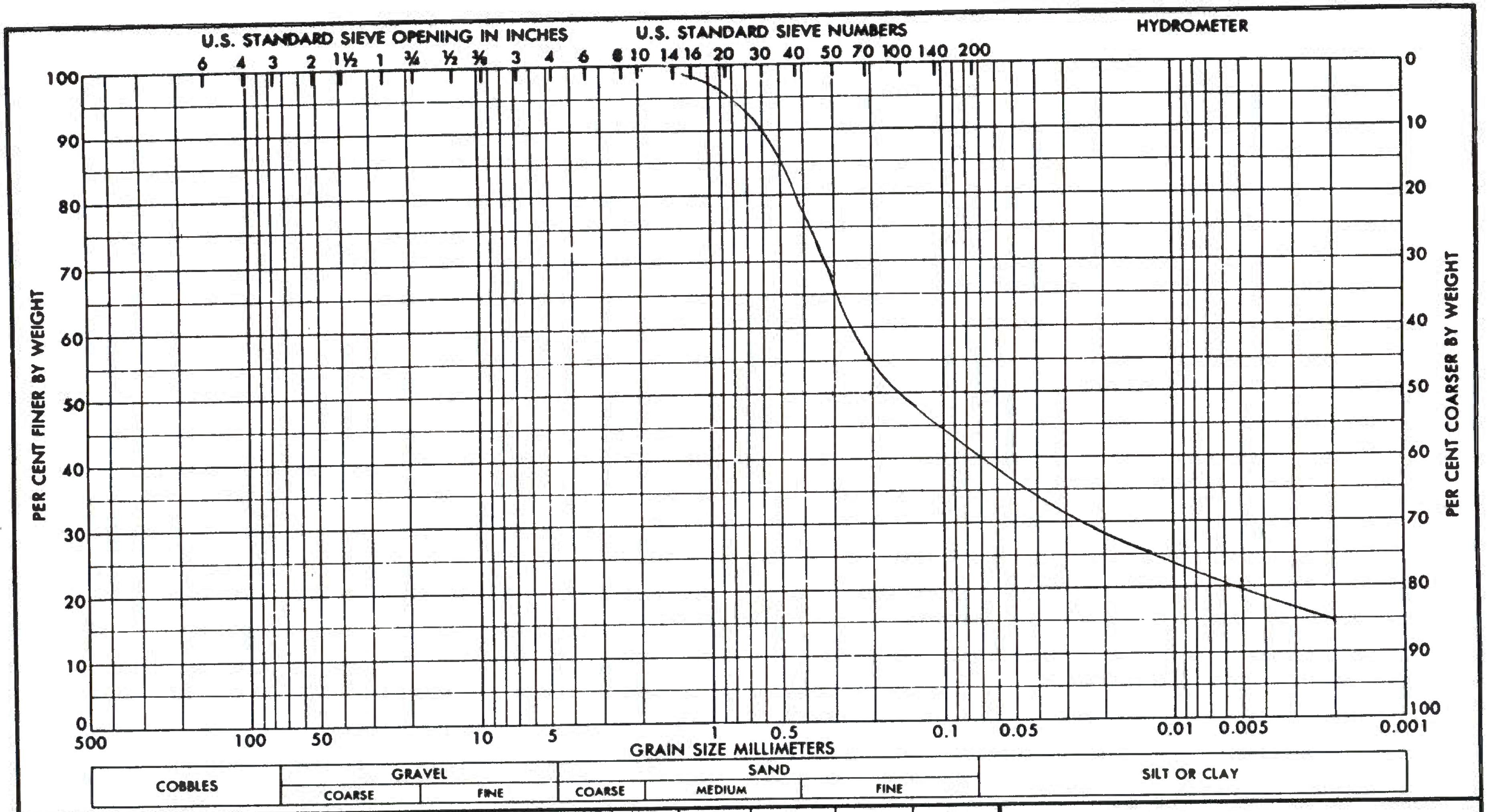
AREA

BORING NO. MW -1

DATE 4/13/90

GRADATION CURVES

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	142'	Dark Brown f/m SAND some silt, little clay				

PROJECT LKB # 5505-02

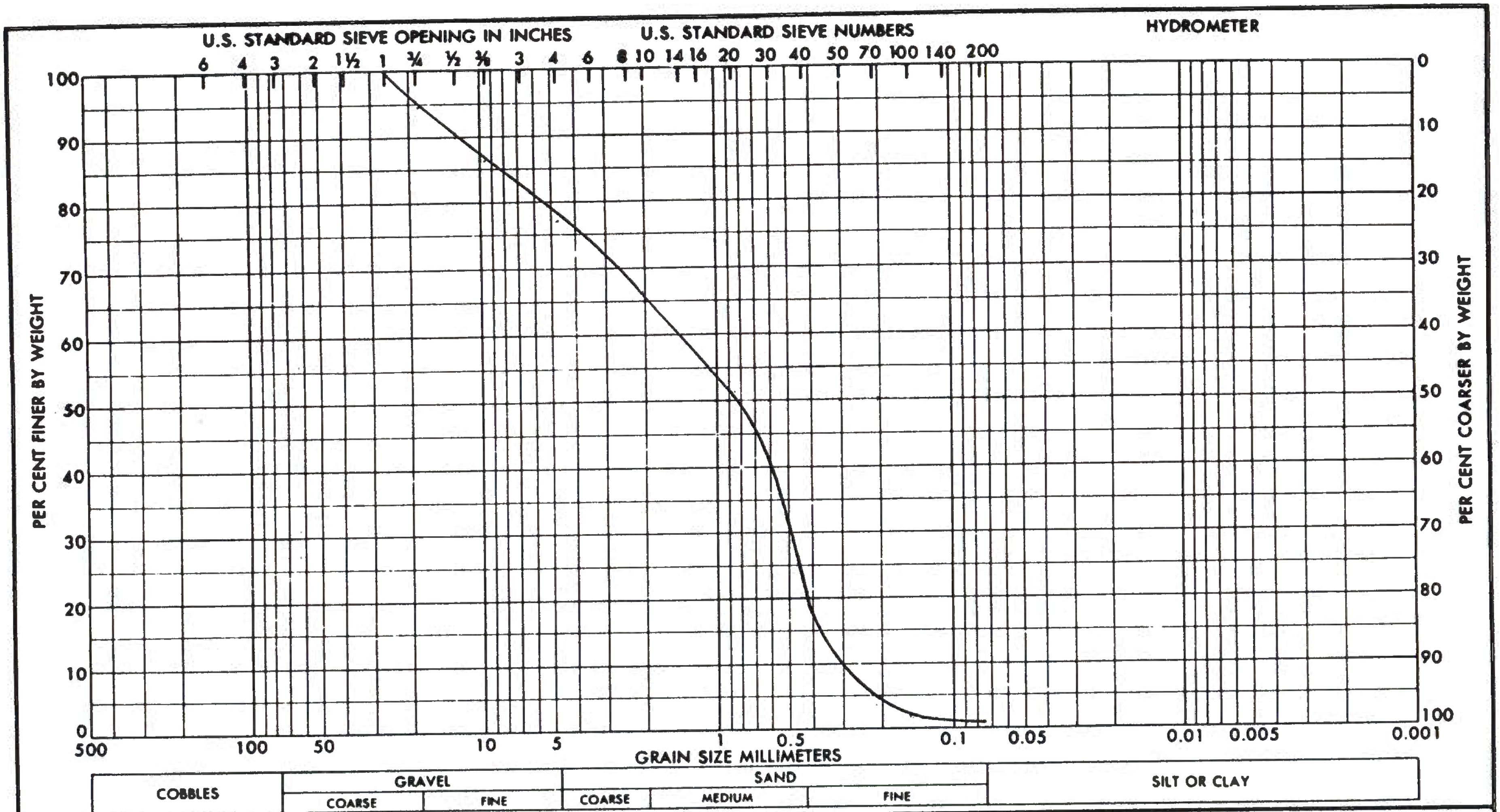
AREA

BORING NO. MW - 1

DATE 4/13/90

GRADATION CURVES

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	20'	Brown c/f SAND little gravel	3.5			

