PRELIMINARY SITE ASSESSMENT
FMC CORPORATION
PEROXYGEN CHEMICALS DIVISION
TONAWANDA, NEW YORK SITE
SITE NO. 915025

Prepared for:
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Peroxygen Chemicals Division
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1.0
INTRODUCTION

FMC Corporation (FMC) has entered into an Order on Consent (Index #B9-0431-93-06), effective November 22, 1993, with the New York State Department of Environmental Conservation (NYSDEC) to perform a Preliminary Site Assessment (PSA) at FMC's Peroxygen Chemicals Division manufacturing facility located at 37 Sawyer Avenue in Tonawanda, New York (NYSDEC Site No. 915025). Approximately 100 tons of plant waste materials were reportedly disposed of over a twelve year period (from 1964 to 1976) in two to four pits located along the southwestern portion of the plant property. Woodward-Clyde Consultants (WCC) has been retained to assist FMC in performance of the PSA.

In accordance with the terms and provisions of the Order, FMC submitted a Work Plan for conducting a PSA Investigation to the NYSDEC on January 21, 1994. A revised work plan reflecting NYSDEC comments was submitted on May 11, 1994. An addendum to this Work Plan was submitted July 14, 1994, responding to the final NYSDEC comment letter of June 28, 1994. The Work Plan, with the Addendum, was approved by NYSDEC in a letter dated August 12, 1994. In accordance with the schedule in the approved Work Plan, the PSA report is due within 60 days of receipt of laboratory data. Laboratory data was received by WCC on November 21, 1994.

This report describes the Preliminary Site Assessment (PSA) performed at the Tonawanda Plant site in accordance with the approved Work Plan. Work was completed in accordance with the schedule presented in the Work Plan. Completion of the PSA report was delayed slightly from the preliminary schedule due to delays in receipt of laboratory deliverables, which were received approximately 8 weeks after sample collection, versus the anticipated 4 to 6 weeks. No other delays were encountered.

The subsequent sections of this report present:

- The objectives of the PSA Investigation (Section 2)
- Site background information (Section 3)

- A summary of methods used, including sample locations, sampling methods, and analytical procedures (Section 4)
- Results of the field investigation (Section 5)
- Conclusions based on the findings (Section 6)
- Recommendations for additional work (Section 7)
- A certification that work was completed in accordance with the Work Plan (Section 8)

2.0
OBJECTIVES

As set forth in the Order, the objectives of this investigation are to gather data to enable the Department to (1) determine whether hazardous waste is present at the Site; and (2) if hazardous wastes are present, characterize the nature of such wastes and determine whether they constitute a significant threat to public health or the environment.

3.0
BACKGROUND

The FMC Facility is located at the corner of Sawyer Avenue and River Road in the Town of Tonawanda, Erie County, New York. A location map is provided as Figure 3-1. The plant was built by Buffalo Electro-Chemical Company (BECCO) in 1925. In 1952, BECCO was acquired by the Food Machinery and Chemical Corporation; in 1961, the company name was shortened to FMC Corporation. According to FMC personnel, chemicals produced at the facility have not changed substantially over the entire history of the facility, going back to 1925.

On January 6, 1994, FMC submitted to NYSDEC a report of a "Records Search" concerning the history of potential hazardous waste disposal at the facility. Information collected during this "Records Search" suggests that some waste disposal may also have occurred along the western boundary of the parking lot. In this PSA report, the area south of the parking lot is designated Site-1, while the area to the west is designated Site-2. A site map is provided as Figure 3-2.

Based on the available information, waste disposal activities at both Site-1 and Site-2 ceased in approximately 1976. Disposal areas were reportedly covered with clay. The 1-acre parcel of land (Site-1) has since been graded with gravel while Site-2 has been graded and grassed. According to the NYSDEC Report entitled "Inactive Hazardous Waste Disposal Sites in New York State" (NYSDEC, 1986), the pits on Site-1 were properly closed.

In 1988, Site-1 was listed by NYSDEC as an inactive hazardous waste disposal site and further classified by NYSDEC as a Class 2a site. This classification indicates that investigation is required to determine whether hazardous wastes were disposed of on-site, and, if so, whether conditions resulting from such disposal constitute a significant threat to human health or the environment.

Investigations conducted by the USGS in 1982 and 1983 (Senior, 1983), at Site-1 indicated that a tight clay layer was encountered at shallow depths (0.5 to 3.5 feet below

grade), and that no groundwater was encountered in borings drilled up to 11.5 feet in depth. Thus, there is no evidence of a continuous shallow groundwater zone which could potentially result in horizontal contamination transport.

In 1989, Ecology and Environment (E&E), under contract to the NYSDEC, performed a Phase I investigation of the FMC Site. The investigation consisted of a records review, interviews and physical inspection of Site-1. The purposes of the investigation were to provide a preliminary evaluation of the potential hazardous waste present at the time, to estimate the potential pollutant migration pathways leading off site, and to determine the natural resources or extent of the human population that might be affected by the pollutants. This information was reviewed by WCC prior to development of the PSA Work Plan.

The site is listed in the Registry of Inactive Hazardous Waste Disposal Sites in New York State as Site No. 915025. According to the current Registry Listing, NYSDEC believes that FMC used two and possibly four pits, located in an undeveloped area south of a plant parking lot, for the disposal of an estimated 100 tons of peroxygen chemicals between the years 1964 through 1976. FMC entered into an Order on Consent, effective November 22, 1993, to perform a Preliminary Site Assessment (PSA) at FMC's Tonawanda facility.

3.1 SITE DESCRIPTION

The FMC Tonawanda Plant is located in an industrial area of Tonawanda, New York between Interstate 190 and the Niagara River. The river is located approximately 1,800 feet west of the FMC Plant.

Site-1 is an approximately one acre parcel owned by FMC, located south of the current paved plant parking lot. The area is currently covered with gravel placed over thin plastic sheeting used for weed control. Site-1 is bounded by the FMC plant to the east, the plant parking lot to the north, a vacant parcel owned by FMC to the west (Site-2), and a Niagara Mohawk rail spur and coal unloading area to the south (see Figure 3-2).

The surface topography of Site-1 slopes gently to the south and west. The land surface along the western fence line of Site-1 is approximately 1 to 2 feet higher than the adjacent portion of Site-2. Based on the site topography, surface water runoff likely flows toward Site-2. A sewer line crosses Site-1. The approximate location of the sewer line is shown on Figure 3-2. There are no surface water bodies on Site-1.

Site-2 is an approximately three acre parcel, owned by FMC, located west of the plant parking lot. Site-2 is currently level and grassed. Site-2 is bordered by Site-1 and the plant parking lot to the east, Sawyer Avenue to the north, River Road (and Niagara Mohawk's Huntley Station) to the west, and the Niagara Mohawk rail spur to the south.

Site-2 is relatively flat. Intermittent surface drainage ditches are present along the northern boundary of the parcel, adjacent to Sawyer Avenue, and the western boundary, adjacent to River Road. These ditches would receive surface water runoff from Site-2. Some surface water drainage may also occur at the southern boundary of Site-1 and Site-2, along the Niagara Mohawk rail spur. Sewer lines and raw water supply lines run under Site-2, as shown on Figure 3-2. There are no surface water bodies on Site-2.

3.2 SITE HISTORY

Woodward-Clyde completed a review of the history of disposal of wastes which may be hazardous at the FMC facility, presented in the report to NYSDEC titled "Preliminary Site Assessment, Report of Records Search" dated January 6, 1994. This review included a review of documents in FMC and NYSDEC files, review of historical aerial photographs, and interviews with current and former FMC employees. The conclusions of the records search are as follows:

1. The FMC Tonawanda Plant was constructed by BECCO in 1925. Chemicals produced at the facility have changed little over time. Major products included persulfate and peroxide salts. Other chemicals produced included perborates, hydrogen peroxide, peracetic acid, and dipicolinic acid.

2. A review of records, employee interviews and a review of aerial photographs indicates that on-site disposal of potentially hazardous wastes occurred between

approximately 1952 and 1976. Disposal occurred in two areas referred to as Site-1, south of the parking lot, and Site-2, west of the parking lot (see Figure 3-2). Employees reported disposal in approximately four pits on Site-1, approximately 12 to 15 feet in diameter and 6 feet in depth. Wastes disposed in these pits reportedly included floor sweepings and product residues. One employee recalled disposal of small quantities of paint and paint solvent in Site-1. The pits were reportedly covered with clay. NYSDEC (NYSDEC, 1986) has acknowledged that Site-1 pits were properly closed.

3. Eighteen geotechnical soil borings were advanced on the western portion of the plant property between 1967 and 1969. Plant waste was reported in two of the eighteen borings, and evidence of fill (e.g., wood fragments) was reported in one boring. The remaining borings reported native soils.

4. In general, the potentially hazardous wastes reportedly disposed of on-site were primarily composed of plant products which do not include hazardous wastes listed in present RCRA or NYSDEC hazardous waste regulations. Under present regulatory provisions, some waste materials may have exhibited the characteristic of ignitability at the time of disposal. However, due to the rapid degradation rates of these chemicals, which are strong oxidizers, products disposed of on-site have almost certainly degraded into salts over time, and would therefore no longer exhibit the characteristic of ignitability. One employee recalled that paint wastes and solvents, likely representing low volume wastes, were also disposed of in the pits on Site-1. These wastes represent potentially hazardous wastes. Paint wastes reportedly contained 1,1,1-trichloroethane. Paint wastes also potentially contain flammable solvents and heavy metal pigments, and could exhibit other hazardous waste characteristics. Oily rags from the powerhouse, possibly containing residues of 1,1,1-trichloroethane used to clean equipment, were also reportedly placed in the pits on Site-1. A small quantity of unknown product from another FMC plant and warehoused at the FMC Tonawanda facility may have been disposed of in one of the pits on Site-1.

5. The review of aerial photographs indicated disturbed areas or excavations generally correlating with information obtained during employee interviews. In

Site-1, three areas of disturbance or excavation were noted in the 1966 and 1969 aerial photographs (see Figure 3-2). One or more additional pits in the southwest corner of Site-1, reported to have existed in the 1950's to 1968 by Mr. Clarence Dick, may not be evident in the aerial photographs.

Aerial photographs indicate disturbance or excavations in Site-2 just west of the parking lot fence, consistent with locations of a disposal area reported by two employees. Small piles of material in the central portion of Site-2 in the 1969 aerial photograph and an unvegetated area on the western portion of Site-2 are consistent with reports of use of coal ash to fill this area.

6. The native clays underlying the entire site, including any disposal pits, represent a barrier to contaminant migration.

Additional supporting documentation is provided in the "Records Search" Report.

3.3 SITE GEOLOGY/HYDROLOGY

The Site is located within the Erie-Ontario Lowlands Physiographic Province of New York, which is characterized by a thick, gently dipping (southward at a rate of 20 to 50 feet per mile) sequence of rock formations, ranging from sandstones and shales to dolomites and limestones from the Silurian and Devonian Periods. The site is underlain by the Late Silurian Camillus Formation, a member of the Salina Group. The Camillus Formation lithology consists of gray to light gray shale, siltstone and dolostone with occasional to abundant lenses, veins, and beds of anhydrite, halite, and gypsum. Gypsum is the most predominant evaporite mineral present. Groundwater flow is primarily through secondary features of fractures and solution cavities. The Camillus contains significant groundwater reserves in secondary cavities formed by dissolution of the evaporite deposits, but this water is generally of poor quality and unacceptable for use as a municipal or private water supply due to the high concentrations of dissolved ionic species. Some industrial supply wells have been completed in the Camillus Formation. Groundwater flow in the bedrock across the site is probably toward the Niagara River.

The surficial geology of Western New York has been largely controlled by the effects of Pleistocene glaciation. Glacial deposits in the Erie-Ontario basin of Western New York were formed almost entirely during Late Wisconsinan time by an expansion of the Laurentide Ice Sheet. This period of glaciation began approximately 30,000 years before present and lasted until approximately 12,000 years before present. The resultant deposits in the area include glacial moraine, till, drift, and lacustrine deposits. Lacustrine deposits were the result of embayments and water level fluctuations caused by the influx of glacial meltwater trapped in the Erie Basin by retreating ice and glacial moraines. This resulted in several episodes of water level fluctuations in the Erie basin at significantly higher elevations than the current Lake Erie level. These lacustrine deposits frequently overlie previous glacial deposits.

The lacustrine deposits are medium to fine sand, silt, and clay, which are thin to massively bedded. These deposits typically exhibit very low vertical permeabilities. The silt and clay deposits are frequently varved and there is some moderate permeability along the bedding planes in some locations.

The site stratigraphy, as indicated by the geotechnical investigation conducted by Pittsburgh Testing Laboratories, shows varying thin layers of fill consisting of crushed stone, slag, cinders, sand, silt and clay to a maximum depth of 5.1 feet, then brown to red-brown silty clay with traces of gravel to a depth of 25 feet. Two geotechnical borings were continued to bedrock. The locations of these borings were in Site-1 and the central portion of the parking lot. The log of the boring from Site-1 indicates that the silty clay lacustrine deposits continued to a depth of approximately 58 feet where weathered bedrock was encountered. The log of the boring from the central portion of the parking lot indicates that the silty clay lacustrine deposits continue to a depth of approximately 49.5 feet, where very dense silty fine sand with gravel was encountered, which is most likely till. The till was approximately 6 feet in thickness below which weathered bedrock was encountered at a depth of approximately 55 feet.

The hydrology of the unconsolidated deposits varies. The predominant lithology on the site, the lacustrine silty clay, is of very low permeability. Samples of this material collected from locations approximately 1/2 mile south of the FMC facility show permeability of undisturbed samples in the range of 10^{-8} cm/second. The hydraulic

conductivity of the fill and till are not known. The nature and thickness of the fill varies widely and the permeability of the material may be expected to correspond accordingly. The typical thickness of the fill in the geotechnical investigation was about 2 feet. Water was reported in only one geotechnical boring at completion, and was likely associated with the crushed stone fill below asphalt pavement. The sewer line which transects the central portion of Site-2 and the parking lot may include coarse granular fill and pipe bedding which would have higher permeabilities than the natural formations. Shallow groundwater on the site most likely occurs as discontinuous perched water above the natural deposits. Perched water was observed in the fill/waste layers overlying the clay in some test pits excavated during this investigation.

The very low permeability of the natural deposits likely precludes hydraulic connection between the isolated areas of granular fill. The thickness of the lacustrine deposits above the bedrock also prevents vertical flow of the perched water downward.

4.0
METHODS

The Work Plan presented a detailed Sampling and Analysis Plan, Quality Assurance Plan, and Health and Safety Plan. The field investigation methods were consistent with those specified in the Work Plan except as noted below. This section presents a summary of sample locations and sampling and analytical methods used in the investigation.

4.1 SAMPLING PROCEDURES

4.1.1 Waste Samples

In accordance with the Work Plan, test pits were excavated around four suspected waste disposal locations on Site-1 (designated A through D), and four suspected waste disposal locations of Site-2 (designated E through H). In addition, at the request of NYSDEC, test pits were excavated in the western portion of Site-2 (location I), where coal ash and cinders may have been placed as fill. Figure 4-1 illustrates the location of the test pits. All test pit excavations were inspected by a WCC geologist, and observations were recorded in logs (see Appendix A).

The Work Plan required excavation of up to eight test pits around each suspected waste disposal pit location. At some locations, fewer than eight test pits were excavated or test pits were relocated due to:

- the small area encompassed by some locations, and overlap with an adjacent location,
- the presence of underground utilities which precluded safe excavation in the northern portion of Location G,
- the property boundary, which represented the southern limit of investigation at Locations A and D.