PROJECT LKB # 5505-02

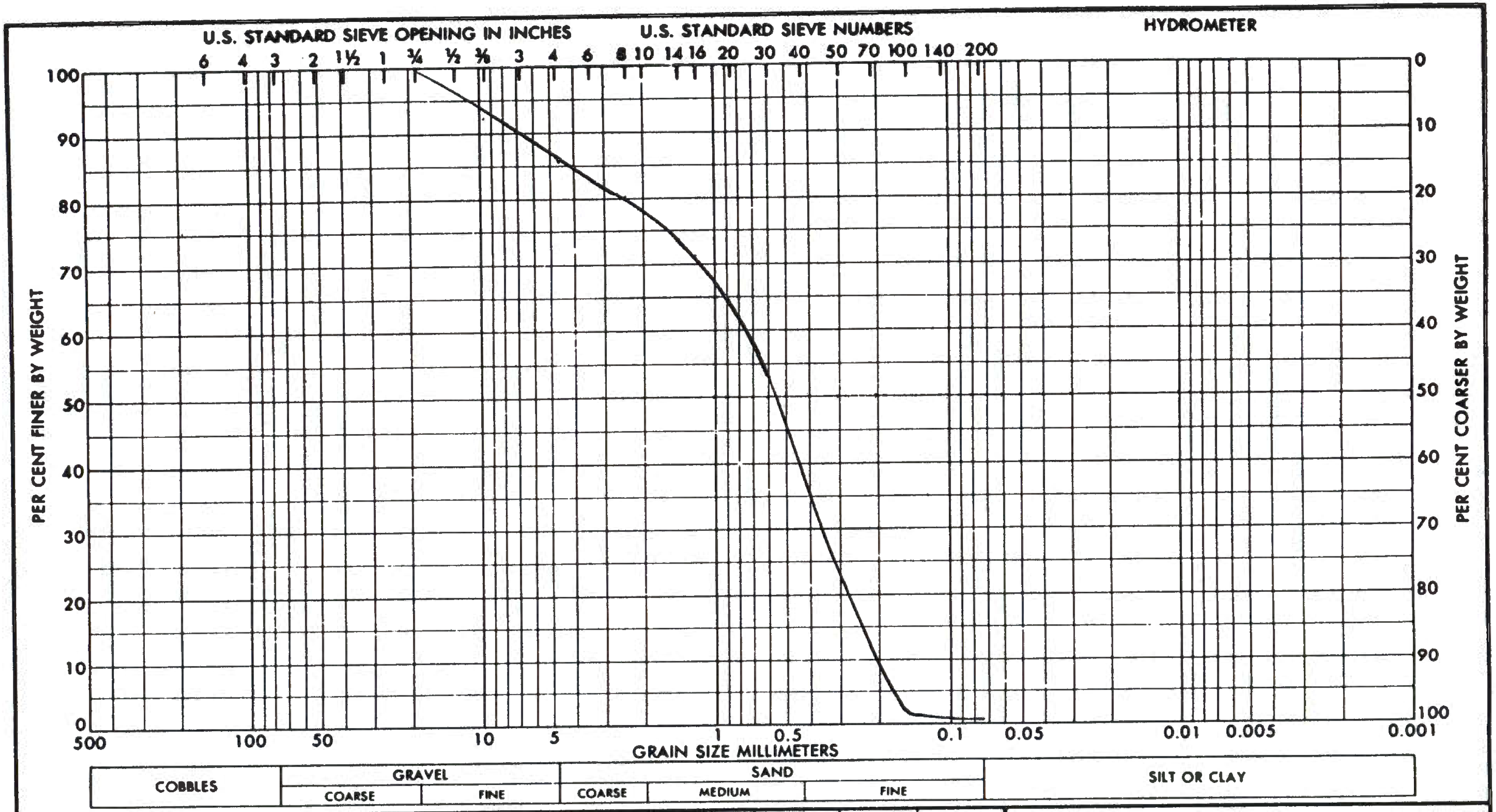
AREA

BORING NO. MW -2

DATE 4/13/90

GRADATION CURVES

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	30'	Brown f/c SAND little gravel				

GRADATION CURVES

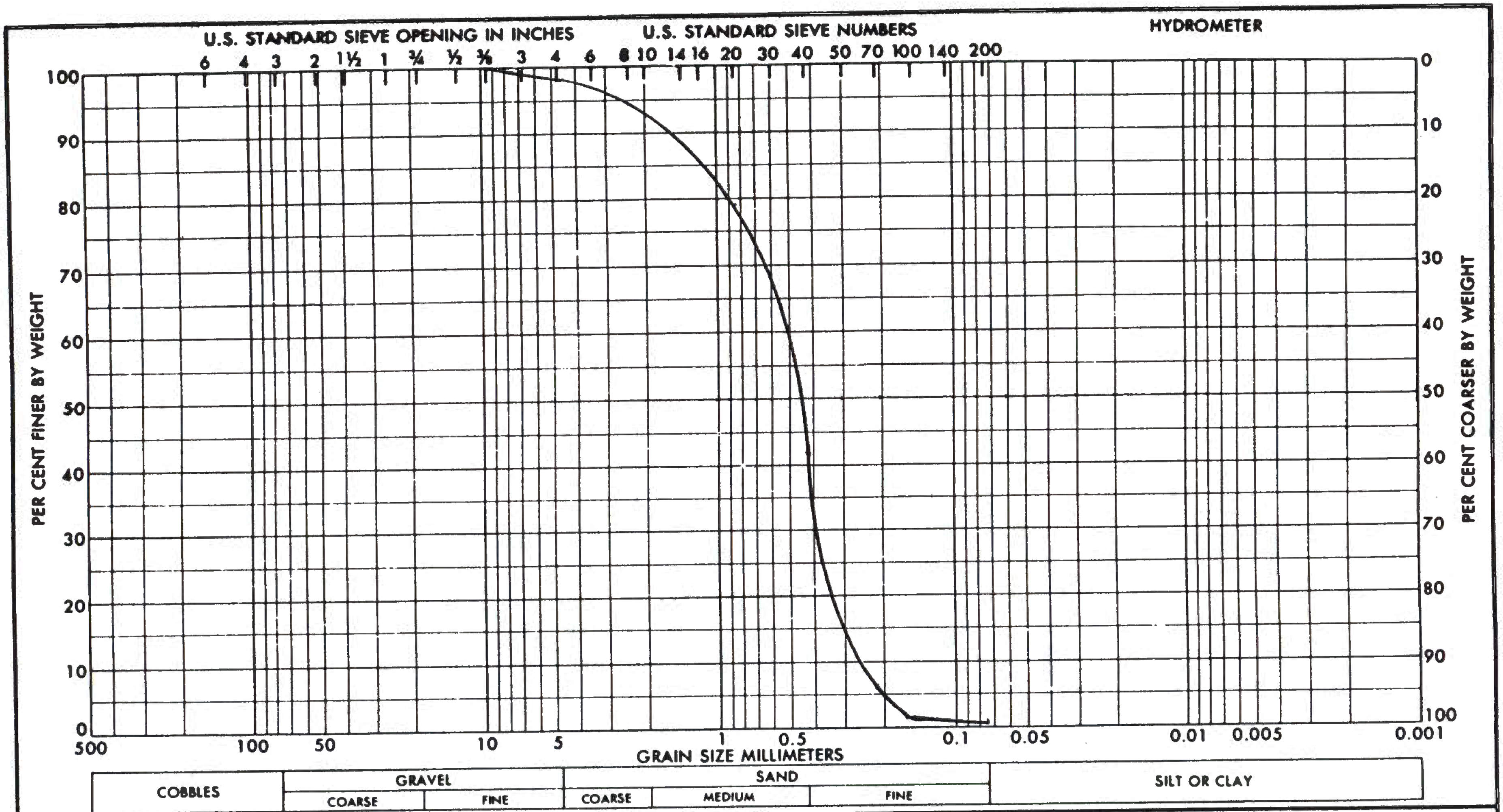
PROJECT LKB - # 5505-02

AREA

BORING NO. MW- 2

DATE 4/13/90

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	50'	Brown f/c SAND trace gravel	18.4			