Based upon these field conditions, fewer than eight test pits were excavated at location B on Site-1 (7 test pits) and Location G on Site-2 (4 test pits). Additional test pits were excavated at locations A, C, and D on Site-1 (9, 10, and 9 test pits, respectively), and locations F, H and I on Site-2 (9 test pits each). A total of 75 test pits, versus 72 planned, were excavated. Modifications in the excavation program were reviewed in the field with NYSDEC's on-site representative, Mr. J. Hyden, and were approved. As shown in Figure 4-1, the test pit excavations provided broad coverage of the potential areas of concern.

The Work Plan required collection of waste samples for analysis at each location where evidence of disposal of apparent waste materials was observed, based upon visual observations or field testing. At each test pit location where potential plant wastes were encountered, representative samples were tested in the field for presence of oxidizers. No positive results for oxidizers were recorded. At locations where plant wastes were encountered, organic vapor analyses using field instrumentation (Century OVA or HNu meter) were used to screen samples for potential volatile organics. At test pits in Location A where apparent waste materials were encountered (test pits A-1 through A-6), organic vapor readings of waste sample jar headspace were recorded, in accordance with the Work Plan. At Location D, waste sample jar headspace readings were not accomplished due to a malfunction of the OVA. However, direct readings of organic vapors over uncontained apparent waste materials were obtained prior to the OVA malfunction. Elevated organic vapor readings were observed in some test pits in Locations A and D. These results were considered in selecting samples for laboratory analyses.

Based upon the field test results, and visual observations of material encountered in the test pits, it was determined that residual plant waste was encountered at only two waste pit locations (Areas A and D on Site-1). Samples of waste for laboratory analysis were collected from these locations, in accordance with the Work Plan. Composite samples were prepared from materials showing the greatest potential for contamination based upon field observations. At Location A, a sample was collected based upon the organic odor observed, primarily related to a green clayey material observed at this location. Some metallic sandy material was also observed at Location A. At Location D, a sample was collected based on observations of white, hard salt-like materials, oily/tarry

material, and a grease-like material, in conjunction with reworked silty clay. In general, samples were collected from the backhoe bucket. At Location A, a sample of the odorous clayey material was collected directly from the pit sidewall, because this material was not effectively captured by the backhoe bucket.

Selection of waste sample locations was reviewed and approved in the field by NYSDEC's representative, J. Hyden.

4.1.2 Soil Samples

The Work Plan required collection of soil samples from the natural clay unit underlying each location where apparent waste materials were encountered. In accordance with the Work Plan, grab soil samples for chemical analysis were collected at locations A and D. Undisturbed Shelby tube samples for geophysical analysis (grain size and permeability) were collected from Location C on Site-1 and Location F on Site-2.

4.1.3 Decontamination Procedures

All non-dedicated equipment used during waste and soil sampling activities was thoroughly decontaminated prior to each use according to the following procedures:

1. Brush all foreign material off of equipment
2. Rinse with de-ionized water rinse.
3. Wash with non-phosphate detergent/potable water solution.
4. Rinse with de-ionized water rinse.
5. Air dry.

The backhoe was decontaminated between sample locations by means of a high-pressure steam or spray wash and prior to being mobilized on the site.

All fluids generated during decontamination were containerized for proper disposal by FMC.

4.2 ANALYTICAL PROCEDURES

A summary of analyses performed and analytical methodologies is provided in Tables 4-1 and 4-2.

4.2.1 Waste Samples

The following waste classification tests were performed on waste samples:

- Ignitability (oxidizers)
- Toxicity Characteristic Leaching Procedure (TCLP)
  -- Metals
  -- Volatile organics
- PCBs

Volatile organic analysis was performed on a grab sample from test pit A-5. Test pit A-5 had the highest headspace OVA readings, and organic odors were observed at this location. Volatile organic analysis was performed on a composite sample from Location D-4. Location D-4 was selected for analysis because it contained the greatest quantity of apparent waste materials of any pit in Location D based upon visual observations. The remaining analyses were performed on samples composited across the depth of apparent waste materials observed in the test pits at Locations A-5 and D-4.

At the request of NYSDEC, TCL-semi-volatile organic analysis was performed at one location (Location D-4) on Site-1, selected based upon visual evidence of potential organic contamination.

4.2.2 Soil Samples

Soil samples were collected from the upper unit of natural soil or clay underlying Locations A and D. These samples were analyzed for Target Compound List (TCL) volatile organic compounds and RCRA metals, to evaluate potential migration of waste constituents into soil underlying the pits. Volatile organic analyses were performed on a grab sample representing the top of the natural clay/soil stratum. The remaining

analyses were performed on a composite of the upper two feet of the natural soil/clay layer. At the request of NYSDEC, TCL semi-volatile organic analysis was performed at Location D-4 on Site-1, selected on the basis of visual evidence of potential organic contamination in overlying waste materials. One sample of the natural clay soils from each of Site-1 and Site-2 was collected and analyzed for grain-size distribution and permeability.

4.2.3 Analytical Procedures

A summary of sample analyses performed is presented on Table 4-1. Analytical protocols that were used for this investigation are summarized on Table 4-2. Analytical parameters are summarized on Table 4-3. Analyses were performed by Nytest Environmental, Inc., (NYS Lab ID No. 10195) with the exception of the analyses of oxidizers and permeability, and grain size analyses. Potential presence of oxidizers was screened using ASTM Method D-4981-89 (Standard Test Method for Screening of Oxidizers in Wastes). If presence of oxidizers was indicated in a waste sample by the screening, the sample was to be analyzed for the hazardous waste characteristic of ignitability (for solid oxidizers) in accordance with 49 CFR 173, Appendix F. All results of screening tests for oxidizers were negative, thus no further analysis for oxidizers was required. Analyses for permeability and grain size were performed by WCC using ASTM methods D5084-90 for permeability and D-422 for grain size. There are no NYSDOH protocols for these analyses.

4.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

QA/QC procedures were followed in accordance with Appendix A of the Work Plan. QA/QC samples were collected in the field at the required frequency, including field replicate and equipment blank samples.

Analytical results provided by the laboratory were reviewed and validated by WCC using the following documents as guidance:

1. CLP Organics Data Review and Preliminary Review. SOP No. HW-6, Revision 8. USEPA Region II. January 1992.

2. Evaluation of Metals Data for the Contract Laboratory Program (CLP) based on SOW 3/90, Revision XI. USEPA Region II. January 1992.

5.0
RESULTS

5.1 FIELD OBSERVATIONS

Test pit logs, summarizing field observations, are presented in Appendix A. Significant field observations are summarized on Table 5-1 and are discussed below.

Visual evidence of waste disposal was encountered at two locations on Site-1, locations A and D, both located near the southern property boundary. No substantial evidence of waste disposal was encountered at locations B and C on Site-1, or at locations E through I on Site 2.

Location A. Evidence of waste disposal was observed in the eastern portion of Area A, primarily in test pits A-5, A-6, and A-9, where copper colored sand-like material, wood, wire, ceramic material, metal, and drum ring remnants were observed, in addition to fill materials (e.g., flyash and slag) found in other portions of the site. Odorous clayey material with slightly elevated organic vapor readings was also observed in test pits A-5 and A-8. Apparent waste materials were encountered to depths approximately 5 feet below ground surface (bgs) where the native clay was observed. The remaining test pits in Area A encountered typical fill material (primarily flyash and slag) found in other portions of the plant site. Three waste samples (from pits A-5, A-6, and A-9) were tested for presence of oxidizers. All results were negative.

Location B. No evidence of plant waste materials was encountered in Area B. Fill materials consisting primarily of flyash, with some brick, wood, metal and ceramic material were encountered in this area, to depths of approximately 5 feet.

Location C. No substantial evidence of plant waste was encountered in Area C. One isolated small clump (approximately 2″ x 3″ x 4″) of a salt-like material was encountered. This material was tested for presence of oxidizers, with negative results. This test pit, and the other test pits in Area C encountered flyash used as fill material.

Location D. Evidence of plant waste was encountered in several test pits in Location D (test pits D-2, D-3, D-4, D-5, D-8, D-9, and D-10). Apparent waste materials encountered included salts, drum ring remnants, oil/tar, grease and copper colored sand-like material. Waste materials were encountered at depths up to 7 feet bgs, where the native clays were encountered. Five waste samples were tested for presence of oxidizers (test pits D-2, D-3, D-4, D-5, and D-8); all results were negative. Fill material in this area included flyash and rubble (bricks and wood). Elevated organic vapor readings were encountered in several test pits in Location D.

Location E. No evidence of plant waste disposal was encountered in Location E. Fill material encountered in this area included flyash and rubble (brick, metal, cement, wire, clay, tile and asphalt). Fill was encountered to depths up to 7.5 feet bgs.

Location F. No evidence of plant waste or disposal was encountered in Location F. Fill material was limited in this location, with some rubble (concrete, brick, ceramic, shotrock) observed near the surface. The native clay layer was encountered at depths ranging from 1.0 to 3.5 feet bgs.

Location G. No evidence of plant waste disposal was encountered at Location G. Some fill material was observed near the surface, with slag, flyash, and rubble (brick and ceramic material) encountered at depths ranging from 1.5 to 3.0 feet.

Location H. No evidence of plant waste disposal was encountered at Location H. Fill materials, including slag, flyash and rubble (wood, metal, ceramic, brick) were encountered at depths up to 5.0 feet bgs.

Location I. No evidence of plant waste disposal was encountered at Location I. Miscellaneous fill materials, primarily rubble (brick, concrete, metal, asphalt, wood) and some coal and slag, were encountered at depths up to 4.0 feet bgs. A sandy material was encountered in test pit I-7. This material was tested for presence of oxidizers; results were negative.

The approximate extent of plant waste disposal identified during this investigation is shown on Figure 4-1. The approximate northern and western limits of apparent waste

materials in Locations A and D were determined based on field observations. The southern and eastern limits were not defined. Fill materials (flyash, broken ceramic, brick and wood) were encountered in the test pits located immediately south of the sewer line (e.g., test pits B-2, B-4, B-6, B-7, D-1, D-6, H-2, H-3, H-5, and H-6). However, no evidence of plant waste materials was observed in these test pits.

5.2 ANALYTICAL RESULTS

5.2.1 Waste Samples

Waste samples were collected from Locations A and D on Site-1, the only locations where evidence of disposal of plant waste was encountered (e.g., observation of apparent waste material, staining and elevated OVA readings). Based on field observations, samples for analysis were collected from test pits A-5 and D-4. Results of analyses of these samples are presented on Tables 5-2 through 5-4.

5.2.1.1 TCLP Results

TCLP results for the waste samples are presented on Table 5-2. All TCLP-volatile organics and 1,1,1-trichloroethane, which is not on the TCLP parameter list but was analyzed at the request of NYSDEC, were below detection limits. All TCLP metals were below the applicable regulatory limit for the toxicity characteristic.

5.2.1.2 PCB Results

PCBs were detected in both waste samples. Aroclors-1254 and 1260 were reported in replicate samples from test pit D-4, at concentrations ranging from 6.8 to 14 mg/kg (ppm) (see Table 5-3). Aroclor-1260 was reported in the sample from test pit A-5, at a concentration of 16,000 mg/kg (ppm).

5.2.1.3 Semi-Volatile Organics

Table 5-4 presents a summary of semi-volatile organic results for the waste sample from test pit D-4, selected based on field observations as the sample location with the highest

potential for contamination by organic compounds. Semi-volatile organics in this sample were generally low or non-detected. As expected, the primary semi-volatile organics detected were polyaromatic hydrocarbons (PAHs). PAHs detected included:

Compound	Concentration (mg/kg) (ppm)
naphthalene	1.2
2-methylnaphthalene	1.8
acenaphthene	0.44
dibenzofuran	0.38
fluorene	0.54
phenanthrene	4.7
fluoranthene	1.7
pyrene	1.9
benzo(a)anthracene	1.1
chrysene	1.3
benzo(b)fluoranthene	0.7
benzo(k)fluoranthene	0.68
benzo(a)pyrene	0.31
indeno(1,2,3-c,d)pyrene	0.22
dibenzo(a,h)anthracene	0.14
benzo(g,h,i)perylene	0.15

As noted in Section 5.1.1 of the Work Plan, it was anticipated that low concentrations of PAH would be detected due to the extensive use of coal at the adjacent Niagara Mohawk facility, and use of asphalt paving materials at the FMC site. Thus, these compounds are not considered indicative of plant waste materials.

The only other semi-volatile organic compounds detected were:

Compound	Concentration (mg/kg)
4-methylphenol	0.89
1,2,4-trichlorobenzene	1.0
butylbenzylphthalate	0.66
bis(2-ethylhexyl)phthalate	3.8

The presence of 1,2,4-trichlorobenzene may be related to the presence of PCBs at this location. Trichlorobenzenes have also been used as pesticides. The phthalate esters are common plasticizers, and are common laboratory artifacts. 4-methylphenol (o-cresol)

has been used as a disinfectant. None of these compounds is a known or suspected hazardous constituent of plant wastes from the FMC Tonawanda Plant.

5.2.1.4 Summary

All TCLP test results on samples of apparent waste materials from Locations A and D were below regulatory criteria for hazardous wastes. PCBs were detected in waste samples from Locations A and D. Analysis of a selected sample for semi-volatile organic compounds did not detect any compounds considered known or suspected hazardous constituents of plant wastes generated at the FMC Tonawanda Plant.

5.2.2 Soil Samples

Soil samples were collected from the native clays underlying waste disposal pits in Locations A and D. In accordance with the Work Plan, samples for volatile organic compounds were grab samples from the upper 6 inches of the native clay underlying the pits. Remaining parameters were analyzed on composite samples of the upper two feet of the native clay. Results of analyses for these samples are presented in Tables 5-5 through 5-7, and are discussed below.

5.2.2.1 Volatile Organics

Volatile organic compounds were generally low or not detected in soil samples from Locations A-5 and D-4 (see Table 5-5). The following volatile organic compounds were detected in soil samples:

	Concentration (mg/kg)		
Compound	D-4	D-4 Dup.	A-5
methylene chloride	0.013		
acetone	0.16	0.15	
benzene			0.001
tetrachloroethene			0.063
toluene	0.002	0.002	
chlorobenzene			0.002
ethyl benzene	0.002	0.002	0.003
xylenes (total)	0.002	0.003	0.096

Acetone and methylene chloride were detected in laboratory method blanks, and may be laboratory artifacts.

As shown above, all volatile organic compounds were below 0.2 mg/kg (ppm) in the upper 6 inches of native soils under the waste disposal pits, and most detected compounds were below 0.01 mg/kg.

5.2.2.2 Semi-Volatile Organics

As shown in Table 4-6, no semi-volatile organic compounds were detected in native soils underlying the waste disposal pits.

5.2.2.3 Metals

Metal concentrations in native clays underlying waste disposal pits are summarized on Table 5-7. Metal concentrations were generally low or not detected, and appear to be typical of natural background metal concentrations.

5.2.2.4 Summary

Low concentrations (less than 0.2 mg/kg) of volatile organic compounds were detected in the native clays underlying waste disposal pits in Locations A and D. No semi-volatile organic compounds were detected, and reported metal concentrations were low, and apparently typical of natural background.

5.3 GEOPHYSICAL TESTING

Geophysical property testing was performed on samples of the native clay layer underlying Site-1 and Site-2. Samples from test pit C-7 on Site-1 and F-8 on Site-2 were tested for grain-size distribution and permeability, to evaluate the effectiveness of the clay layer as a barrier to contaminant migration. Geophysical test results are included in Appendix B. Results are discussed below.