PROJECT LKB # 5505-02

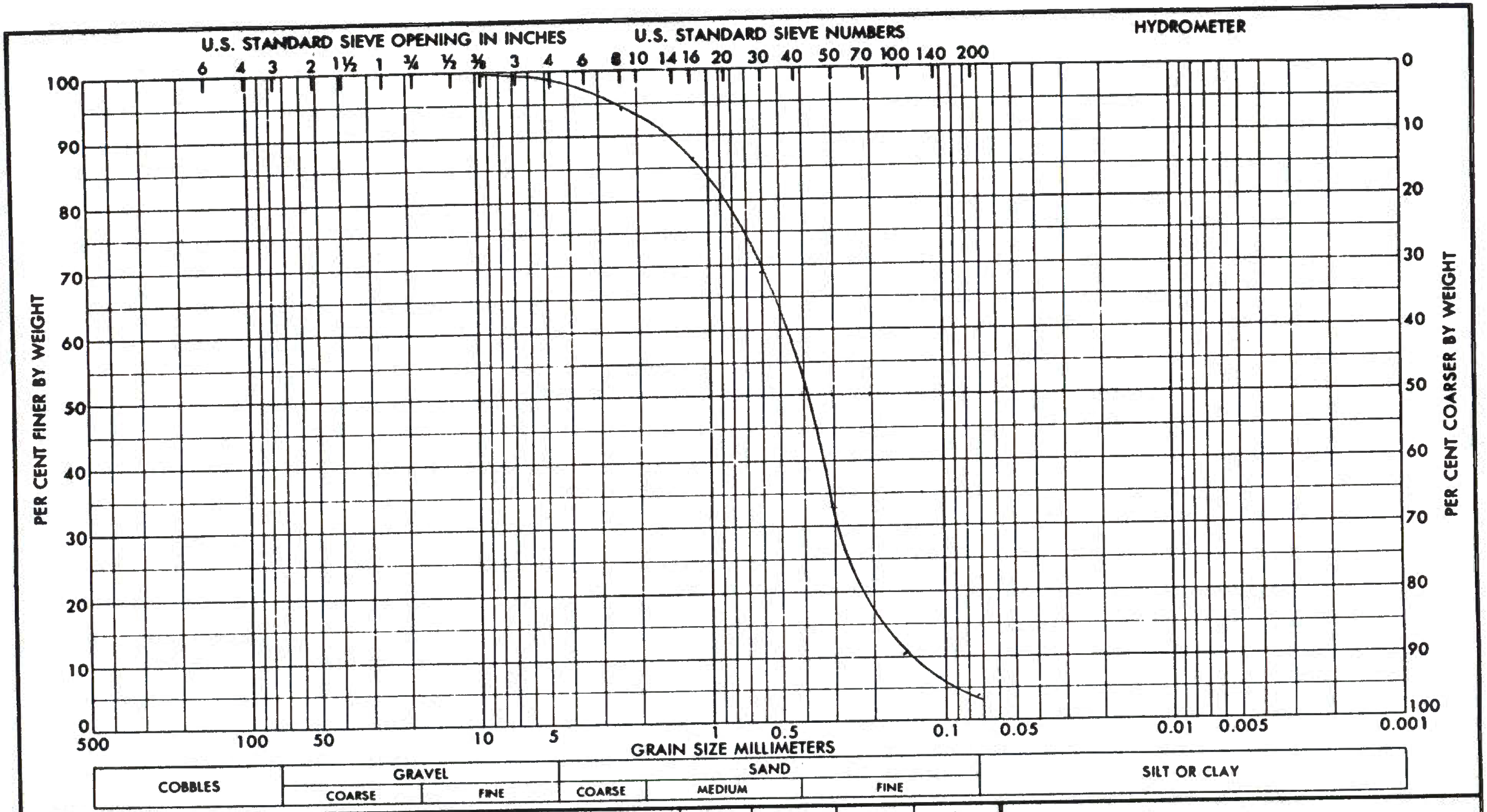
AREA

BORING NO. MW - 4

DATE 4/13/90

GRADATION CURVES

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	80'	Brown f/c SAND trace silt & gravel	15.8			

PROJECT LKB # 5505-02

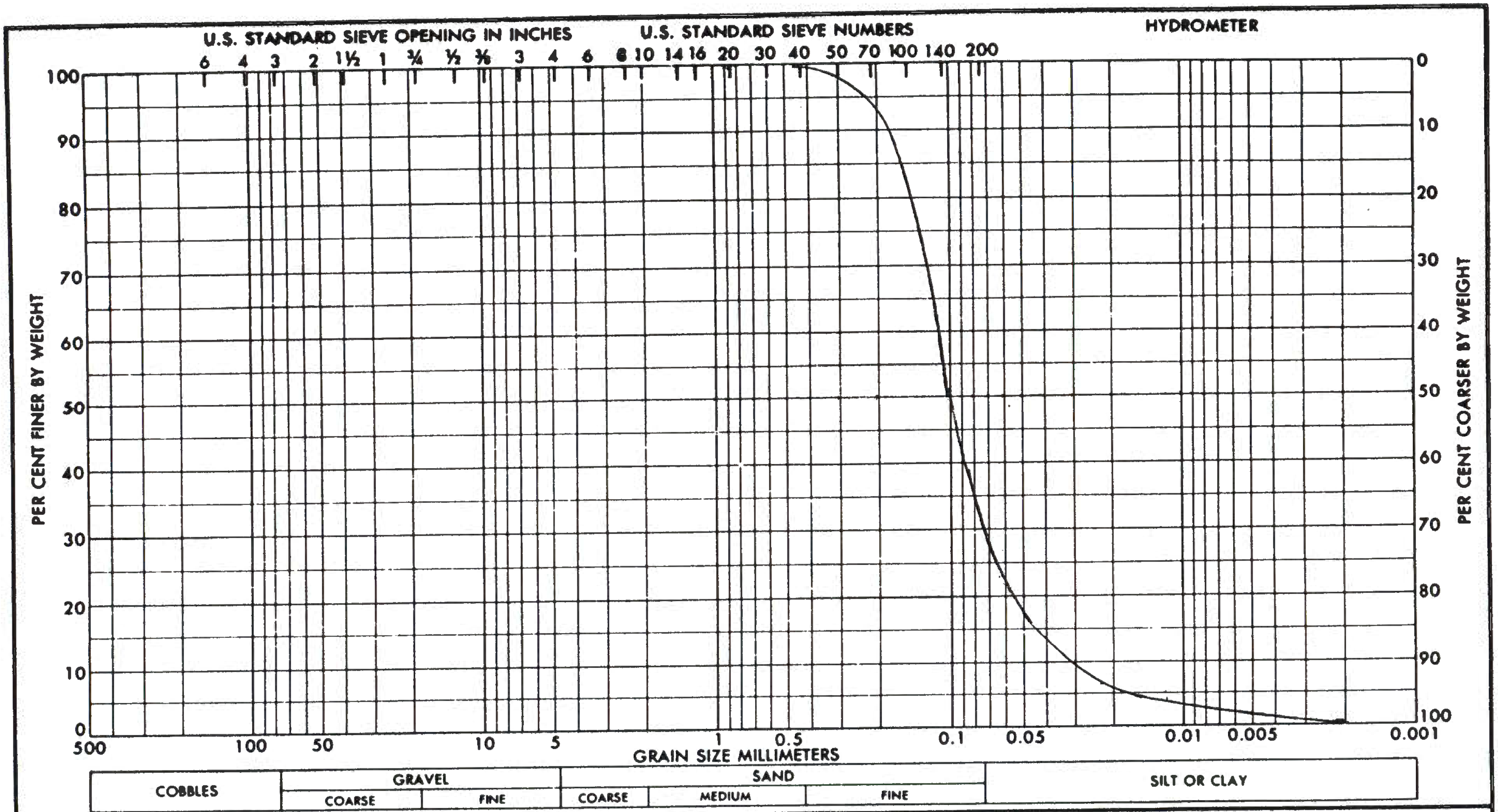
AREA

BORING NO. MW - 4

DATE 4/13/90

GRADATION CURVES

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	112'	Brown fine SAND some silt				