Based on grain-size distribution, both samples were classified as clay. The Site-1 sample was classified as a brown slightly plastic clay with traces of fine gravel and fine sand, and 87.4% passing a 200 mesh sieve. The permeability of this sample was 3.3×10^{-7} cm/sec.

The Site-2 sample was classified as a red-brown medium plastic silty clay, with traces of coarse-fine sand. Permeabilities for replicate samples from Site-2 were 1.1×10^{-6} and 2.0×10^{-7} cm/sec. Reported clay densities were in the range of 130.3 to 134.5 pounds/cubic foot, or about 1.8 tons/cubic yard.

5.4 QUALITY ASSURANCE/QUALITY CONTROL

Field replicate samples and equipment (field) blanks were collected in accordance with the Work Plan requirements. Analytical data were reviewed and validated by WCC. The results of the data validation are discussed in Appendix C, and appropriate data qualifiers have been incorporated into the data summary tables in this report. The overall conclusion of the data validation was that the data reported were acceptable for their intended use, with minor qualification. No substantial contamination was detected in equipment blanks. Acceptable precision was achieved in analyses of field replicate samples. Additional details concerning the data validation can be found in Appendix C. Copies of laboratory data summary forms (Form-1s) are included in Appendix D.

6.0
CONCLUSIONS

The following conclusions are based on the results of the PSA field investigation.

1) Evidence of disposal of plant manufacturing waste was encountered at only two of nine suspected disposal pit locations. These two locations (Locations A and D on Site-1) are both located along the southern property boundary. The approximate extent of waste to the west and north of these disposal pits was determined by observations during test pit excavations. The eastern and southern extent of waste disposal was not determined. Depth of waste disposal ranged to approximately 7 feet bgs.

2) A native clay layer was encountered at all test pit locations, at depths ranging from 2 to 7 feet bgs. Previous geotechnical investigations at the site indicate that the thickness of the clay layer is on the order of 50 feet and underlies the entire site. The clay layer has low permeability in the range of 2×10^{-7} to 1×10^{-6} cm/sec.

3) Miscellaneous fill materials (primarily flyash, slag and rubble) were encountered at most test pit locations.

4) None of the samples collected for analysis exhibited a hazardous waste characteristic. All tests for presence of oxidizers, the primary plant waste, were negative, confirming that any oxidizing materials disposed of at the site have decomposed to innocuous salts. All TCLP results were below regulatory criteria for hazardous waste. No semi-volatile organics representative of plant wastes were reported in apparent waste materials.

5) The PCB concentration in the sample from Location A on Site-1 was well above the NYS hazardous waste criterion. The source of PCBs at this location is unknown. The extent of PCB contamination was not determined in this investigation. Due to the low mobility of PCBs, the low permeability

of the native clay underlying the site, and the clay cover placed over the disposal pits, no substantial migration of PCBs from the original disposal location is anticipated.

Thus, the risk to human health or the environment is minimal.

6) Analysis of native clay samples underlying waste disposal pits did not indicate any significant migration of contaminants from the waste. Only traces (less than 0.2 mg/kg) of volatile organic compounds were detected. No semi-volatile organics were detected. Reported metal concentrations were typical of background.

7) The locations of waste disposal pits identified during this investigation were not in the vicinity of the sewer lines crossing Site-1 and Site-2. The location of wastes, in conjunction with the low permeability of the native clays into which wastes were placed, indicated no substantial potential for waste related contaminants to be transported in the sewer lines or bedding materials.

8) Based upon the low permeability of the native clay underlying the site, the low concentration of constituents found in soil directly underlying the waste disposal pits, and the low mobility of PCBs, there is no evidence suggesting potential for groundwater contamination due to past waste disposal practices at the site.

7.0
RECOMMENDATIONS

7.1 GENERAL RECOMMENDATIONS

Additional investigation is proposed to determine the extent of PCB contamination in apparent waste materials, and potentially in underlying soils at the site. Due to the low mobility of PCBs, the low permeability of the native clay underlying the site and the clay cover placed over the disposal pits, PCB contamination is probably localized, primarily at Location A-5. However, detection of PCBs at Location D-4, indicates the possibility that PCBs may be present throughout the waste disposal locations A and D. The PSA investigation did not include testing for PCBs in soils underlying the waste disposal pits, and test trench excavations did not delineate the extent of apparent waste present to the south and east of Locations A and D. Therefore, additional investigation is proposed to characterize the vertical and horizontal extent of PCB contamination at these locations. It is recommended that reclassification of the site be deferred pending completion of the additional investigation.

No other additional work is recommended. The results of the PSA investigation confirmed that:

- Plant wastes (oxidizers) disposed in the pits, and potentially exhibiting the hazardous waste characteristic of ignitability, have decomposed, as expected, and are no longer hazardous. No evidence of materials exhibiting hazardous waste characteristics was identified during the PSA.

- The low permeability natural clay layer underlying the site represents an effective barrier to contaminant transport. Thus, potential for groundwater contamination related to waste disposal is not a concern, and groundwater monitoring is not warranted.

- There is no evidence that hazardous wastes were disposed of in proximity to the sewer lines crossing the site. Thus, no additional testing of the sewer lines or backfill materials is warranted.

7.2 ADDITIONAL INVESTIGATION

The following work is recommended to characterize the vertical and horizontal extent of PCBs at Locations A and D on Site-1 at the FMC Tonawanda Plant.

7.2.1 Vertical Extent

Four soil borings are proposed for vertical delineation, two each in Locations A and D. The purpose of these borings is to determine whether PCB contamination has penetrated the native clay underlying the pits. These borings will penetrate the native clay underlying the disposal pits to a depth of approximately 2 feet. Using a split spoon sampler, soil samples will be collected from 0″ to 6″, 6″ to 12″, and 18″ to 24″ from the top of the clay layer. The samples will be analyzed sequentially in order of increasing depth. For example, if the 0″ to 6″ sample from a given boring does not contain PCBs (< 1 ppm), no analysis of deeper samples at that location will be performed. In this manner, the depth of penetration of PCBs into the clay layer, if any, will be determined. If visual observations in the field suggest contamination more than two feet into the clay layer (e.g., oily staining), the boring will be extended, and additional samples will be collected at one foot intervals, until visual evidence of contamination is absent, samples collected will be analyzed sequentially with depth as described above.

One boring in each of Location A and D will be advanced at the approximate locations of samples containing PCBs encountered during the PSA. A second boring will be advanced near the center of the disposal area based on data collected to date. The approximate location of these borings is shown on Figure 7-1.

7.2.2 Horizontal Delineation

A series of additional shallow borings will be advanced in a grid pattern covering the area surrounding waste disposal Locations A and D. The purpose of this grid is to

establish the horizontal extent of PCBs in apparent waste materials above the clay layer. The grid will be established on approximately 25-foot centers starting at locations of waste disposal identified during the PSA, and will proceed outward until evidence of plant waste is no longer encountered in the borings. Assuming access is granted, the grid will be extended to the south, onto the Niagara Mohawk property adjacent to FMC. It is anticipated that the initial off-site borings will be located near the property line (within approximately 5 feet). Due to the presence of railroad tracks, a berm, and a ditch on the Niagara Mohawk property, boring locations in this area will likely be modified in the field based on accessibility. The approximate locations of the proposed boring grid is shown on Figure 7-1.

Four additional borings will be advanced in the immediate vicinity of test pit location A-5, to better delineate the horizontal extent of PCB contamination in this area. These borings will be placed approximately 12 feet away from the original sample location (see Figure 7-1).

The shallow borings will be advanced through waste/fill to the top of the clay layer. Waste/fill samples above the clay layer will be collected from split spoon samplers. Samples for analysis will be selected in the field based on visual evidence of contamination (e.g., oily stains) if any. If no evidence of contamination is observed, samples for analysis will be collected from the split spoon immediately above the native clay layer.

7.2.3 Sampling and Analysis

With the exception of the use of borings rather than test pits to collect samples, the sampling and decontamination procedures presented in the approved Work Plan will be followed.

Samples will be analyzed for PCBs, using EPA Method 8080.

7.2.4 QA/QC

Applicable provisions of the QA Plan presented in Appendix A of the approved PSA Work Plan will apply to the additional investigation. Field replicate samples will be collected on the basis of one replicate per 20 field samples. Due to the limited potential for cross-contamination of samples by PCBs, only two equipment blanks will be collected during the field program.

7.2.5 Health and Safety

The Health and Safety Plan presented as Appendix B to the approved Work Plan will apply to the additional investigation. An addendum to the Health and Safety Plan will be developed to specifically address the hazards associated with PCBs prior to conducting the proposed field work.

8.0
CERTIFICATION

Woodward-Clyde Consultants provided full-time inspection of field work, and completed this PSA report in accordance with the provisions of the Work Plan. Location and number of test pits installed during the investigations were subject to minor modifications, based upon field conditions, as documented in this report and as approved by NYSDEC's field representative. Due to equipment malfunction, organic vapor headspace readings were not obtained for waste samples from Location D. However, organic vapor screening of waste samples in this area was completed prior to the malfunction, and these data were considered in selection of samples for laboratory analyses. No other significant deviations from the Work Plan occurred.

Tables

TABLE 4-1

SUMMARY OF SAMPLING AND ANALYSIS
PRELIMINARY SITE ASSESSMENT
FMC, TONAWANDA, NEW YORK SITE

Sample Matrix	Laboratory Parameters	QA Samples: Investigative Samples	Equipment Blanks	Field Replicates	MS/MD[1] Samples	Matrix Total
Waste	Oxidizer Screening[2]	10	--	--	--	10
	TCLP - VOCs	2	--	1	1/1	5
	TCLP - Metals	2	--	1	1/1	5
	TCL - Semi-Volatiles	1	--	--	--	1
	PCBs	2	1	1	1/1	6
Soil	TCL - VOCs	2	1	1	1/1	6
	RCRA - Metals	2	1	1	1/1	6
	TCL - Semi-Volatiles	1	--	--	--	1
	Permeability	2	--	--	--	2
	Grain Size	2	--	--	--	2

Notes:

(1) Matrix spike/matrix spike duplicate samples. Oxidizer screening will consist of a laboratory duplicate sample analysis. A matrix spike/laboratory duplicate analysis will be performed for metals.

(2) The DOT oxidizer test (49 CFR 173 Appendix F) will be applied to any wastes identified as potential oxidizers based on the oxidizer screening test.

TCLP Toxicity characteristics leaching procedure.

TCL Target compound list

VOCs Volatile organic compounds

TABLE 4-2

ANALYTICAL METHODS
PRELIMINARY SITE ASSESSMENT
FMC, TONAWANDA, NEW YORK SITE

Matrix	Parameters	Method	Method Reference
Waste	Oxidizer Screening	D-4981-89	1
	DOT Oxidizer Test	---	2
	TCLP Extraction	---	3
	TCLP - VOCs	91-1	3
	TCLP - Metals	CLP-M	3
	TCL - Semi-Volatiles	91-2	3
	PCBs	91-3 Modified(1)	3
Soil	TCL VOCs	91-1	3
	RCRA - Metals	CLP-M	3
	TCL - Semi-Volatiles	91-2	3
	Permeability	D5084-90	1
	Grain Size Analysis	D422	1

Notes

TCLP Toxicity characteristic leaching procedures

TCL Target compound list

(1) Modified for the analysis of PCBs only

NB Data packages for method reference 3 will be consistent with ASP Category B type deliverables.

Method References

(1) American Society for Testing and Materials (ASTM), 1990.
(2) 49 CFR 173 Appendix F.
(3) NYSDEC Analytical Services Protocol (ASP), 1991.

TABLE 4-3
ANALYTICAL PARAMETERS
PRELIMINARY SITE ASSESSMENT
FMC, TONAWANDA, NEW YORK SITE

TCLP - Volatile Organic Compounds (Waste)

- benzene
- carbon tetrachloride
- chlorobenzene
- chloroform
- 1,2-dichloroethane
- 1,1,1-trichloroethane
- tetrachloroethylene
- trichloroethylene
- 1,1-dichloroethylene
- vinyl chloride
- methyl ethyl ketone

TCL - Volatile Organic Compounds (Soil)

- chloromethane
- bromomethane
- vinyl chloride
- chloroethane
- methylene chloride
- acetone
- carbon disulfide
- 1,1-dichloroethene
- 1,1-dichloroethane
- 1,2-dichloroethene (total)
- chloroform
- 1,2-dichloroethane
- 2-butanone
- 1,1,1-trichloroethane
- 1,1,2,2-tetrachloroethane
- chlorobenzene
- xylenes (total)
- carbon tetrachloride
- bromodichloromethane
- 1,2-dichloropropane
- cis-1,3-dichloropropene
- trichloroethene
- dibromochloromethane
- 1,1,2-trichloroethane
- benzene
- trans-1,3-dichloropropene
- bromoform
- 4-methyl-2-pentanone
- 2-hexanone
- tetrachloroethene
- toluene
- ethyl benzene
- styrene

TCL - Semi-Volatile Organic Compounds (Waste and Soil)

- phenol
- bis(2-chloroethyl)ether
- 2-chlorophenol
- 1,3-dichlorobenzene
- 1,4-dichlorobenzene
- 1,2-dichlorobenzene
- 2-methylphenol
- 2,2-oxybis (1-chloropropane)
- 4-methylphenol
- n-nitroso-di-n-propylamine
- hexachloroethane
- nitrobenzene
- isophorone
- 2-nitrophenol
- 2,4-dimethylphenol
- bis(2-chloroethoxy)methane
- 2,4-dichlorophenol
- 1,2,4-trichlorobenzene
- naphthalene
- 4-chloroaniline
- hexachlorobutadiene
- 4-chloro-3-methylphenol
- 2-methylnaphthalene
- hexachlorocyclopentadiene

TABLE 4-3
ANALYTICAL PARAMETERS
PRELIMINARY SITE ASSESSMENT
FMC, TONAWANDA, NEW YORK SITE

(Continued)

TCL - Semi-Volatile Organic Compounds (Waste and Soil) (continued)

- 2,4,6-trichlorophenol
- 2,4,5-trichlorophenol
- 2-chloronaphthalene
- 2-nitroaniline
- dimethylphthalate
- acenaphthylene
- 2,6-dinitrotoluene
- 3-nitroaniline
- acenaphthene
- 2,4-dinitrophenol
- 4-nitrophenol
- dibenzofuran
- 2,4-dinitrotoluene
- diethylphthalate
- 4-chlorophenyl-phenyl-ether
- fluorene
- 4-nitroaniline
- 4,6-dinitro-2-methylphenol
- n-nitrosodiphenylamine
- 4-bromophenyl-phenylether
- hexachlorobenzene
- pentachlorophenol
- phenanthrene
- anthracene
- carbazole
- di-n-butylphthalate
- fluoranthene
- pyrene
- butylbenzylphthalate
- 3,3'-dichlorobenzidine
- benzo(a)anthracene
- chrysene
- bis(2-ethylhexyl)phthalate
- di-n-octylphthalate
- benzo(b)fluoranthene
- benzo(k)fluoranthene
- benzo(a)pyrene
- indeno(1,2,3-cd)pyrene
- dibenz(a,h)anthracene
- benzo(g,h,i)perylene

TCLP/RCRA Metals (Waste and Soil)

- arsenic
- barium
- cadmium
- chromium
- lead
- mercury
- selenium
- silver

PCBs (Waste)

- Aroclor-1016
- Aroclor-1221
- Aroclor-1232
- Aroclor-1242
- Aroclor-1248
- Aroclor-1254
- Aroclor-1260

TABLE 5-1
SUMMARY OF OBSERVATIONS IN TEST PITS
FMC - TONAWANDA, NEW YORK PSA

Area-Pit #	Waste Found	Oxidizer Test Result	Fill Found/Type	Depth to Native Clay (ft)	Comments
A-1	No		Slag	-4.0	
A-2	No		Slag	-4.0	
A-3	No		Slag	-3.7 to -4.5	
A-4	No		Slag	-3.5	
A-5	Copper colored sand like material	Negative	Wood, Wire, Ceramic	-5.0	Green mottled clay, odorous, 1-4 ppm OVA
A-6	Copper colored sand like material	Negative	Brick, Cement, Metal	-5.0	
A-7	No		Slag	-4.75	
A-8	No		Flyash	-4.5	Odor from mottled clay, 3-5 ppm OVA
A-9	Fill from drum ring	Negative	Cardboard, Metal, Flyash, Cement, Slag	-5.0	
A-10	No		Flyash	-5.0	
B-1	No		Brick, Wood, Flyash	-4.5	
B-2	No		Flyash	-5.0	
B-3	No		Slag, Flyash	-4.5	
B-4	No		Metal, Ceramic	-3.5	
B-5	No		Flyash, Slag	-4.0	
B-6	No		No	-3.0	
B-7	No		Flyash, Slag	-3.5	
C-1	No		Flyash	-2.5	
C-2	No		Flyash	-2.0	
C-3	No		Flyash	-3.5	
C-4	Salt-like substance	Negative	Flyash	-3.5	
C-5	No		Flyash	-3.0 to -4.0	
C-6	No		Flyash	-4.0 to -4.5	

TABLE 5-1
SUMMARY OF OBSERVATIONS IN TEST PITS
FMC - TONAWANDA, NEW YORK PSA

Area-Pit #	Waste Found	Oxidizer Test Result	Fill Found/Type	Depth to Native Clay (ft)	Comments
C-7	No		Flyash	-4.0 to -4.5	Shelby tube sample - Site-1
C-8	No		Flyash	-3.0 to -3.5	
C-9	No		Flyash	-2.0	
D-1	No		Brick, Wood, Flyash	-4.5	Green black clay gave 20-250 ppm (OVA) on fresh surface
D-2	Material from drum ring	Negative	Wood, Brick, Metal, Cardboard, Drum Ring, Flyash	-5.5	
D-3	Flyash and brick	Negative	Wood, Brick, Metal, Flyash	-6.0	
D-4	Oil\tar, grease(?), salt-like substance	Negative	Brick, Wood, Metal, Rubbish, Etc.	-7.0	Wet, sampled waste and soil
D-5	Salt-like substance	Negative	Brick, Wood, Plastic	-6.0	
D-6	No		Brick, Flyash	-4.5	200-400 ppm (OVA) off flyash
D-7	No		Flyash	-5.0	1-8 ppm (OVA) flyash
D-8	Salt-like substance	Negative	Flyash	-5.0	100-300 ppm (OVA) off flyash
D-9	Very little salt-like substance		Flyash, Brick	-4.5	
D-10	Very little metallic "sand"		Flyash, Brick	-4.5	
E-1	No		Cement, Wire	-4.0	
E-2	No		Brick, Cement	-4.0	
E-3	No		No	-5.5	
E-4	No		No	-2.5	
E-5	No		Clay Tile, Asphalt, Brick, Cement	-7.5	Sewer-like odor (wet)
E-6	No		Brick, Cement	-7.0	

TABLE 5-1
SUMMARY OF OBSERVATIONS IN TEST PITS
FMC - TONAWANDA, NEW YORK PSA

Area-Pit #	Waste Found	Oxidizer Test Result	Fill Found/Type	Depth to Native Clay (ft)	Comments
E-7	No		Cement	-2.0	
E-8	No		Clay Tile, Brick, Metal, Cement, Flyash	-6.0	
F-1	No		No	-1.5 to -2.0	
F-2	No		No	-1.5	
F-3	No		Brick at Surface	-1.5	
F-4	No		Concrete at Surface	-1.0	Old sewer pipe intersect
F-5	No		Concrete at Surface	-1.5	
F-6	No		No	-1.0	
F-7	No		Ceramic, Brick at Surface	-1.0	
F-8	No		Ceramic, Shotrock at Surface	-1.0	Site-2 Shelby Tube Sample
F-9	No		Shotrock	-3.5	
G-1	No		Slag	-3.0	
G-2	No		No	-2.0	
G-3	No		Flyash, Brick, Ceramic at Surface	-1.5	
G-4	No		Slag	-3.0	
H-1	No		Slag, Flyash	-3.0	Wet
H-2	No		Slag, Flyash	-3.0 to -3.5	
H-3	No		Wood, Metal, Slag	-3.5	
H-4	No		Flyash	-3.5 to -4.0	
H-5	No		No	-4.5	
H-6	No		Ceramic at Surface	-5.0	
H-7	No		Ceramic at Surface, Slag	-2.5	

TABLE 5-1
SUMMARY OF OBSERVATIONS IN TEST PITS
FMC - TONAWANDA, NEW YORK PSA

Area-Pit #	Waste Found	Oxidizer Test Result	Fill Found/Type	Depth to Native Clay (ft)	Comments
H-8	No		Flyash	-2.5	
H-9	No		Brick	-2.5	
I-1	No		Brick at Surface	-2.5	
I-2	No		No	-2.5	
I-3	No		Brick, Concrete at Surface	-2.0	
I-4	No		Metal, Brick, Asphalt at Surface	-4.0	
I-5	No		No	-3.5	
I-6	No		Metal, Wood, Coal, Concrete, Slag near Surface	-4.0	
I-7	Sand like material	Negative	Cement with Sand- like Material	-3.0	
I-8	No		Cement, Metal	-3.0	
I-9	No		No	-2.0	

TABLE 5-2
SUMMARY OF ANALYTICAL RESULTS
WASTE SAMPLES - TCLP
FMC - TONAWANDA, NY PSA
SEPTEMBER 1994

Location:	D-4W		Dup. D-4W		A-5W		
Sample Date:	9/20/94		9/20/94		9/2094		
Units:	mg/l		mg/l		mg/l		
Compound TCLP-VOCs	**Lab Result**	**WCC Qualifier**	**Lab Result**	**WCC Qualifier**	**Lab Result**	**WCC Qualifier**	**Regulatory Limit mg/l**
benzene	ND 0.05		ND 0.05		ND 0.05		0.5
carbon tetrachloride	ND 0.05		ND 0.05		ND 0.05		0.5
chlorobenzene	ND 10		ND 10		ND 10		100
chloroform	ND 0.6		ND 0.6		ND 0.6		6.0
1,2-dichloroethane	ND 0.05		ND 0.05		ND 0.05		0.5
1,1-dichloroethene	ND 0.07		ND 0.07		ND 0.07		0.7
methyl ethyl ketone	ND 20		ND 20		ND 20		200
tetrachloroethene	ND 0.07		ND 0.07		ND 0.07		0.7
trichloroethene	ND 0.05		ND 0.05		ND 0.05		0.5
vinyl chloride	ND 0.02		ND 0.02		ND 0.02		0.2
1,1,1-trichloroethane	ND[1] --		ND[1] --		ND[1] --		--
Compound TCLP-Metals							
arsenic	92.5		155		52.0U		5,000
barium	26,900		16,800		989		100,000
cadmium	2.0U		2.0U		12.5	J	1,000
chromium	19.6		20.8		5.0U		5,000
lead	26.0U		26.0U		3,180		5,000
mercury	0.20U		0.20U		0.20U		200
selenium	90.0U		90.0U		90.0U		1,000
silver	5.0U		5.0U		5.0U		5,000

Notes:

Lab Results

U The compound was analyzed for, but was not detected above the level of the associated value.
ND[1] Compound was searched for but was not detected. A quantitation limit was not calculated since 1,1,1-trichloroethane does not have a TCLP regulatory limit.

WCC Qualifiers

J Indicates an estimated concentration due to outlying QC data.

TABLE 5-3
SUMMARY OF ANALYTICAL RESULTS
WASTE SAMPLES - PCBs
FMC - TONAWANDA, NY PSA
SEPTEMBER 1994

Location:	D-4W		Dup. D-4W		A-5W		EB-1	
Sample Date:	9/20/94		9/20/94		9/2094		9/20/94	
Units:	mg/kg		mg/kg		mg/kg		µg/l	
Compounds PCBs	Lab Result	WCC Qualifier	Lab Result	WCC Qualifier	Lab Result	WCC Qualifier	Lab Result	WCC Qualifier
Aroclor-1016	0.12U		0.110U		22U		1.0U	
Aroclor-1221	0.240U		0.230U		45U		2.0U	
Aroclor-1232	0.120U		0.110U		22U		1.0U	
Aroclor-1242	0.120U		0.110U		22U		1.0U	
Aroclor-1248	0.120U		0.110U		22U		1.0U	
Aroclor-1254	13DP	J	7.3DP	J	22U		1.0U	
Aroclor-1260	14D		6.8D		16,000		1.0U	

Notes:

Lab Results:

D Result reported from secondary dilution analysis.
P Percent difference (%D) between duel column GC results exceeds 25 percent.
U The compound was analyzed for, but was not detected above the level of the associated value.

WCC Qualifiers:

J Indicates an estimated concentration due to outlying QC data.

TABLE 5-4
SUMMARY OF ANALYTICAL RESULTS
WASTE SAMPLES - SEMI-VOLATILE ORGANICS
FMC - TONAWANDA, NY PSA
SEPTEMBER 1994

Location:	D-4W	
Sample Date:	9/20/94	
Units:	µg/kg	
Compounds	**Lab**	**WCC**
TCL-BNAs	**Result**	**Qualifier**
phenol	1,200U	R
bis(2-chloroethyl)ether	1,200U	
2-chlorophenol	1,200U	R
1,3-dichlorobenzene	1,200U	
1,4-dichlorobenzene	1,200U	
1,2-dichlorobenzene	1,200U	
2-methylphenol	1,200U	R
2,2'-oxybis(1-chloropropane)	1,200U	
4-methylphenol	890J	J
n-nitroso-di-n-propylamine	1,200U	
hexachloroethane	1,200U	
nitrobenzene	1,200U	
isophorone	1,200U	
2-nitrophenol	1,200U	
2,4-dimethylphenol	1,200U	R
2,4-dichlorophenol	1,200U	R
1,2,4-trichlorobenzene	1,000J	J
naphthalene	1,200	
4-chloroaniline	1,200U	
hexachlorobutadiene	1,200U	UJ
bis(2-chloroethoxy)methane	1,200U	
4-chloro-3-methylphenol	1,200U	R
2-methylnaphthalene	1,800	
hexachlorocyclopentadiene	1,200U	
2,4,6-trichlorophenol	1,200U	R
2,4,5-trichlorophenol	2,800U	R
2-chloronaphthalene	1,200U	
2-nitroaniline	2,800U	
dimethylphthalate	1,200U	

TABLE 5-4 (Cont.)
SUMMARY OF ANALYTICAL RESULTS
WASTE SAMPLES - SEMI-VOLATILE ORGANICS
FMC - TONAWANDA, NY PSA
SEPTEMBER 1994

Location:	D-4W	
Sample Date:	9/20/94	
Units:	µg/kg	
Compounds TCL-BNAs	**Lab Result**	**WCC Qualifier**
acenaphthylene	1,200U	
2,6-dinitrotoluene	1,200U	
3-nitroaniline	2,800U	
acenaphthene	440J	
2,4-dinitrophenol	2,800U	R
4-nitrophenol	2,800U	R
dibenzofuran	380J	
2,4-dinitrotoluene	1,200U	
diethylphthalate	1,200U	
4-chlorophenyl-phenylether	1,200U	
fluorene	540J	
4-nitroaniline	2,800U	
4,6-dinitro-2-methylphenol	2,800U	R
n-nitrosodiphenylamine	1,200U	
4-bromophenyl-phenylether	1,200U	
hexachlorobenzene	1,200U	
pentachlorophenol	2,800U	R
phenanthrene	4,700	
anthracene	1,200U	
carbazole	1,200U	
di-n-butylphthalate	1,200U	
fluoranthene	1,700	J
pyrene	1,900	
butylbenzyphthalate	660J	
3,3'-dichlorobenzidine	1,200U	UJ
benzo(a)anthracene	1,100J	
chrysene	1,300	
bis(2-ethylhexyl)phthalate	3,800B	
di-n-octylphthalate	1,200U	UJ

TABLE 5-4 (Cont.)
SUMMARY OF ANALYTICAL RESULTS
WASTE SAMPLES - SEMI-VOLATILE ORGANICS
FMC - TONAWANDA, NY PSA
SEPTEMBER 1994

Location:		D-4W	
Sample Date:		9/20/94	
Units:		µg/kg	
Compounds TCL-BNAs		Lab Result	WCC Qualifier
benzo(b)fluoranthene		700J	J
benzo(k)fluoranthene		680J	
benzo(a)pyrene		310J	J
indeno(1,2,3-cd)pyrene		220J	J
dibenz(a,h)anthracene		140J	
benzo(g,h,i)perylene		150J	
Tentatively Identified Compounds (TICS)			
unknown		9,700JAB	R
unknown		448,200J	
unknown hydrocarbons		15,100J	
unknown aromatics		4,700J	

Notes:

Lab Results

A Compound is a suspected aldol condensation product that most likely was contributed from laboratory contamination.
B Compound was found in associated laboratory method blank sample.
J For target compounds, indicates a result below the contract required quantitation limit (CRQL), but greater than zero; value is considered an estimate. For TICs, indicates an estimated concentration since result was not quantitated using an authentic standard.
U The compound was analyzed for, but was not detected above the level of the associated value.

WCC Qualifiers

J Indicates an estimated concentration due to outlying QC data.
R Indicates an unusable result due to outlying QC data or due to suspected laboratory contamination (TICs only).
U Indicates the result is qualified as non-detected at the value detected in the sample (when value is greater than CRQL) or, at the numerical value preceding the "U" qualifier (when value is less than CRQL).
UJ Indicates a result that has been qualified as non-detected (see "U" above) and the quantitation limit estimated due to outlying QC data, or indicates an estimated quantitation limit for non-detects due to outlying QC data.