PROJECT LKB # 5505-02

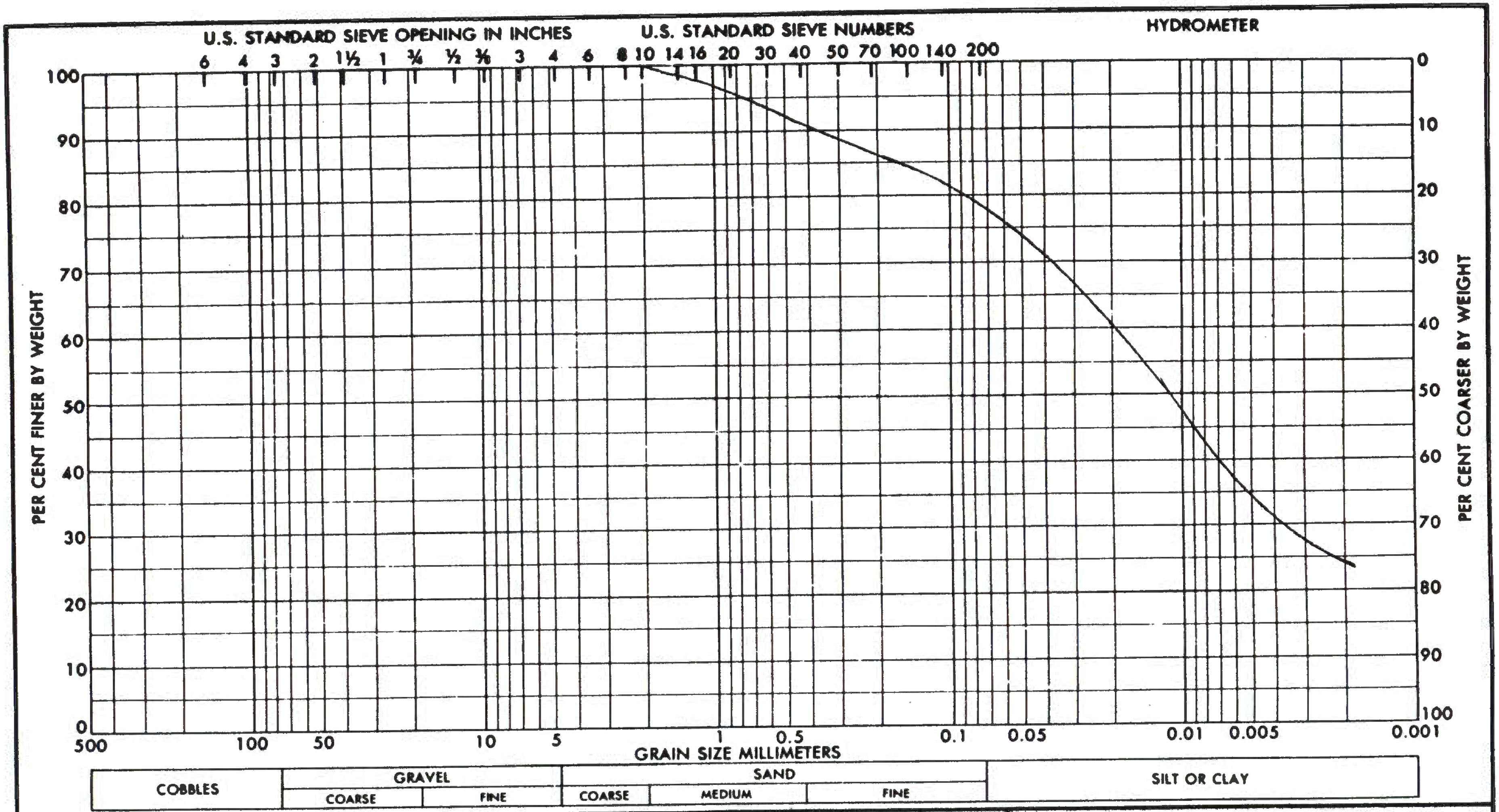
AREA

BORING NO. MW -4

DATE 4/13/90

GRADATION CURVES

JOHNSON SOILS ENGINEERING LABORATORY



SAMPLE NO.	ELEV OR DEPTH	CLASSIFICATION	NAT W%	LL	PL	PI
	118'	Brown SILT some clay & sand				