TABLE 5-5
SUMMARY OF ANALYTICAL RESULTS
SOIL SAMPLES - VOLATILE ORGANICS
FMC - TONAWANDA, NY PSA
SEPTEMBER 1994

Location:	D-4S		Dup. D-4S		A-5S		EB-1	
Sample Date:	9/20/94		9/20/94		9/2094		9/20/94	
Units:	µg/kg		µg/kg		µg/kg		µg/l	
Compounds TCL-VOCs	**Lab Result**	**WCC Qualifier**	**Lab Result**	**WCC Qualifier**	**Lab Result**	**WCC Qualifier**	**Lab Result**	**WCC Qualifier**
chloromethane	12U		12U		12U		10U	
bromomethane	12U		12U		12U		10U	
vinyl chloride	12U		12U		12U		10U	
chloroethane	12U		12U		12U		10U	
methylene chloride	13B		6JB	12U	6JB	12U	9JB	10U
acetone	160B	J	150B	J	60B	UJ	10U	UJ
carbon disulfide	12U		2J		12U		10U	
1,1-dichloroethene	12U		12U		12U		10U	
1,1-dichloroethane	12U		6J		2J		10U	
1,2-dichloroethene (total)	12U		12U		12U		10U	
chloroform	12U		12U		12U		10U	
1,2-dichloroethane	12U		12U		14		10U	
2-butanone	30B	UJ	32B	UJ	10JB	12UJ	10U	
1,1,1-trichloroethane	12U		12U		12U		10U	
carbon tetrachloride	12U		12U		12U		10U	
bromodichloromethane	12U		12U		12U		10U	
1,2-dichloropropane	12U		12U		12U		10U	
cis-1,3-dichloropropene	12U		12U		12U		10U	
trichloroethene	12U		12U		2J	12UJ	12	
dibromochloromethane	12U		12U		12U		10U	
1,1,2-trichloroethane	12U		12U		12U		10U	
benzene	12U		12U		1J	J	10U	
trans-1,3-dichloropropene	12U		12U		12U		10U	
bromoform	12U		12U		12U		10U	
4-methyl-2-pentanone	12U		12U		12U		10U	
2-hexanone	12U		12U		12U		10U	
tetrachloroethene	12U		12U		63		10U	

by: KJS Chk by: AJM
January 18, 1995

TABLE 5-5 (Cont.)
SUMMARY OF ANALYTICAL RESULTS
SOIL SAMPLES - VOLATILE ORGANICS
FMC - TONAWANDA, NY PSA
SEPTEMBER 1994

Location:	D-4S		Dup. D-4S		A-5S		EB-1	
Sample Date:	9/20/94		9/20/94		9/2094		9/20/94	
Units:	µg/kg		µg/kg		µg/kg		µg/l	
Compounds TCL-VOCs	**Lab Result**	**WCC Qualifier**	**Lab Result**	**WCC Qualifier**	**Lab Result**	**WCC Qualifier**	**Lab Result**	**WCC Qualifier**
1,1,2,2-tetrachloroethane	12U		12U		12U		10U	
toluene	2J	J	2J	J	12U		10U	
chlorobenzene	12U		12U		2J	J	10U	
ethylbenzene	2J		2J		3J		10U	
styrene	12U		12J		12U		10U	
xylene (total)	2J		3J		96		10U	
Tentatively Identified Compounds (TICS)								
unknown siloxane	24J	R	9J	R	--		--	
unknowns					33J		--	
unknown hydrocarbons					752J		--	

Notes:

Lab Results

B Compound was found in associated laboratory method blank sample.

J For target compounds, indicates a result below the contract required quantitation limit (CRQL), but greater than zero; value is considered an estimate. For TICs, indicates an estimated concentration since result was not quantitated using an authentic standard.

U The compound was analyzed for, but was not detected above the level of the associated value.

WCC Qualifiers

J Indicates an estimated concentration due to outlying QC data.

R Indicates an unusable result due to outlying QC data or due to suspected laboratory contamination (TICs) only.

U Indicates the result is qualified as non-detected at the value detected in the sample (when value is greater than CRQL) or, at the numerical value preceding the "U" qualifier (when value is less than CRQL).

UJ Indicates a result that has been qualified as non-detected (see "U" above) and the quantitation limit estimated due to outlying QC data, or indicates an estimated quantitation limit for non-detects due to outlying QC data.

TABLE 5-6
SUMMARY OF ANALYTICAL RESULTS
SOIL SAMPLES - SEMI-VOLATILE ORGANICS
FMC - TONAWANDA, NY PSA
SEPTEMBER 1994

Location:		D-4S
Sample Date:		9/20/94
Units:		µg/kg
Compounds	**Lab**	**WCC**
TCL-BNAs	**Result**	**Qualifier**
phenol	780U	
bis(2-chloroethyl)ether	780U	
2-chlorophenol	780U	
1,3-dichlorobenzene	780U	
1,4-dichlorobenzene	780U	
1,2-dichlorobenzene	780U	
2-methylphenol	780U	
2,2'-oxybis(1-chloropropane)	780U	
4-methylphenol	780U	
n-nitroso-di-n-propylamine	780U	
hexachloroethane	780U	
nitrobenzene	780U	
isophorone	780U	
2-nitrophenol	780U	
2,4-dimethylphenol	780U	
2,4-dichlorophenol	780U	
1,2,4-trichlorobenzene	780U	
naphthalene	780U	
4-chloroaniline	780U	
hexachlorobutadiene	780U	
bis(2-chloroethoxy)methane	780U	
4-chloro-3-methylphenol	780U	
2-methylnaphthalene	780U	
hexachlorocyclopentadiene	780U	UJ
2,4,6-trichlorophenol	780U	
2,4,5-trichlorophenol	1900U	
2-chloronaphthalene	780U	
2-nitroaniline	1900U	

TABLE 5-6 (Cont.)
SUMMARY OF ANALYTICAL RESULTS
SOIL SAMPLES - SEMI-VOLATILE ORGANICS
FMC - TONAWANDA, NY PSA
SEPTEMBER 1994

Location:		D-4S	
Sample Date:		9/20/94	
Units:		µg/kg	
Compounds		**Lab**	**WCC**
TCL-BNAs		**Result**	**Qualifier**
dimethylphthalate		780U	
acenaphthylene		780U	
2,6-dinitrotoluene		780U	
3-nitroaniline		1900U	
acenaphthene		780U	
2,4-dinitrophenol		1900U	
4-nitrophenol		1900U	
dibenzofuran		780U	
2,4-dinitrotoluene		780U	
diethylphthalate		780U	
4-chlorophenyl-phenylether		780U	
fluorene		780U	
4-nitroaniline		1900U	
4,6-dinitro-2-methylphenol		1900U	
n-nitrosodiphenylamine		780U	
4-bromophenyl-phenylether		780U	
hexachlorobenzene		780U	
pentachlorophenol		1900U	
phenanthrene		780U	
anthracene		780U	
carbazole		780U	
di-n-butylphthalate		780U	
fluoranthene		780U	UJ
pyrene		780U	
butylbenzyphthalate		780U	
3,3'-dichlorobezidine		780U	UJ
benzo(a)anthracene		780U	
chrysene		780U	

TABLE 5-6 (Cont.)
SUMMARY OF ANALYTICAL RESULTS
SOIL SAMPLES - SEMI-VOLATILE ORGANICS
FMC - TONAWANDA, NY PSA
SEPTEMBER 1994

Location:		D-4S
Sample Date:		9/20/94
Units:		µg/kg
Compounds	**Lab**	**WCC**
TCL-BNAs	**Result**	**Qualifier**
bis(2-ethylhexyl)phthalate	780U	
di-n-octylphthalate	780U	UJ
benzo(b)fluoranthene	780U	UJ
benzo(k)fluoranthene	780U	
benzo(a)pyrene	780U	UJ
indeno(1,2,3-cd)pyrene	780U	UJ
dibenz(a,h)anthracene	780U	
benzo(g,h,i)perylene	780U	
Tentatively Identified Compounds (TICS)		
unknown	11,000JAB	R
unknowns	9,900J	
unknown aromatic	220J	

Notes:

Lab Results

A Compound is a suspected aldol condensation product that most likely was contributed from laboratory contamination.

B Compound was found in associated laboratory method blank sample.

J For target compounds, indicates a result below the contract required quantitation limit (CRQL), but greater than zero; value is considered an estimate. For TICs, indicates an estimated concentration since result was not quantitated using an authentic standard.

U The compound was analyzed for, but was not detected above the level of the associated value.

WCC Qualifiers

R Indicates an unusable result due to outlying QC data or due to suspected laboratory contamination (for TICs only).

UJ Indicates a result that has been qualified as non-detected (see "U" above) and the quantitation limit estimated due to outlying QC data, or indicates an estimated quantitation limit for non-detects due to outlying QC data.

TABLE 5-7
SUMMARY OF ANALYTICAL RESULTS
SOIL SAMPLES - METALS
FMC - TONAWANDA, NY PSA
SEPTEMBER 1994

Location:	D-4S		Dup. D-4S		A-5S		EB-1	
Sample Date:	9/20/94		9/20/94		9/2094		9/20/94	
Units:	mg/kg		mg/kg		mg/kg		µg/l	
RCRA Metals	Lab Result	WCC Qualifier	Lab Result	WCC Qualifier	Lab Result	WCC Qualifier	Lab Result	WCC Qualifier
arsenic	3.4B	J	2.9B		3.6B		5.0U	
barium	469	J	190	J	116		11.0U	
cadmium	0.47U		0.47U		0.58B	J	2.0U	
chromium	20.7		20.0		22.1		5.0U	
lead	9.7	J	11.0	J	13.0	J	3.0U	
mercury	0.12U	UJ	0.12U	UJ	0.12U	UJ	0.20U	UJ
selenium	1.1U	UJ	1.0U	UJ	1.1U	UJ	5.0U	
silver	1.2U	UJ	1.2U	UJ	1.2U	UJ	6.5B	

Notes:

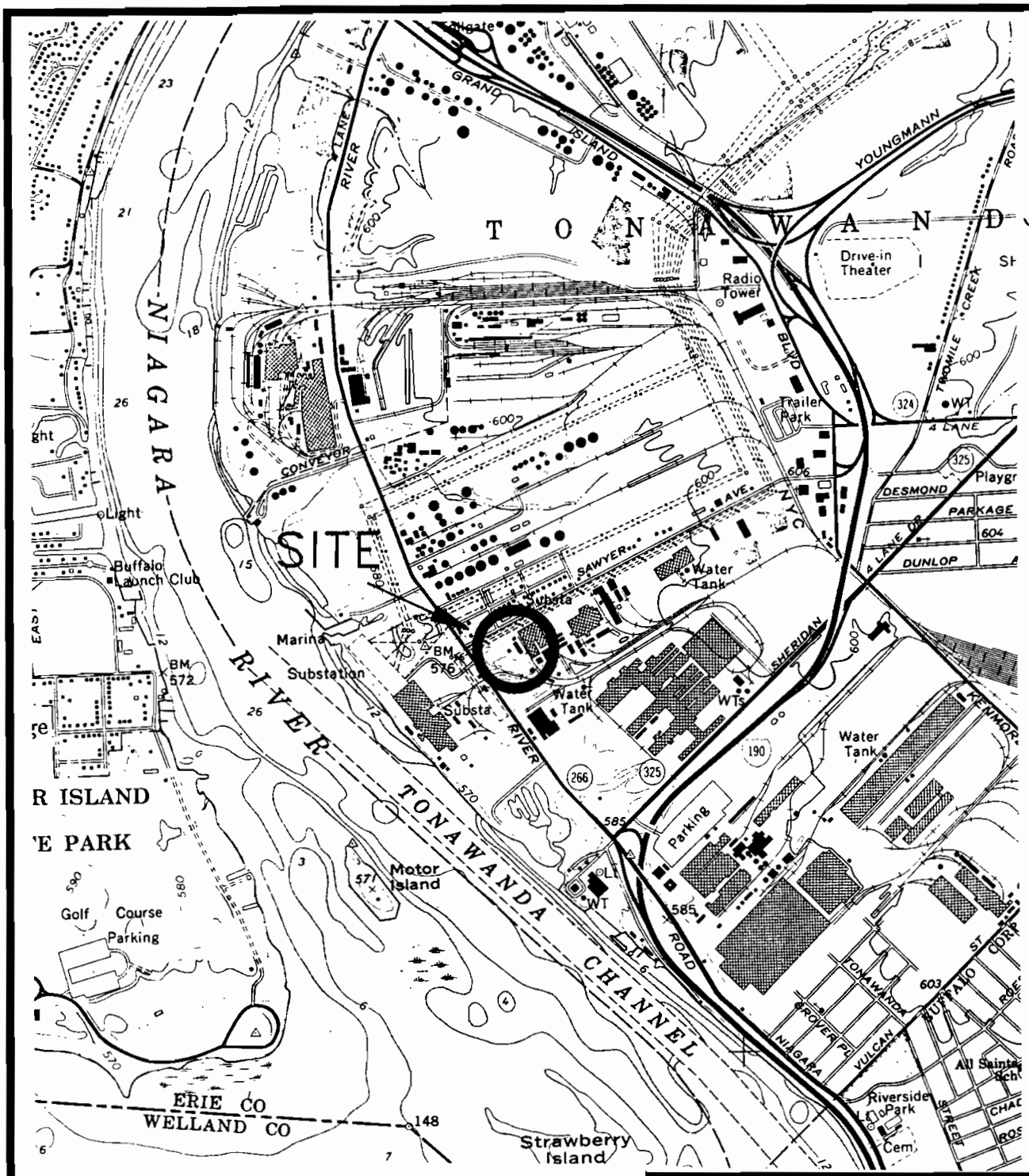
Lab Results

B Indicates a detection below the contract required detection limit (CRQL) but greater than zero.
U The compound was analyzed for, but was not detected above the level of the associated value.

WCC Qualifiers

U Indicates the result is qualified as non-detected at the value detected in the sample (when value is greater than CRQL) or, at the numerical value preceding the "U" qualifier (when value is less than CRQL).
J Indicates an estimated concentration due to outlying QC data.
UJ Indicates a result that has been qualified as non-detected (see "U" above) and the quantitation limit estimated due to outlying QC data, or indicates an estimated quantitation limit for non-detects due to outlying QC data.

Figures



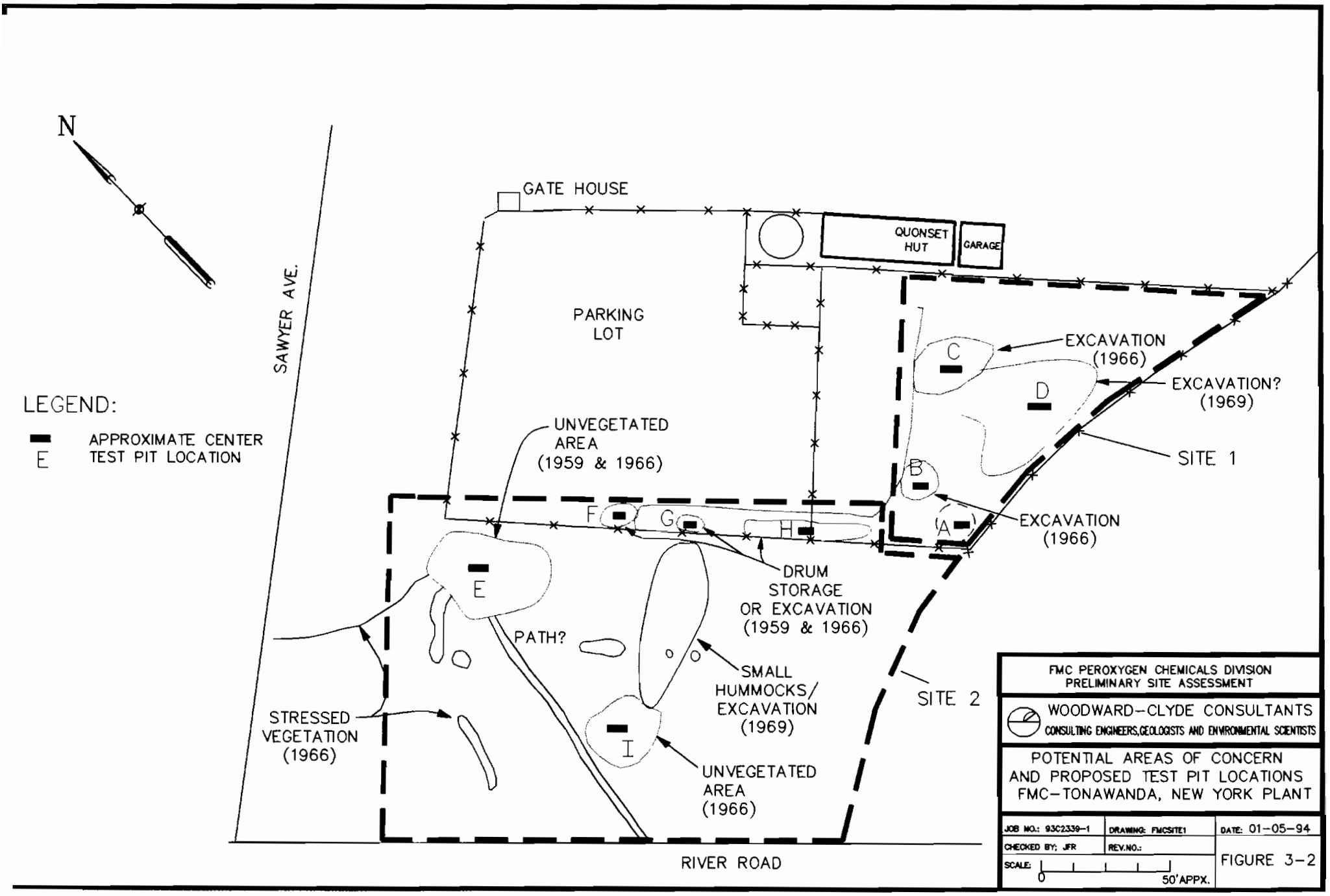
From U.S.G.S. Buffalo NW, N.Y.–Ont. Quadrangle
NW/4 Buffalo 15'
N4252.5–W7852.5/7.5

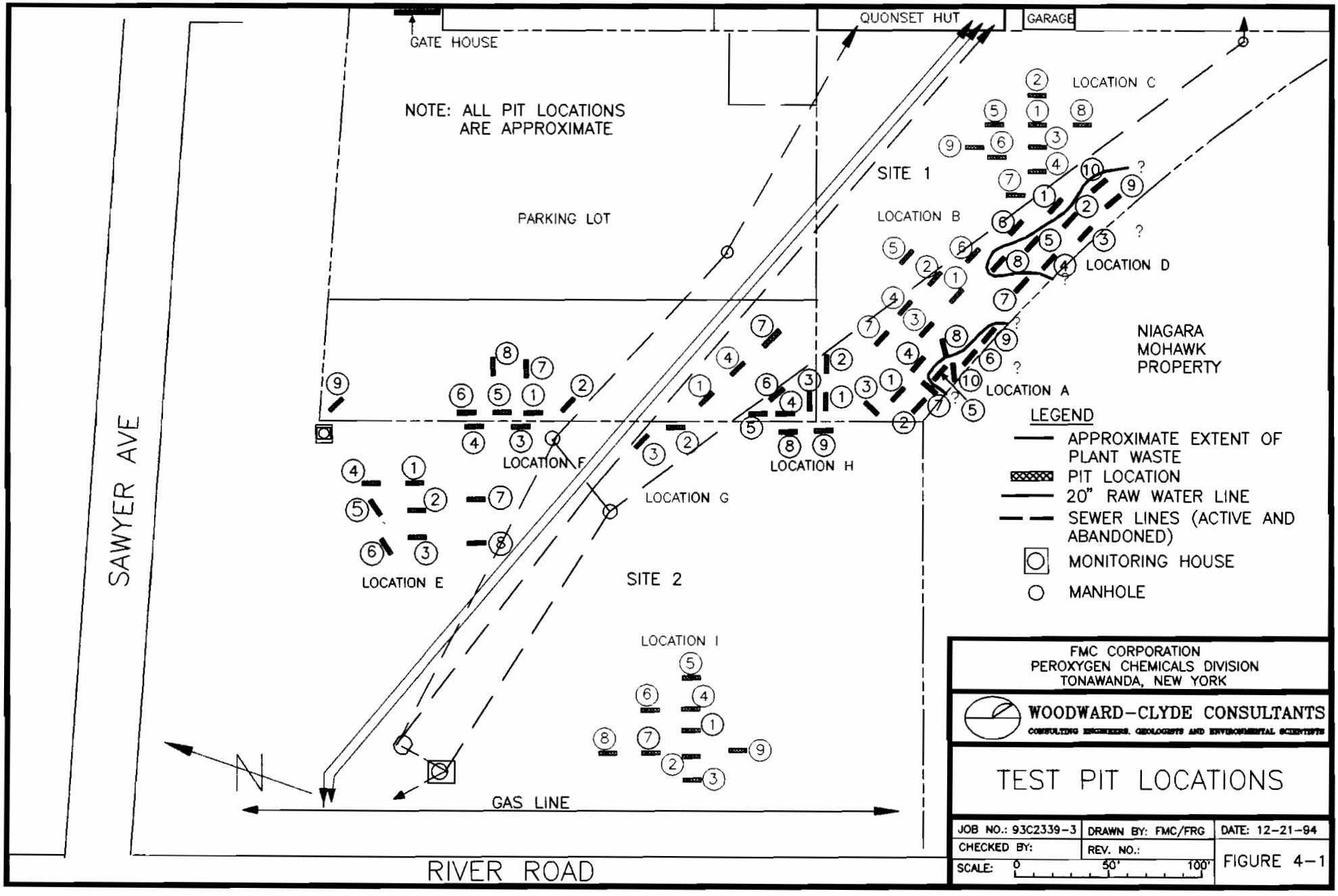
FMC Peroxygen Chemicals Division
Preliminary Site Assessment

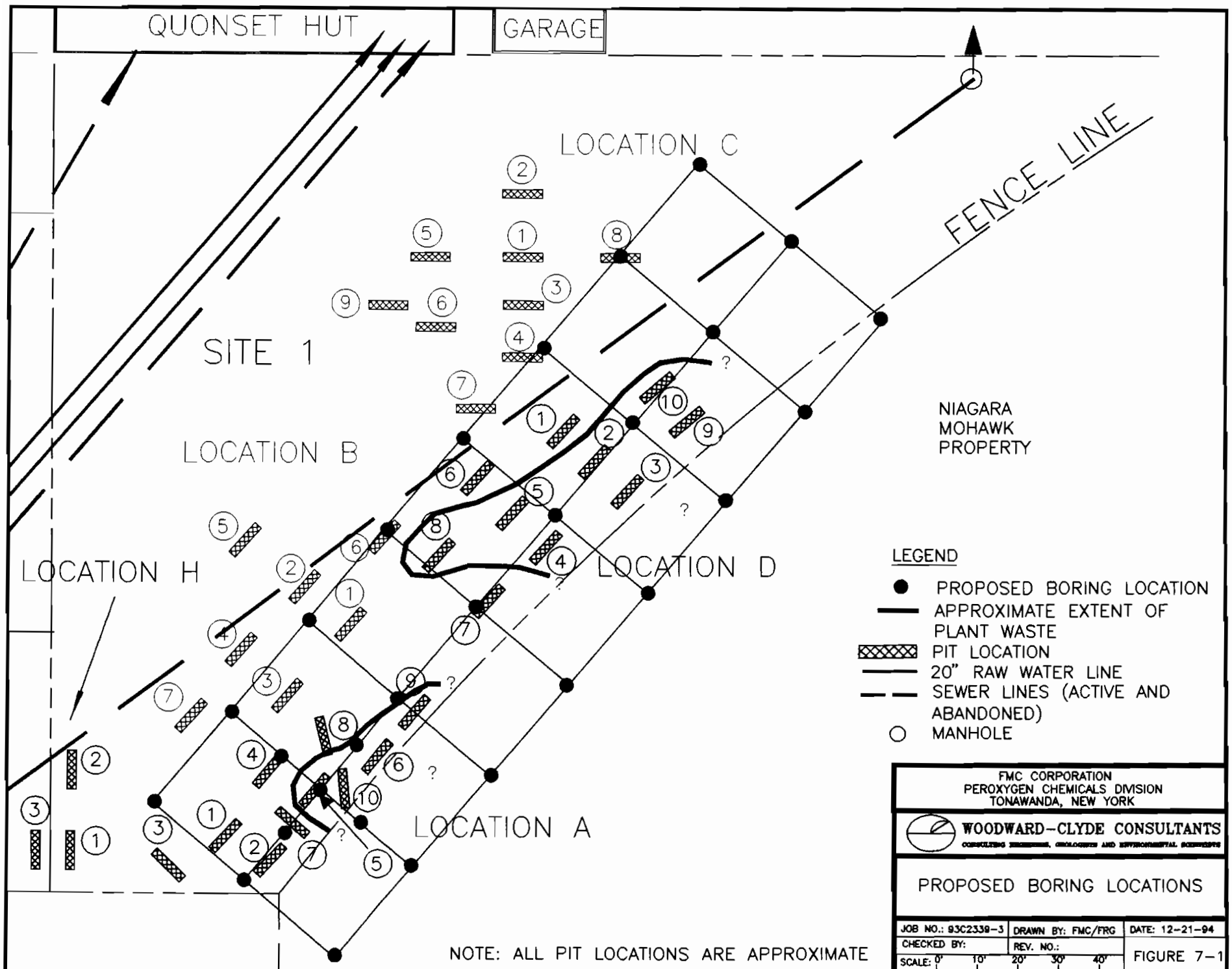
WOODWARD–CLYDE CONSULTANTS
Consulting Engineers, Geologists and Environmental Scientists

SITE LOCATION MAP

Job No.:93C2339–1	Drawing No.	Date:
Checked by: JFR	Rev. No.:	
Scale: 1"=2000'		Figure 3–1


N
LEGEND:
APPROXIMATE CENTER
TEST PIT LOCATION
E
SAWYER AVE.
GATE HOUSE
QUONSET HUT
GARAGE
PARKING LOT
EXCAVATION (1966)
EXCAVATION? (1969)
SITE 1
UNVEGETATED AREA (1959 & 1966)
EXCAVATION (1966)
DRUM STORAGE OR EXCAVATION (1959 & 1966)
PATH?
SMALL HUMMOCKS/ EXCAVATION (1969)
SITE 2
STRESSED VEGETATION (1966)
UNVEGETATED AREA (1966)
RIVER ROAD
A
B
C
D
E
F
G
H
I
FMC PEROXYGEN CHEMICALS DIVISION
PRELIMINARY SITE ASSESSMENT
WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
POTENTIAL AREAS OF CONCERN
AND PROPOSED TEST PIT LOCATIONS
FMC-TONAWANDA, NEW YORK PLANT
JOB NO.: 93C2339-1
DRAWING: FMCSITE1
DATE: 01-05-94
CHECKED BY: JFR
REV.NO.:
SCALE: 0 50' APPX.
FIGURE 3-2


GATE HOUSE
QUONSET HUT
GARAGE
NOTE: ALL PIT LOCATIONS ARE APPROXIMATE
SITE 1
PARKING LOT
LOCATION C
LOCATION B
LOCATION D
LOCATION A
NIAGARA MOHAWK PROPERTY
LOCATION F
LOCATION G
LOCATION H
LOCATION E
SITE 2
LOCATION I
SAWYER AVE
GAS LINE
RIVER ROAD
N
LEGEND
APPROXIMATE EXTENT OF PLANT WASTE
PIT LOCATION
20" RAW WATER LINE
SEWER LINES (ACTIVE AND ABANDONED)
MONITORING HOUSE
MANHOLE
FMC CORPORATION
PEROXYGEN CHEMICALS DIVISION
TONAWANDA, NEW YORK
WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
TEST PIT LOCATIONS
JOB NO.: 93C2339-3
DRAWN BY: FMC/FRG
DATE: 12-21-94
CHECKED BY:
REV. NO.:
SCALE: 0 50' 100'
FIGURE 4-1



FMC CORPORATION
PEROXYGEN CHEMICALS DIVISION
TONAWANDA, NEW YORK

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

PROPOSED BORING LOCATIONS

JOB NO.: 93C2339-3	DRAWN BY: FMC/FRG	DATE: 12-21-94
CHECKED BY:	REV. NO.:	FIGURE 7-1
SCALE: 0' 10' 20' 30' 40'		

Appendix A

APPENDIX A

TEST PIT LOGS

APPENDIX C

ANALYTICAL DATA VALIDATION

TABLE OF CONTENTS

1.0 INTRODUCTION

This appendix presents an analytical data validation for soil and waste samples collected in September 1994 in support of the FMC Tonawanda facility Preliminary Site Assessment (PSA). Analytical services were provided by Nytest Environmental, Inc. (Nytest) of Port Washington, New York (New York State Lab I.D. #10195). The number and type of samples and parameters analyzed are summarized below.

Matrix / Soil	Investigative Samples	Field Duplicate Samples	Equipment Blank Samples	MS/MSD[1] Samples
TCL-VOCs	2	1	1	1/1
RCRA-Metals	2	1	1	1/1
TCL-Semi-Volatiles	1	--	--	--
Waste				
TCLP-VOCs	2	1	--	1/1
TCLP-Metals	2	1	--	1/1
TCL-Semi-Volatiles	1	--	--	--
PCBs	2	1	1	1/1

(1) Matrix spike/matrix spike duplicate (MS/MSD) for organics and matrix spike/laboratory duplicate for metals
TCLP Toxicity characteristic leaching procedure
TCL Target Compound List
VOCs Volatile organic compounds

Sample analyses followed the New York State Department of Environmental Conservation Analytical Services Protocol (NYSDEC ASP), 1991.

The following documents were used for the data validation:

1. Preliminary Site Assessment Work Plan, Appendix A: Quality Assurance Plan. FMC Tonawanda Plant, Tonawanda, Erie County, NY, Site No. 915025. Revised May 11, 1994. Prepared by WCC.

2. CLP Organics Data Review and Preliminary Review. SOP No. NW-6, Revision 8. USEPA Region II. January 1992.

3. Evaluation of Metals Data for the Contract Laboratory Program. SOP No. HW-2, Revision XI. USEPA Region II. January 1992.

The above "Guidelines" provided the criteria to review. The following items were reviewed as part of the data validation:

- Results reported from secondary dilution
- Holding times
- Instrument performance and calibration
- Method blanks and equipment blank results
- Surrogate spike recoveries (organics)
- Matrix spike/matrix spike duplicate analyses (organics)
- Matrix spike/laboratory duplicate analyses (inorganics)
- Internal standard areas and retention times (VOCs and semi-volatiles)
- Field duplicate sample results
- Review of both GC-column results
- Overall assessment of data

The following sections present the results of the data validation.

2.0
ANALYTICAL DATA VALIDATION

2.1 RESULTS REPORTED FROM SECONDARY DILUTIONS

For samples that required dilutions, part of the validation process is to evaluate which set of results (initial or diluted) are considered to be more usable. For this data set, three samples required dilutions for select PCBs and two samples required dilutions for semi-volatile compounds.

- Samples D-4S and D-4W were analyzed for TCL-semi-volatiles at dilutions since screening of samples prior to final analysis indicated matrix interferences. For these samples, a ten times more concentrated extract was not analyzed and reported by Nytest.

- Aroclor-1254 and Aroclor-1260 results for samples D-4W and QA-1W (D-4W Dup.) and the Aroclor-1260 result for sample A-5W were noted by Nytest as exceeding the corresponding instruments' linear calibration range. Detected Aroclor results for these samples were not reported on the corresponding initial sample analysis Form-1s. All three initial sample extracts were diluted and reanalyzed and the diluted Aroclor concentrations were reported as separate analyses. For these samples, the diluted results for the detected Aroclors were transcribed onto the data summary table (Table 5-3) with a "D" code (result reported from secondary dilution) along with any appropriate qualifiers.

2.2 SAMPLE HOLDING TIMES

Holding time criteria for the analyses performed are defined in the respective analytical methods. Review of the provided sample receipt, extraction and/or analyses dates noted the following analyses performed outside holding time criteria:

Parameter	Reported Sample Holding Time	Required Sample Holding Time
Soil		
Total Mercury	33 days from VTSR[1] to analyses	26 days from VTSR to analysis
Associated Samples:	D-4S, QA-1S, A-5S, EB-1	
Waste		
TCLP-VOCs	5 days from VTSR to TCLP ext.; 9 days from ext. to analysis	7 days from VTSR to TCLP ext.; 7 days from ext. to analysis
Associated Samples:	D-4W, QA-1W, A-5W	

(1) Validated time of sample receipt (at laboratory)

As the TCLP VOC analyses were completed within the allotted holding time criteria (14 days from VTSR to analysis), qualification of the associated data was not considered necessary. Due to the potential loss of analytes from holding time exceedances, total mercury results for the associated samples were qualified as estimated (UJ, for non-detects).