GRADATION CURVES

PROJECT LKB # 5505-02

AREA

BORING NO. MW - 4

DATE 4/13/90

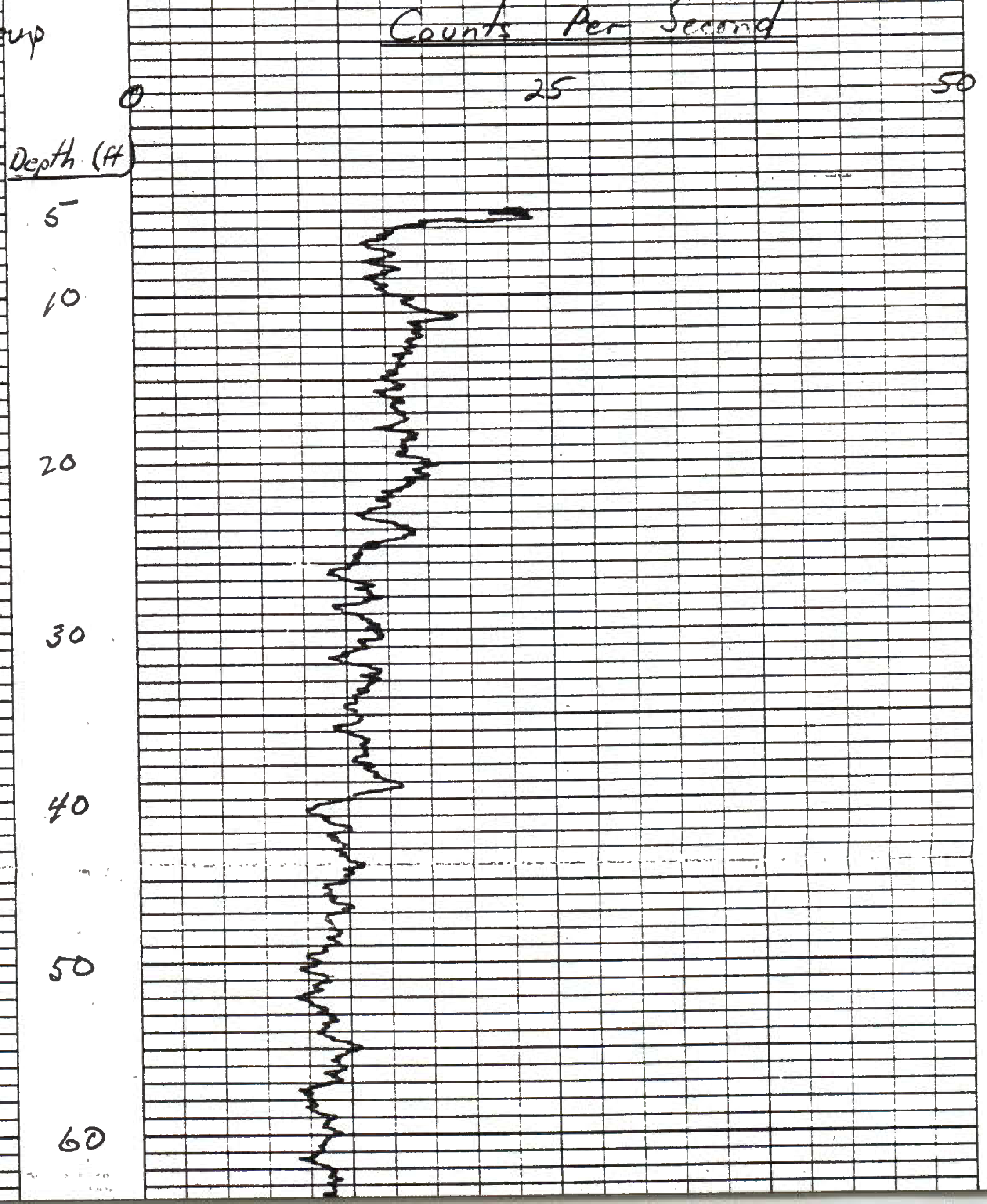
JOHNSON SOILS ENGINEERING LABORATORY

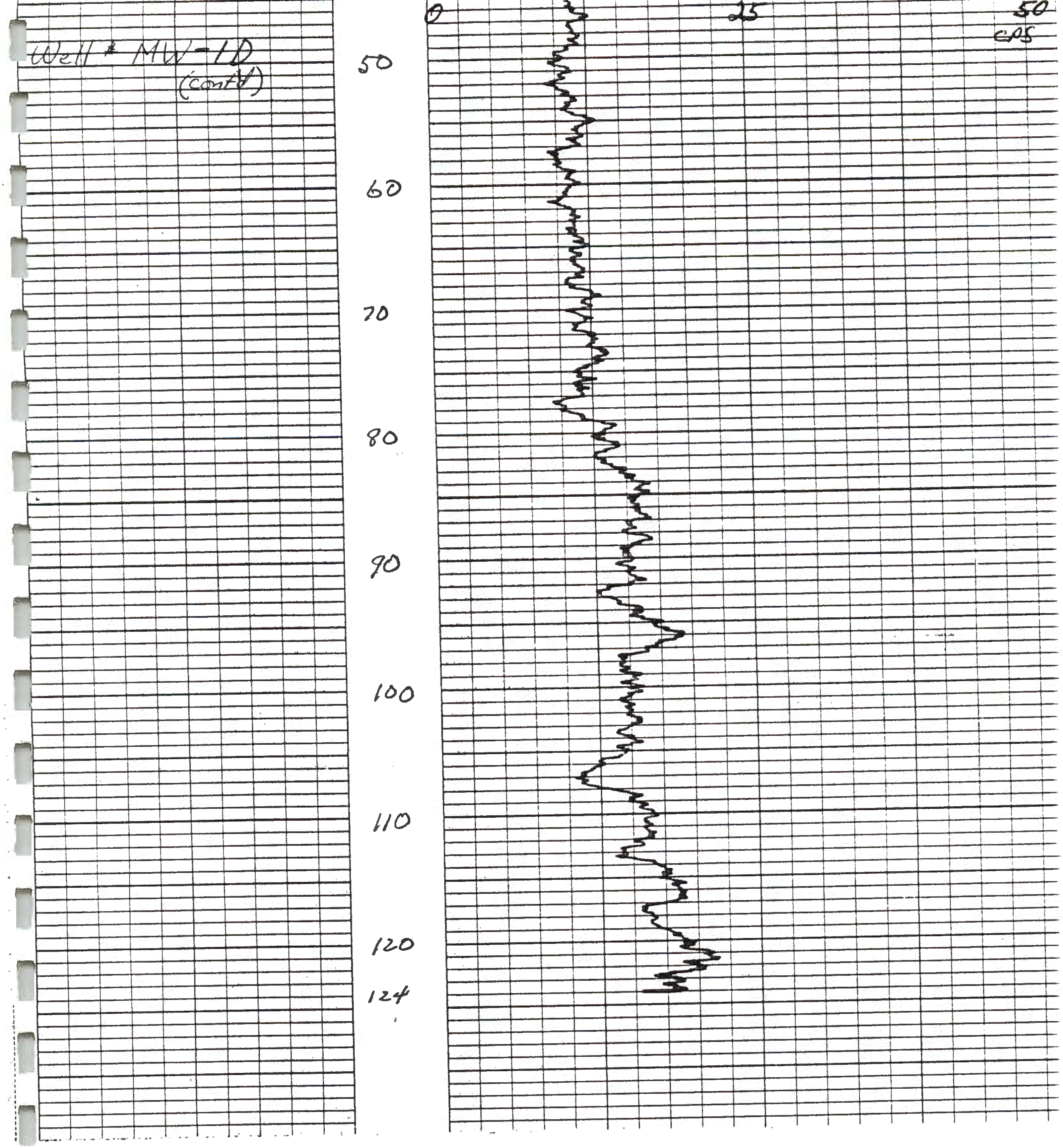
APPENDIX H

Gamma Logs

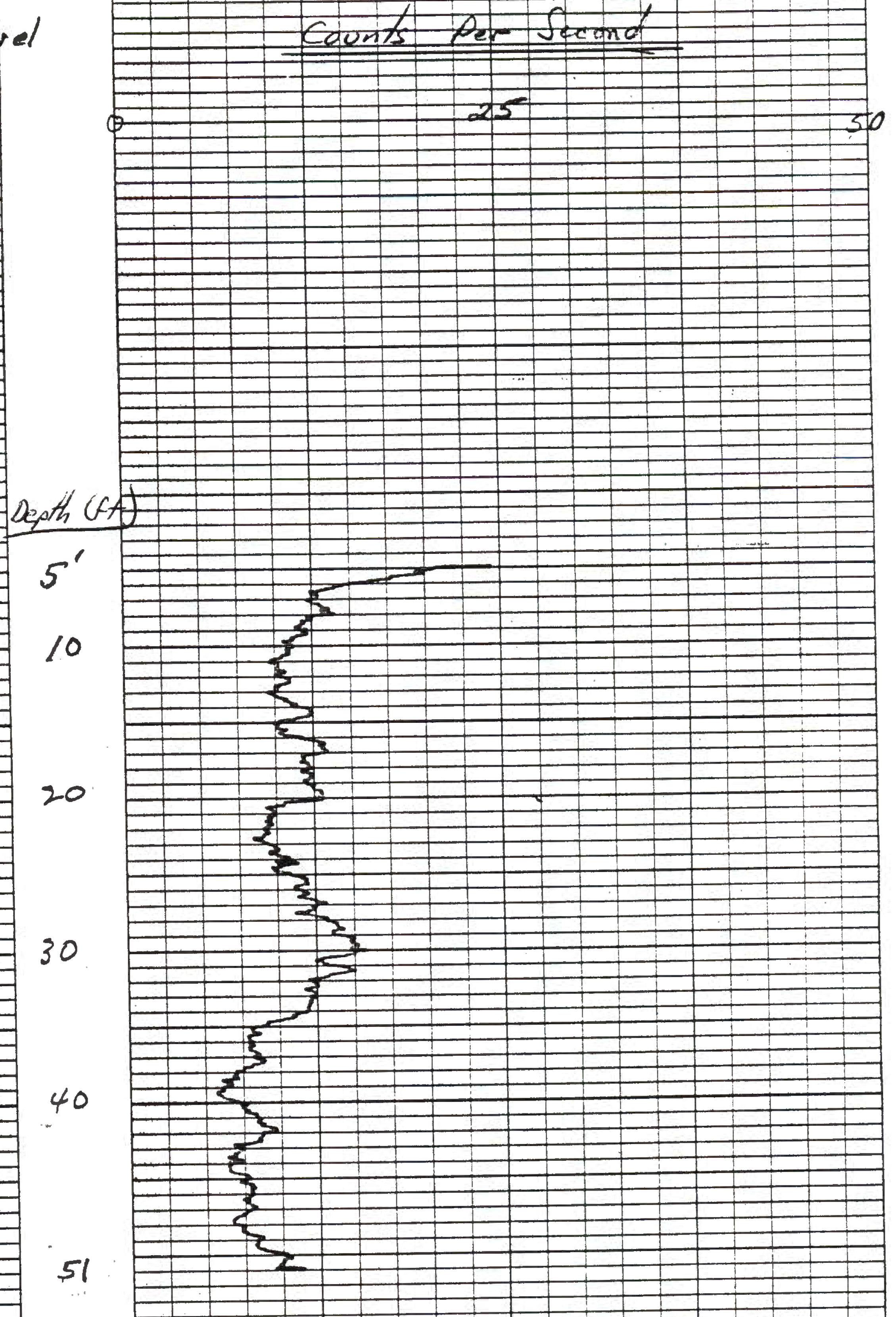
Hubbard Sand + Gravel

Well # MW-1D
TC = 3
Rec Out = 500
CPS = 50
Log Speed = 20'/MIN
Dia. Hole = 2" PVC
Depth Logged = 124'
Run #1
Driller John Barnes
Logger G. Tibbe
Hydro Group

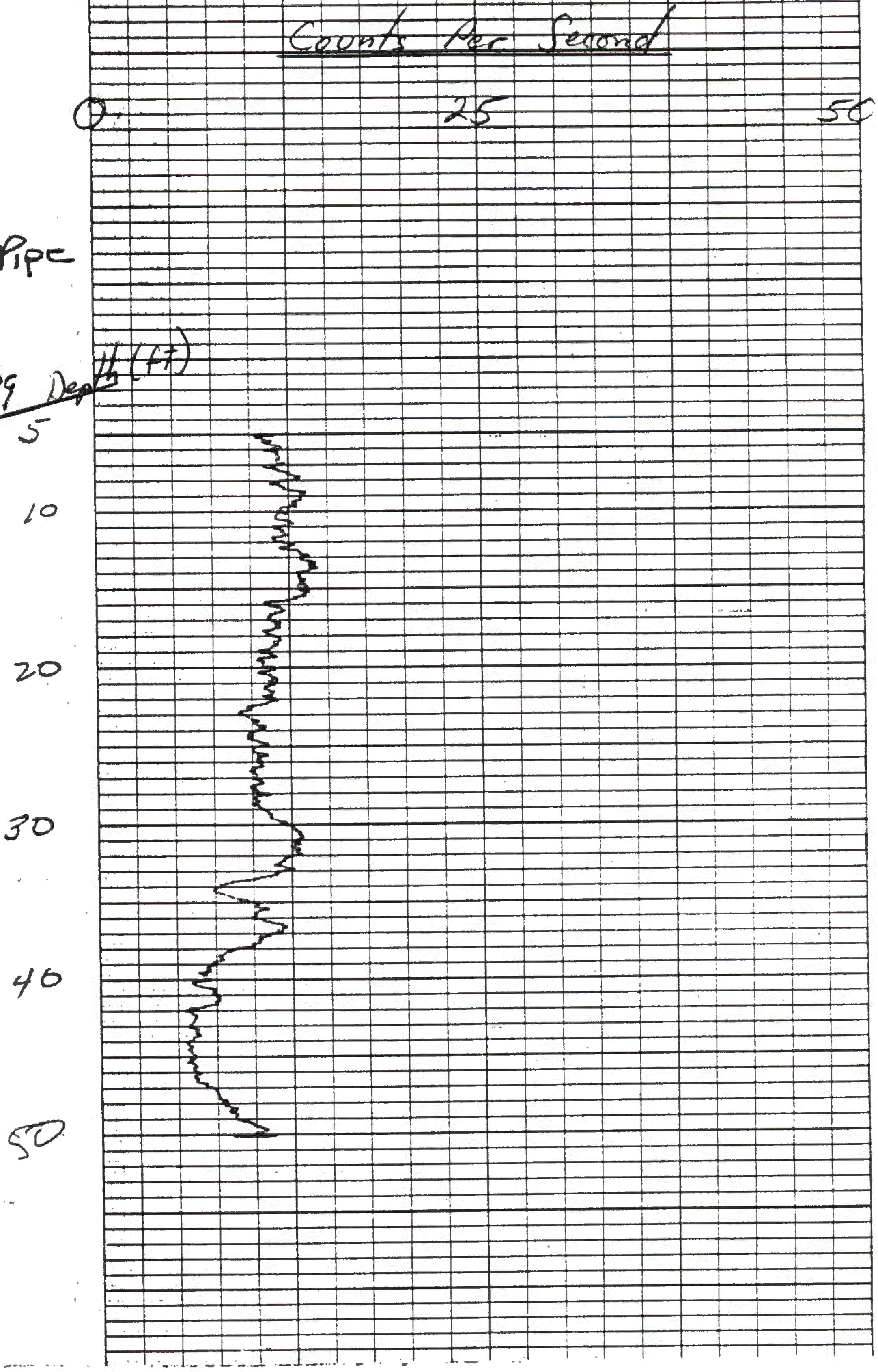



Well # MW-1D (cont'd)

Hubbard Sand + Gravel
Well # MW-2M
TC = 3
Rec. Out = 500
CPS = 50
Log Speed = 20/min
Dia Hole = 2" PVC
Depth Logged = 51'
Run #1
Date Logged = 9/6/89
Driller J. Barnes
Logger G. Tibbe
Hydro Group



Hubbard Sand & Gravel
Well # MW-3M
TC = 3
Re. Adj = 500
CPS = 50
Log Speed = 20'/min
Dia. Hole = 2" PVC Pipe
Depth Logged = 50'
Run #1
Date Logged 9-6-89
Driller J. Barnes
Logger G. Tibbe
Hydro Group



APPENDIX I

Drum Sample Analytical Results

REPRESENTATIVE SAMPLE CERTIFICATE

This form is to be completed by the person obtaining the sample, preferably a representative of the generator.
DO NOT COLLECT OR FORWARD SAMPLES THAT ARE RADIOACTIVE, SHOCK SENSITIVE, EXPLOSIVE, OR PYROPHORIC.

Generator's Company Name: Water Resources
Company's Address: Site: Mini Storage 5th Ave

Location of Sampling: Unit, Pond, Pit, Tank, etc.: Drums
Process Producing Waste: Drilling operation

Date Sampled: 9/27/89 Time Sampled 12:30 AM ____ PM x Volume of Collected 2 x 1pt

I certify this sample is representative of the waste to be tested.

Generator: ____________ Print Name ____________ Signature ____________ Telephone Number

Type of Waste: (circle) Sludge [✓ Wastewater] 1 [✓ Solid] 2 Mix Other ____________ (specify)

Type of Sampler: (circle) [✓ Coliwasa] Grain Trier [✓ Scoop] Auger Pond Weighted Bottle Thief Other ____________ (specify)

Composite Sample: ____________ Number of Bottles ____________

Part I: Field Section

Collector Don Griffing Date Sampled 9/27/89 Time 1230 Hours

Bill MPC.

Affiliation of Sampler Marine Pollution Control.

Address 375 Dunton Ave E. Patchogue NY 11772
Number Street City State Zip

Telephone (516) 654-4900 Company Contact J. Davey

LABORATORY SAMPLE NUMBER	COLLECTOR'S SAMPLE NO.	TYPE OF SAMPLE*	FIELD INFORMATION**
	5th Ave MS Liq.	Liquid	
	5th Ave MS Solid	Solid	

Analysis Requested CPC Disposal

Special Handling and/or Storage ____________

PART II: LABORATORY SECTION**

Received by ____________ Title ____________ Date 9.28.89 Time ____________

Analysis Required ____________

im Barnes
ater Resources

Volumetric Techniques, LTD.