Remaining sample extractions and/or analyses were completed within holding time criteria.

2.3 GC/MS INSTRUMENT PERFORMANCE

GC/MS instrument performance checks are performed to ensure mass resolution, identification, and instrument sensitivity. Validation of instrument performance checks included evaluating possible transcription/calculation errors, adherence to instrument tuning frequency requirements, mass assignments, and ion abundance criteria. All criteria for bromofluorobenzene (BFB) and decafluorotriphenylphosphine (DFTPP) for VOCs (TCL and TCLP) and semi-volatiles respectively, were met for this data set.

2.4 INSTRUMENT CALIBRATION

Initial and continuing calibration criteria are established to ensure the instruments are capable of producing acceptable qualitative and quantitative data throughout a given

analysis sequence. Initial and continuing calibration procedures are detailed in each of the respective analytical methods.

All VOC (TCL and TCLP), semi-volatile, PCB and inorganic initial and continuing calibrations were analyzed at the required frequency.

Examination of the PCB calibration data showed that all instrument calibration results were acceptable. Two TCL-VOC initial calibration analyses and one semi-volatile initial calibration analysis had outlying relatively standard deviation (RSD) values between initial calibration relative response factors (RRFs). Per the "Guidelines", detected sample data associated with initial calibrations having outlying RSD values require qualification as estimated (J) and non-detected results are qualified using professional judgement. As per earlier versions of the "Guidelines", non-detects were qualified as estimated (UJ) if the RSD value was greater than 50 percent and less than or equal to 90 percent. For RSD values in excess of 90 percent, non-detected results were rejected (R). Presented as follows are the affected samples and applicable data qualifiers based on the initial calibration data:

ICAL Date	Fraction	Compound	RSD	Qualifier Detects/ Non-Detects
09/18/94	TCL-VOCs	acetone	42.4	J/-
Associated Samples:	Equipment Blank (EB-1)			
08/22/94	TCL-VOCs	acetone	31.9	J/-
		2-butanone	38.2	J/-
		2-hexanone	35.8	J/-
Associated Samples:	D-4S, QA-1S, A-5S			
10/24/94	TCL-semi-volatiles	hexachlorocyclopentadiene	47.2	J/-
Associated Samples:	D-4S, D-4W			

J/- estimated result for detects, no qualification for non-detects

Samples associated with the TCL-VOC ICAL performed on 09/18/94 and with the semi-volatile ICAL of 10/24/94 were non-detected for the associated compounds; consequently, qualification was not necessary.

One TCL-VOC and one TCL-semi-volatile continuing calibration analyses had percent differences (%Ds) between initial mean relative response factors and continuing calibration response factors in excess of the "Guidelines" criterion of 25 percent. Per the "Guidelines", sample data associated with continuing calibrations having outlying %D values require qualification of both detected and non-detected results as estimated (J or UJ). Presented as follows are the affected samples and applicable data qualifiers based on the outlying continuing calibration data:

Cont. Cal. Date	Fraction	Compound	%D	Qualifier Detects/ Non-Detects
09/28/94	TCL-VOCs	acetone	42.5	J/UJ
Associated Samples: EB-1				
10/27/94	TCL-Semi-volatiles	hexachlorocyclopentadiene	26.4	J/UJ
		fluoranthene	34.6	J/UJ
		3,3'-dichlorobenzidine	26.7	J/UJ
		di-n-octylphthalate	36.2	J/UJ
		benzo(b)fluoranthene	25.3	J/UJ
		benzo(a)pyrene	26.9	J/UJ
		indeno(1,2,3-cd)pyrene	25.7	J/UJ
Associated Samples: D-4S, D-4W				

J Estimated result for detects
UJ Estimated quantitation limit for non-detects

Review of the provided inorganic data noted acceptable calibration results with the exception of outlying contract required detection limit (CRDL) check sample recoveries reported for cadmium (both total and TCLP). Per the "Guidelines", affected samples and applicable data qualifiers based on the outlying CRDL check sample recoveries are as follows:

Analyte	Fraction	% CRDL Recovery[1] (80-120)	Qualifier Detects/ Non-Detects
cadmium	total	126.5	J/-
Associated Sample:	A-5S		
cadmium	TCLP	126.5	J/-
Associated Sample:	A-5W		

(1) Control limits noted in parentheses
J/- Estimated result for detects, no qualification for non-detects

All remaining instrument calibration data were acceptable. Additionally, no errors in calculations or transcriptions were noted.

2.5 METHOD BLANK SAMPLES

Method blanks evaluate the existence and potential for sample contamination through laboratory activities. TCL-VOC, TCL-semi-volatile and inorganic method blanks had detections of common laboratory contaminants at concentrations at or below respective contract required detection limits (CRDLs) or contract required quantitation limits (CRQLs). Per the "Guidelines", target compounds that are attributable to laboratory contamination (accounting for moisture content) require qualification as non-detected (U) and tentatively identified compounds (TICs) require rejection (R). Samples and appropriate data qualifiers required due to potential laboratory contamination are as follows:

TCL-VOCs

Sample	Compound	Sample Conc.	Qualified Sample Conc.
Method Blank 82 (µg/l)	methylene chloride	7J	
Associated Samples:			
EB-1	methylene chloride	9JB	10U
Method Blank 41 (µg/kg)	methylene chloride	1J	
	acetone	10	
	2-butanone	8J	

TCL-VOCs

Sample	Compound	Sample Conc.	Qualified Sample Conc.
Associated Samples:			
D-4S	2-butanone	30B	30U
QA-1S	methylene chloride	6JB	12U
	2-butanone	32B	32U
A-5S	methylene chloride	6JB	12U
	acetone	60B	60U
	2-butanone	10JB	12U
TCL-Semi-Volatiles			
Method Blank 53 (µg/kg)	unknown R.T. 5.056	6300JA	
Associated Samples:			
D-4S	unknown R.T. 5.005	11000JAB	R
D-4W	unknown R.T. 5.021	9700JAB	R

A Aldol condensation product; suspected laboratory contaminant.
B Compound detected in associated method blank.
U Non-detected as stated quantitation limit.
J For target compounds, indicates that compound was detected below quantitation limit and is considered estimated. For TICs, indicates an estimated concentration since concentration was not quantitated using an authentic standard.
R Result is unusable.

Additionally, an unknown siloxane compound was reported as a VOC TIC in samples D-4S and QA-1S. Although siloxane was not detected in the associated laboratory method blanks, the unknown siloxane results for both samples were rejected (R) since it is a common laboratory contaminant.

No other sample results required qualification based on method blank contamination.

2.6 EQUIPMENT BLANK SAMPLES

Equipment blanks are used to assess sampling equipment decontamination procedures. One equipment blank sample, identified as EB-1, is associated with the samples from this investigation. Per the QAP, the equipment blank was analyzed for TCL-VOCs,

TCL-PCBs and RCRA metals. Trichloroethene and silver were the only two analytes detected in EB-1 at concentrations of 12 μg/l and 6.5 μg/l, respectively. All associated samples were non-detected for silver. Trichloroethene was detected in sample A-5S at 2 μg/kg. As this result is less than five times the equipment blank concentration, the trichloroethene result for sample A-5S required qualification as non-detected (U at CRQL of 12 μg/kg).

2.7 SURROGATE SPIKE RECOVERIES

Surrogate compounds are used to evaluate overall laboratory sample preparation efficiency on a per sample basis. TCL-VOC and TCLP-VOC surrogate recoveries were acceptable. The TCL-semi-volatile sample D-4W had a zero percent recovery for surrogate compound 2,4,6-tribromophenol (control limits 19-123 percent). Per the "Guidelines", detected acid compound results for D-4W required qualification as estimated (J) and non-detected acid compound results required rejection (R) based on the outlying surrogate recovery.

Waste samples submitted for PCB analyses had outlying surrogate recoveries reported on both GC-columns as shown below:

	Surrogate Recovery(1)			
Sample ID	DCB1	DCB2	TCX1	TCX2
EB-1	--	--	172	162
D-4W	48	54	155	--
D-4W DL (DF 1:20)	234	--	305	--
QA-1W	59	59	162	--
QA-1W DL (DF 1:20)	208	345	925	--
A-5W (DF 1:500)	0	0	53,500	48,000
A-5W DL (DF 1:25,000)	0	0	0	47,800

(1)	Control limits 60-150 percent
DCB	Decachlorobiphenyl
TCX	Tetrachlorometaxylene
DCB1/TCX1	Surrogate recoveries from GC-column DB-608
DCB2/TCX2	Surrogate recoveries from GC-column DB-1701

With the exception of EB-1, the outlying surrogate recoveries for the above non-diluted samples were caused by interference from individual PCB peaks which exceeded the instruments linear calibration range. No PCB results were quantitated from the initial

non-diluted analyses and therefore, qualification based on the outlying surrogate recoveries was not required. For the diluted sample PCB analyses, the magnitude of the dilutions performed were too great to accurately quantitate the surrogate recoveries. Therefore, qualification of the PCB results reported from the diluted analyses was not considered necessary. As for EB-1, the outlying surrogate recoveries indicated a potential high bias on both GCs and the PCB results were non-detected; therefore, qualification of the PCB sample data for EB-1 was not considered necessary.

No other sample results had outlying surrogate recoveries.

2.8 MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) SAMPLES

Samples A-5S (soil) and A-5W (waste) were analyzed as MS/MSD (organics) samples and MS/lab duplicate (inorganics) samples for the respective parameters analyzed. These samples were analyzed to evaluate potential matrix effects upon the data. No semi-volatile MS/MSD analyses were analyzed; as such the results of laboratory control samples (LCS) were used to evaluate method performance in the absence of interferences.

Due to the necessity for sample dilution, PCB matrix spike compounds for sample A-5W could not be recovered. Outlying spike recoveries or relative percent differences (RPDs) between MS/MSD recoveries or laboratory duplicate results are summarized below:

Analysis	Analyte	% Recovery MS	% Recovery MSD	% Control Limits	RPD[1]	RPD Control Limits
A-5S						
TCL-VOCs	1,1-dichloroethene	--	--	NA	33	22
	trichloroethene	163	--	62-137	36	24
	benzene	182	--	66-142	36	21
	toluene	233	157	59-139	39	21
	chlorobenzene	230	148	60-133	43	21
RCRA Metals	lead	14.3	NA	75-125	--	NA
	selenium	67.1	NA	75-125	--	NA
	silver	72.9	NA	75-125	--	NA

Analysis	Analyte	% Recovery MS	% Recovery MSD	% Control Limits	RPD[1]	RPD Control Limits
A-5W						
TCLP-VOCs	2-butanone	150	152	40-135	--	NA
Laboratory Control Sample						
Semi-volatiles	1,4-dichlorobenzene	100	NA	36-97	NA	NA
	1,2,4-trichlorobenzene	106	NA	39-98	NA	NA
	2,4-dinitrotoluene	106	NA	24-96	NA	NA
	phenol	112	NA	72-110	NA	NA
	4-chloro-2-methylphenol	112	NA	23-97	NA	NA
	4-nitrophenol	104	NA	10-80	NA	NA
	pentachlorophenol	104	NA	9-103	NA	NA

(1) RPD between MS/MSD recoveries for organics and between lab duplicate results for inorganics
NA Not applicable
– Recoveries or RPDs acceptable

The outlying spike recoveries and RPD values associated with the TCL-VOC MS/MSD analyses of sample A-5S indicated a potential high bias and poor analytical precision. As the spike recoveries were high, only detected results for the affected compounds in sample A-5S and associated samples (soil samples) were qualified as estimated (J). The associated samples include: D-4S, QA-1S and A-5S.

The outlying RCRA metals spike recoveries for sample A-5S indicate a potential low bias. Inorganic spike recoveries below 30 percent indicate a substantial low bias. Detected and non-detected selenium and silver results for A-5S and associated samples (soil samples) required qualification as estimated (J or UJ) on the basis of low spike recoveries. For lead, associated sample results were qualified as estimated (J) for detects and non-detects were rejected (R). Associated samples which required qualification of lead, selenium and silver results in accordance with the above include: D-4S, QA-1S and A-5S.

The outlying TCL-semi-volatile spike recoveries for the LCS indicate a potential high bias and, therefore, only detected results for the associated required qualification as estimated (J). Samples associated with the TCL-semi-volatile LCS and requiring qualification in accordance with the foregoing include: D-4S and D-4W.

No other sample results required qualification based on the MS/MSD results.

2.9 INTERNAL STANDARDS (VOCs AND SEMI-VOLATILES)

Internal standard (I.S.) performance data were reviewed to evaluate whether the GC/MS sensitivity and response were stable during each analysis. The VOC and semi-volatile analyses performed for this sampling event yielded acceptable internal standard areas and retention times. Additionally, no calculation or transcription errors were noted.

2.10 FIELD DUPLICATES

Field duplicate results are used to evaluate the aggregate sampling and analytical precision. For soil and waste samples, when analytes for both duplicate and sample values are greater than five times the CRQL or CRDL, satisfactory precision is indicated by an RPD less than or equal to 100 percent. Where one or both of the analytes of a field duplicate pair are reported at less than five times the CRQL or CRDL, satisfactory precision is indicated if the field duplicate results agree within 3.5 times the CRQL or CRDL. Field duplicate results that do not meet these criteria may indicate unsatisfactory precision of the results.

In accordance with the QAP, one field duplicate pair was collected for the soil samples and one field duplicate pair was collected for the waste samples. The soil field duplicate pair were identified as D-4S/QA-1S and the waste field duplicate pair were identified as D-4W/QA-1W.

The results reported for the waste field duplicate sample pair are in agreement with the above criteria, which indicates that the aggregate sampling and analytical precision were acceptable. For soil field duplicate pair D-4S/QA-1S, total barium was the only analyte which was not in agreement with the specified criteria. One of the barium concentrations exceeded five times the CRDL and one was below five times the CRDL and the results differed by approximately six times the CRDL (control limit 3.5 times the CRDL). Based on the difference between the field duplicate sample results, the total barium results for D-4S and QA-1S were qualified as estimated (J).

2.11 COMPOUND IDENTIFICATION AND QUANTITATION

Data for one or more detected compounds/analytes were checked for potential identification errors and were recalculated from the raw data. No anomalies or transcription errors were noted during validation of the reported compound/analyte identifications and quantitations.

The method of standard addition (MSA) is required for quantitation of metals when corresponding post-digestion spike recoveries are outside control limits of 85 - 115 percent and the sample concentration is greater than 50 percent of the spike concentration. MSA was not required for the quantitation of arsenic in sample D-4S although the post-digestion spike recovery was 84.5 percent. Since the post-digestion spike recovery may indicate a potential low bias for the quantitation of arsenic in sample D-4S, the result was qualified as estimated (J).

MSA was required for the quantitation of lead in sample QA-1S. The corresponding MSA correlation coefficient was acceptable (greater than 0.995) and no qualification was required.

2.12 REVIEW OF BOTH COLUMN RESULTS (PCBs)

Samples having detections of PCBs are reviewed to ensure that the lower of the two concentrations from both GC-column analyses is reported and the percent difference (%D) between column results is less than 25 percent.

Review of the data noted that the lower of the two GC-column PCB concentrations were reported in each case. Samples D-4W and QA-1W (D-4W Dup.) had %D values for Aroclor-1254 at 30.8% and 28.8%, respectively. Per the "Guidelines", the Aroclor-1254 results for both samples were qualified as estimated (J).