7 Bernice Drive • Bayport, New York 11705 • (516) 472-4848

o:M P C Environmental Services
375 Dutton Avenue
E. Patchogue NY 11777

Date:
Collected:
Received :09/28/89
Completed:10/05/89
Reported By:
Additional Lab No.:

ample Taken By
Client

Sample:Mini Storage Area 9/28/89
Drilling Operation (Liquid)

Sample Number 14988909

Parameters	**Results** ppb	**Parameters**	**Results** ppb
Benzene	*		
Chlorobenzene	*		
Dichlorobenzene	*		
Total Xylene	*		
MEK	*		
Ethylbenzene	*		
Toluene	*		
Isopropyl Alcohol	*		
Freon	*		
Trichloroethylene	*		
Tetrachloroethylene	*		
1,1,1-Trichloroethane	*		
MIBK	*		
Methylene Chloride	*		
Methyl Alcohol	*		
Ethyl Alcohol	*		
Chloroform	*		
Acetone	*		
Ethyl Acetate	*		
Butyl Acetate	*		
Naptha	*		
Carbon Tetrachloride	*		
Ethyl Toluene	*		

Comments
* = <0.1%

• CONSULTING CHEMISTS • COMPLETE LABORATORY TESTING •
•Sander R. Sternig•Director of Laboratories•

Volumetric Techniques, LTD.

317 Bernice Drive • Bayport, New York 11705 • (516) 472-4848

To:M P C Environmental Services
375 Dutton Avenue
E. Patchogue NY 11777

Date:
Collected:
Received :09/28/89
Completed:10/11/89

Reported By:

Additional Lab No.:

Sample Taken By
Client

Sample:Mini Storage Area 9/28/89
Drilling Operation (Liquid)

Sample Number 14988909

Parameters	**Results** ppm	**Parameters**	**Results** ppm
Arsenic	<0.5	Flash Point	>100 C
Barium	0.04	Ash	NA
Cadmium	<0.01	BTU/Gal	NONE
Chromium	0.90	Viscosity	33
Mercury	<0.1	CHEMICAL COMPOSITION	RESULTS IN %
Lead	0.09	VOC	<0.1
Iron	1.13	Metals	<0.01
Selenium	<0.5	Salts	0.11
Silver	0.04	Water	99+
Copper	0.13		
Nickel	0.03		
Zinc	0.11		
Chromium-Hex	<0.01		
PHYSICAL PARAMETER			
Color	B/BROWN		
Odor	STRONG		
Physical State	LIQUID		
Layers	TWO		
Cyanides	NONE		
Sulfides	NONE		
PCB's	NONE		
Halogen	NONE		
PH	6.1		
TDS	1,100		
Specific Gravity	0.95		

Comments

Volumetric Techniques, LTD.

3 7 Bernice Drive • Bayport, New York 11705 • (516) 472-4848

To: I P C Environmental Services
375 Dutton Avenue
E. Patchogue NY 11777

Date:
Collected:
Received :09/28/89
Completed:10/05/89
Reported By:

Sample Taken By
Client

Additional Lab No.:

Sample:Mini Storage Area 9/28/89
Drilling Operation (Solid)

Sample Number **14998909**

Parameters	**Results** ppb	**Parameters**	**Results** ppb
Benzene	*		
Chlorobenzene	*		
Dichlorobenzene	*		
Total Xylene	*		
MEK	*		
Ethylbenzene	*		
Toluene	*		
Isopropyl Alcohol	*		
Freon	*		
Trichloroethylene	*		
Tetrachloroethylene	*		
1,1,1-Trichloroethane	*		
MIBK	*		
Methylene Chloride	*		
Methyl Alcohol	*		
Ethyl Alcohol	*		
Chloroform	*		
Acetone	*		
Ethyl Acetate	*		
Butyl Acetate	*		
Naptha	*		
Carbon Tetrachloride	*		
Ethyl Toluene	*		

Comments
* = <0.1%

Volumetric Techniques, LTD.
317 Bernice Drive • Bayport, New York 11705 • (516) 472-4848

To:M P C Environmental Services
375 Dutton Avenue
E. Patchogue NY 11777

Date:
Collected:
Received :09/28/89
Completed:10/11/89
Reported By:
Additional Lab No.:

Sample Taken By
Client

Sample Number 14998909

Sample:Mini Storage Area 9/28/89
Drilling Operation (Solid)

Parameters	**Results** ppm
Arsenic	<0.5
Barium	1.44
Cadmium	<0.01
Chromium	0.61
Mercury	<0.1
Lead	<0.15
Iron	5.03
Selenium	<0.5
Silver	<0.01
Copper	0.39
Nickel	0.79
Zinc	2.40
Chromium-Hex	<0.01
PHYSICAL PARAMETER	-
Color	BROWN
Odor	MILD
Physical State	SOLID
Layers	NONE
Cyanides	NONE
Sulfides	NONE
PCB's	NONE
Halogen	NONE
PH	6.2
TDS	SOLID
Specific Gravity	1+

Parameters	**Results** ppm
Flash Point	>100 C
Ash	NA
BTU/Gal	NONE
Viscosity	SOLID
CHEMICAL COMPOSITION	RESULTS IN %
VOC	<0.1
Soil	99+
Metals	<0.01
VOC	<0.01

Comments

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•Sander R. Sternig•Director of Laboratories•

APPENDIX J

HRS Worksheets and Supporting Documents

Facility name: HUBBARD SAND & GRAVEL CORP.

Location: 1612 FIFTH AVE., BAY SHORE, SUFFOLK COUNTY, NEW YORK

EPA Region: 2

Person(s) in charge of the facility: MARK KENEDY
HUBBARD SAND & GRAVEL CORP.
1612 FIFTH AVE., BAY SHORE, N.Y.

Name of Reviewer: A.B. SPEISER (LKB) Date: JUNE 1990

General description of the facility:
(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

A former sand and gravel mine which subsequently received brush and demolition debris. Reportedly, chromium waste was also deposited in the landfill.

Scores: S_M = 1.8 (S_{gw} = 3.2 S_{sw} = 0 S_a = 0)
S_{FE} = 0
S_{DC} = 0

FIGURE 1
HRS COVER SHEET

DOCUMENTATION RECORDS
FOR
HAZARD RANKING SYSTEM

INSTRUCTIONS: The purpose of these records is to provide a convenient way to prepare an auditable record of the data and documentation used to apply the Hazard Ranking System to a given facility. As briefly as possible summarize the information you used to assign the score for each factor (e.g., "Waste quantity = 4,230 drums plus 800 cubic yards of sludges"). The source of information should be provided for each entry and should be a bibliographic-type reference that will make the document used for a given data point easier to find. Include the location of the document and consider appending a copy of the relevant page(s) for ease in review.

FACILITY NAME: HUBBARD SAND & GRAVEL CORP.

LOCATION: BAY SHORE, SUFFOLK COUNTY, NEW YORK

GROUND WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected (5 maximum):

I) Calcium
II) Iron
III) Potassium
IV) Sodium
V) Manganese

Rationale for attributing the contaminants to the facility:

Observed in groundwater samples collected from downgradient monitoring wells.

* * *

2 ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Name/description of aquifers(s) of concern:

I) Glacial Aquifer

Depth(s) from the ground surface to the highest seasonal level of the saturated zone [water table(s)] of the aquifer of concern:

19 feet to glacial aquifer

Depth from the ground surface to the lowest point of waste disposal/ storage:

Unknown

Net Precipitation

Mean annual or seasonal precipitation (list months for seasonal):

48" mean annual

Mean annual lake or seasonal evaporation (list months for seasonal):

30" mean annual

Net precipitation (subtract the above figures):

18"

Permeability of Unsaturated Zone

Soil type in unsaturated zone:

Sand

Permeability associated with soil type:

10^{-3} cm/sec

Physical State

Physical state of substances at time of disposal (or at present time for generated gases):

solid & liquid

* * *

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Landfill no liner

Method with highest score:

3

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

		Tox.	Persist.
I)	Calcium	0	3
II)	Iron	0	3
III)	Potassium	0	3
IV)	Sodium	0	3
V)	Manganese	0	3

Compound with highest score:

Same for all

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

Unknown

Basis of estimating and/or computing waste quantity:

* * *

5 TARGETS

Ground Water Use

Use(s) of aquifer(s) of concern within a 3-mile radius of the facility:

Drinking water

Distance to Nearest Well

Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:

Northwest of site

Distance to above well or building:

3,300 feet

Population Served by Ground Water Wells Within a 3-Mile Radius

Identified water-supply well(s) drawing from aquifer(s) of concern within a 3-mile radius and populations served by each:

> 10,000

Computation of land area irrigated by supply well(s) drawing from aquifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre):

Unknown

Total population served by ground water within a 3-mile radius:

> 10,000

SURFACE WATER ROUTE

1 OBSERVED RELEASE No surface water concerns for this site.

Contaminants detected in surface water at the facility or downhill from it (5 maximum):

Rationale for attributing the contaminants to the facility:

* * *

2 ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:

Name/description of nearest downslope surface water:

Average slope of terrain between facility and above-cited surface water body in percent:

Is the facility located either totally or partially in surface water?

Is the facility completely surrounded by areas of higher elevation?

1-Year 24-Hour Rainfall in Inches

Distance to Nearest Downslope Surface Water

Physical State of Waste

* * *

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Method with highest score:

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated

Compound with highest score:

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

Basis of estimating and/or computing waste quantity:

* * *

5 TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance:

Is there tidal influence?

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

Population Served by Surface Water

Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:

Computation of land area irrigated by above-cited intake(s) and conversion to population (1.5 people per acre):

Total population served:

Name/description of nearest of above water bodies:

Distance to above-cited intakes, measured in stream miles.

AIR ROUTE

1 OBSERVED RELEASE No air release documented.

Contaminants detected:

Date and location of detection of contaminants

Methods used to detect the contaminants:

Rationale for attributing the contaminants to the site:

* * *

2 WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound:

Most incompatible pair of compounds:

Toxicity

Most toxic compound:

Hazardous Waste Quantity

Total quantity of hazardous waste:

Basis of estimating and/or computing waste quantity:

* * *

3 TARGETS

Population Within 4-Mile Radius

Circle radius used, give population, and indicate how determined:

0 to 4 mi 0 to 1 mi 0 to 1/2 mi 0 to 1/4 mi

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

Distance to critical habitat of an endangered species, if 1 mile or less:

Land Use

Distance to commercial/industrial area, if 1 mile or less:

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

Distance to residential area, if 2 miles or less:

Distance to agricultural land in production within past 5 years, if 1 mile or less:

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

Ground Water Route Work Sheet

Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 [✓ 45]	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3	2		6	
Net Precipitation	0 1 2 3	1		3	
Permeability of the Unsaturated Zone	0 1 2 3	1		3	
Physical State	0 1 2 3	1		3	
	Total Route Characteristics Score			15	
3 Containment	0 1 2 3	1		3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	[✓ 0] 3 6 9 12 15 18	1	0	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	—	8	
	Total Waste Characteristics Score		—	26	
5 Targets					3.5
Ground Water Use	0 1 [✓ 2] 3	3	6	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 12 16 18 20 24 30 32 [✓ 35] 40	1	35	40	
	Total Targets Score		41	49	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			1845	57,330	
7 Divide line 6 by 57,330 and multiply by 100		S_{gw} = 3.2			

FIGURE 2
GROUND WATER ROUTE WORK SHEET

Surface Water Route Work Sheet

Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
$\boxed{1}$ Observed Release	[✓ 0] 45	1	0	45	4.1
If observed release is given a value of 45, proceed to line $\boxed{4}$. If observed release is given a value of 0, proceed to line $\boxed{2}$.					
$\boxed{2}$ Route Characteristics					4.2
Facility Slope and Intervening Terrain	0 1 2 3	1		3	
1-yr. 24-hr. Rainfall	0 1 2 3	1		3	
Distance to Nearest Surface Water	0 1 2 3	2		6	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score			—	15	
$\boxed{3}$ Containment	0 1 2 3	1		3	4.3
$\boxed{4}$ Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 18	1		18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
Total Waste Characteristics Score			—	26	
$\boxed{5}$ Targets					4.5
Surface Water Use	0 1 2 3	3		9	
Distance to a Sensitive Environment	0 1 2 3	2		6	
Population Served/Distance to Water Intake Downstream	0 4 6 8 10 12 16 18 20 24 30 32 35 40	1		40	
Total Targets Score			0	55	
$\boxed{6}$ If line $\boxed{1}$ is 45, multiply $\boxed{1}$ x $\boxed{4}$ x $\boxed{5}$ If line $\boxed{1}$ is 0, multiply $\boxed{2}$ x $\boxed{3}$ x $\boxed{4}$ x $\boxed{5}$			0	64,350	
$\boxed{7}$ Divide line $\boxed{6}$ by 64,350 and multiply by 100			S_{sw} = 0		

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Release	[✓ 0] 45	1	0	45	5.1
Date and Location:					
Sampling Protocol:					
If line 1 is 0, the S_a = 0. Enter on line 5. If line 1 is 45, then proceed to line 2.					
2 Waste Characteristics					5.2
Reactivity and Incompatibility LAB PACK	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
RAD					
	Total Waste Characteristics Score		—	20	
3 Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
	Total Targets Score		0	39	
4 Multiply 1 x 2 x 3			0	35,100	
5 Divide line 4 by 35,100 and multiply by 100		S_a =	0		

FIGURE 9
AIR ROUTE WORK SHEET

	S	S^2
Groundwater Route Score (S_{gw})	3.2	10.24
Surface Water Route Score (S_{sw})	0	0
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$	▨	10.24
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$	▨	3.2
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$	▨	1.8

FIGURE 10
WORKSHEET FOR COMPUTING S_M

Fire and Explosion Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Containment	1 3	1		3	7.1
2 Waste Characteristics					7.2
Direct Evidence	0 3	1		3	
Ignitability	0 1 2 3	1		3	
Reactivity	0 1 2 3	1		3	
Incompatibility	0 1 2 3	1		3	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
Total Waste Characteristics Score				20	
3 Targets					7.3
Distance to Nearest Population	0 1 2 3 4 5	1		5	
Distance to Nearest Building	0 1 2 3	1		3	
Distance to Sensitive Environment	0 1 2 3	1		3	
Land Use	0 1 2 3	1		3	
Population Within 2-Mile Radius	0 1 2 3 4 5	1		5	
Buildings Within 2-Mile Radius	0 1 2 3 4 5	1		5	
Total Targets Score				24	
4 Multiply 1 x 2 x 3				1,440	
5 Divide line 4 by 1,440 and multiply by 100	S_{FE} = 0				

FIGURE 11
FIRE AND EXPLOSION WORK SHEET

Direct Contact Work Sheet

Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Incident	0 45	1		45	8.1
If line 1 is 45, proceed to line 4 If line 1 is 0, proceed to line 2					
2 Accessibility	0 1 2 3	1		3	8.2
3 Containment	0 15	1		15	8.3
4 Waste Characteristics Toxicity	0 1 2 3	5		15	8.4
5 Targets					8.5
Population Within a 1-Mile Radius	0 1 2 3 4 5	4		20	
Distance to a Critical Habitat	0 1 2 3	4		12	
Total Targets Score				32	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5				21,600	
7 Divide line 6 by 21,600 and multiply by 100	S_{DC} = 0				

FIGURE 12
DIRECT CONTACT WORK SHEET