3.0 OVERALL DATA ASSESSMENT

Based on the criteria outlined, it is recommended that the results reported for these analyses be accepted for their intended use. Acceptable levels of accuracy and precision (based on MS/MSD analyses and field duplicate results) were achieved for this data set, except where noted in this appendix. In addition, completeness, defined to be the percentage of analytical results which are judged to be valid, including estimated (J or UJ) values, for this data set was 97 percent, which satisfy the methods' historical completeness results of 80 to 85 percent. Sample results from this investigation required some qualification based on minor QC deficiencies as summarized below:

Total mercury results for the soil samples and equipment blank were qualified as estimated (UJ) due to holding time exceedances. Select TCL-VOC results for the soil samples and equipment blank required qualification as estimated (J or UJ) based on outlying initial calibration data. The equipment blank sample required qualification of acetone as estimated (UJ) and both samples analyzed for TCL-semi-volatiles required qualification of select compounds as estimated (J or UJ) based on outlying continuing calibration data. Cadmium results for samples A-5S and A-5W were qualified as estimated due to elevated CRDL check sample recoveries. Select VOC results for the soil samples and equipment blank were qualified as non-detected (U) due to potential laboratory contamination. Select TIC results for both samples analyzed for TCL-semi-volatiles were rejected due to potential laboratory contamination. The trichloroethene result for A-5S was qualified as non-detected (U) due to equipment blank contamination. Non-detected acid results for sample D-4W were rejected (R) and detected and results were qualified as estimated (J) based on one semi-volatile surrogate recovery below 10 percent.

Most samples required qualification of select TCL-VOC, TCL-semi-volatile and RCRA metals results as estimated (J/UJ) based on outlying MS/MSD recoveries. Total barium results for the field duplicate pair D-4S/QA-1S were qualified as estimated (J) based on low precision. Arsenic for sample D-4S was qualified as estimated (J) due to a low post-digestion spike recovery, and Aroclor-1254 results for samples D-4W and QA-1W were

qualified as estimated (J) since %D values between both GC-column concentrations exceeded 25%.

Appendix D

APPENDIX D

LABORATORY DATA SUMMARIES (FORM-1s)

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

NYSDEC SAMPLE NO.

D-4S

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: SDG No.: FMC1

Matrix: (soil/water) SOIL Lab Sample ID: 2208108

Sample wt/vol: 5.0 (g/mL) G Lab File ID: P0889.D

Level: (low/med) LOW Date Received: 09/22/94

% Moisture: not dec. 15 Date Analyzed: 09/29/94

GC Column:CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	12	U
74-83-9	Bromomethane	12	U
75-01-4	Vinyl Chloride	12	U
75-00-3	Chloroethane	12	U
75-09-2	Methylene Chloride	13	B
67-64-1	Acetone	160	B
75-15-0	Carbon Disulfide	12	U
75-35-4	1,1-Dichloroethene	12	U
75-34-3	1,1-Dichloroethane	12	U
540-59-0	1,2-Dichloroethene (total)	12	U
67-66-3	Chloroform	12	U
107-06-2	1,2-Dichloroethane	12	U
78-93-3	2-Butanone	30	B
71-55-6	1,1,1-Trichloroethane	12	U
56-23-5	Carbon Tetrachloride	12	U
75-27-4	Bromodichloromethane	12	U
78-87-5	1,2-Dichloropropane	12	U
10061-01-5	cis-1,3-Dichloropropene	12	U
79-01-6	Trichloroethene	12	U
124-48-1	Dibromochloromethane	12	U
79-00-5	1,1,2-Trichloroethane	12	U
71-43-2	Benzene	12	U
10061-02-6	trans-1,3-Dichloropropene	12	U
75-25-2	Bromoform	12	U
108-10-1	4-Methyl-2-Pentanone	12	U
591-78-6	2-Hexanone	12	U
127-18-4	Tetrachloroethene	12	U
79-34-5	1,1,2,2-Tetrachloroethane	12	U
108-88-3	Toluene	2	J
108-90-7	Chlorobenzene	12	U
100-41-4	Ethylbenzene	2	J
100-42-5	Styrene	12	U
1330-20-7	Xylene (total)	2	J

1E

NYSDEC SAMPLE NO.

D-4S

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: SDG No.: FMC1

Matrix: (soil/water) SOIL Lab Sample ID: 2208108

Sample wt/vol: 5.0 (g/mL) G Lab File ID: P0889.D

Level: (low/med) LOW Date Received: 09/22/94

% Moisture: not dec. 15 Data Analyzed: 09/29/94

GC Column:CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN SILOXANE	21.842	24	J
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1B

NYSDEC SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

D-4S

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: SDG No.: FMC1A

Matrix: (soil/water) SOIL Lab Sample ID: 2208108

Sample wt/vol: 30.0 (g/mL) G Lab File ID: R1041.D

Level: (low/med) LOW Date Received: 09/22/94

% Moisture: 15 decanted: (Y/N) N Date Extracted:09/27/94

Concentrated Extract Volume: 500(UL) Date Analyzed: 10/27/94

Injection Volume: 2.0(uL) Dilution Factor: 2.0

GPC Cleanup: (Y/N) Y pH: 7.4

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	780	U
111-44-4	bis(2-Chloroethyl)Ether	780	U
95-57-8	2-Chlorophenol	780	U
541-73-1	1,3-Dichlorobenzene	780	U
106-46-7	1,4-Dichlorobenzene	780	U
95-50-1	1,2-Dichlorobenzene	780	U
95-48-7	2-Methylphenol	780	U
108-60-1	2,2'-oxybis(1-Chloropropane)	780	U
106-44-5	4-Methylphenol	780	U
621-64-7	N-Nitroso-di-n-propylamine	780	U
67-72-1	Hexachloroethane	780	U
98-95-3	Nitrobenzene	780	U
78-59-1	Isophorone	780	U
88-75-5	2-Nitrophenol	780	U
105-67-9	2,4-Dimethylphenol	780	U
120-83-2	2,4-Dichlorophenol	780	U
120-82-1	1,2,4-Trichlorobenzene	780	U
91-20-3	Naphthalene	780	U
106-47-8	4-Chloroaniline	780	U
87-68-3	Hexachlorobutadiene	780	U
111-91-1	bis(2-Chloroethoxy)methane	780	U
59-50-7	4-Chloro-3-Methylphenol	780	U
91-57-6	2-Methylnaphthalene	780	U
77-47-4	Hexachlorocyclopentadiene	780	U
88-06-2	2,4,6-Trichlorophenol	780	U
95-95-4	2,4,5-Trichlorophenol	1900	U
91-58-7	2-Chloronaphthalene	780	U
88-74-4	2-Nitroaniline	1900	U
131-11-3	Dimethylphthalate	780	U
208-96-8	Acenaphthylene	780	U
606-20-2	2,6-Dinitrotoluene	780	U
99-09-2	3-Nitroaniline	1900	U
83-32-9	Acenaphthene	780	U

1C

NYSDEC SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

D-4S

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: SDG No.: FMC1A

Matrix: (soil/water) SOIL Lab Sample ID: 2208108

Sample wt/vol: 30.0 (g/mL) G Lab File ID: R1041.D

Level: (low/med) LOW Date Received: 09/22/94

% Moisture: 15 decanted: (Y/N) N Date Extracted:09/27/94

Concentrated Extract Volume: 500(UL) Date Analyzed: 10/27/94

Injection Volume: 2.0(uL) Dilution Factor: 2.0

GPC Cleanup: (Y/N) Y pH: 7.4

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	1900	U
100-02-7	4-Nitrophenol	1900	U
132-64-9	Dibenzofuran	780	U
121-14-2	2,4-Dinitrotoluene	780	U
84-66-2	Diethylphthalate	780	U
7005-72-3	4-Chlorophenyl-phenylether	780	U
86-73-7	Fluorene	780	U
100-01-6	4-Nitroaniline	1900	U
534-52-1	4,6-Dinitro-2-methylphenol	1900	U
86-30-6	N-Nitrosodiphenylamine (1)	780	U
101-55-3	4-Bromophenyl-phenylether	780	U
118-74-1	Hexachlorobenzene	780	U
87-86-5	Pentachlorophenol	1900	U
85-01-8	Phenanthrene	780	U
120-12-7	Anthracene	780	U
86-74-8	Carbazole	780	U
84-74-2	Di-n-butylphthalate	780	U
206-44-0	Fluoranthene	780	U
129-00-0	Pyrene	780	U
85-68-7	Butylbenzylphthalate	780	U
91-94-1	3,3'-Dichlorobenzidine	780	U
56-55-3	Benzo(a)anthracene	780	U
218-01-9	Chrysene	780	U
117-81-7	bis(2-Ethylhexyl)phthalate	780	U
117-84-0	Di-n-octylphthalate	780	U
205-99-2	Benzo(b)fluoranthene	780	U
207-08-9	Benzo(k)fluoranthene	780	U
50-32-8	Benzo(a)pyrene	780	U
193-39-5	Indeno(1,2,3-cd)pyrene	780	U
53-70-3	Dibenz(a,h)anthracene	780	U
191-24-2	Benzo(g,h,i)perylene	780	U

(1) - Cannot be separated from Diphenylamine

000030

1F

NYSDEC SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

D-4S

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: SDG No.: FMC1A

Matrix: (soil/water) SOIL Lab Sample ID: 2208108

Sample wt/vol: 30.0 (g/mL) G Lab File ID: R1041.D

Level: (low/med) LOW Date Received: 09/22/94

% Moisture: 15 decanted: (Y/N) N Date Extracted:09/27/94

Concentrated Extract Volume: 500(uL) Date Analyzed: 10/27/94

Injection Volume: 2.0(uL) Dilution Factor: 2.0

GPC Cleanup: (Y/N) Y pH: 7.4

Number TICs found: 10

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN	3.701	270	JB
2.		UNKNOWN	3.944	180	J
3.		UNKNOWN	4.431	530	J
4.		UNKNOWN	5.005	11000	JAB
5.		UNKNOWN AROMATIC	9.493	220	J
6.		UNKNOWN	15.668	510	J
7.		UNKNOWN	19.443	180	J
8.		UNKNOWN	27.949	5600	J
9.		UNKNOWN	33.236	330	J
10.		UNKNOWN	37.864	2300	J
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
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22.					
23.					
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27.					
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29.					
30.					

11/8/94

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

D-4S

Lab Name: NYTEST_ENV_INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: _____ SDG No.: FMC1

Matrix (soil/water): SOIL Lab Sample ID: 208108

Level (low/med): LOW Date Received: 09/22/94

% Solids: 84.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic	3.4	B	W	F
7440-39-3	Barium	469			P
7440-41-7	Beryllium				NR
7440-43-9	Cadmium	0.47	U		P
7440-70-2	Calcium				NR
7440-47-3	Chromium	20.7			P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	9.7		N	F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.12	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium	1.1	U	N	F
7440-22-4	Silver	1.2	U	N	P
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
5955-70-0	Cyanide				NR

Color Before: BROWN Clarity Before: _____ Texture: MEDIUM

Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

NYSDEC SAMPLE NO.

QA-1S

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: SDG No.: FMC1

Matrix: (soil/water) SOIL Lab Sample ID: 2208110

Sample wt/vol: 5.0 (g/mL) G Lab File ID: P0890.D

Level: (low/med) LOW Date Received: 09/22/94

% Moisture: not dec. 16 Date Analyzed: 09/29/94

GC Column:CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	12	U
74-83-9	Bromomethane	12	U
75-01-4	Vinyl Chloride	12	U
75-00-3	Chloroethane	12	U
75-09-2	Methylene Chloride	6	JB
67-64-1	Acetone	150	B
75-15-0	Carbon Disulfide	2	J
75-35-4	1,1-Dichloroethene	12	U
75-34-3	1,1-Dichloroethane	6	J
540-59-0	1,2-Dichloroethene (total)	12	U
67-66-3	Chloroform	12	U
107-06-2	1,2-Dichloroethane	12	U
78-93-3	2-Butanone	32	B
71-55-6	1,1,1-Trichloroethane	12	U
56-23-5	Carbon Tetrachloride	12	U
75-27-4	Bromodichloromethane	12	U
78-87-5	1,2-Dichloropropane	12	U
10061-01-5	cis-1,3-Dichloropropene	12	U
79-01-6	Trichloroethene	12	U
124-48-1	Dibromochloromethane	12	U
79-00-5	1,1,2-Trichloroethane	12	U
71-43-2	Benzene	12	U
10061-02-6	trans-1,3-Dichloropropene	12	U
75-25-2	Bromoform	12	U
108-10-1	4-Methyl-2-Pentanone	12	U
591-78-6	2-Hexanone	12	U
127-18-4	Tetrachloroethene	12	U
79-34-5	1,1,2,2-Tetrachloroethane	12	U
108-88-3	Toluene	2	J
108-90-7	Chlorobenzene	12	U
100-41-4	Ethylbenzene	2	J
100-42-5	Styrene	12	U
1330-20-7	Xylene (total)	3	J

000024

1E

NYSDEC SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

QA-1S

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: SDG No.: FMC1

Matrix: (soil/water) SOIL Lab Sample ID: 2208110

Sample wt/vol: 5.0 (g/mL) G Lab File ID: P0890.D

Level: (low/med) LOW Date Received: 09/22/94

% Moisture: not dec. 16 Data Analyzed: 09/29/94

GC Column:CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN SILOXANE	21.841	9	J
2.					
3.					
4.					
5.					
6.					
7.					
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29.					
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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

QA-1S

Lab Name: NYTEST_ENV_INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: SDG No.: FMC1

Matrix (soil/water): SOIL Lab Sample ID: 208110

Level (low/med): LOW Date Received: 09/22/94

% Solids: 84.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic	2.9	B		F
7440-39-3	Barium	190			P
7440-41-7	Beryllium				NR
7440-43-9	Cadmium	0.47	U		P
7440-70-2	Calcium				NR
7440-47-3	Chromium	20.0			P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	11.0		SN	F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.12	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium	1.0	U	N	F
7440-22-4	Silver	1.2	U	N	P
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
5955-70-0	Cyanide				NR

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

2-J - VOA

TCLP Results

Sample ID: D-4W
Lab ID: 2206107

EPA Hazardous Waste Number	TCLP Contaminant	Regulatory levels mg/l	Practical Quantitation Limit mg/l	Found mg/l
D018	Benzene	0.50	0.05	ND
D019	Carbon tetrachloride	0.50	0.05	ND
D021	Chlorobenzene	100.0	10	ND
D022	Chloroform	6.0	0.6	ND
D028	1,2-Dichloroethane	0.5	0.05	ND
D029	1,1-Dichloroethylene	0.7	0.07	ND
D035	Methyl ethyl ketone	200.0	20	ND
D039	Tetrachloroethylene	0.7	0.07	ND
D040	Trichloroethylene	0.5	0.05	ND
D043	Vinyl chloride	0.20	0.02	ND
	1,1,1-Trichloroethane	-	-	ND

ND - None Detected

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

NYSDEC SAMPLE NO.

D-4W

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: SDG No.: FMC1A

Matrix: (soil/water) SOIL Lab Sample ID: 2208107

Sample wt/vol: 30.0 (g/mL) G Lab File ID: R1040.D

Level: (low/med) LOW Date Received: 09/22/94

% Moisture: 44 decanted: (Y/N) N Date Extracted:09/27/94

Concentrated Extract Volume: 500(UL) Date Analyzed: 10/27/94

Injection Volume: 2.0(uL) Dilution Factor: 2.0

GPC Cleanup: (Y/N) Y pH: 8.4

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	1200	U
111-44-4	bis(2-Chloroethyl)Ether	1200	U
95-57-8	2-Chlorophenol	1200	U
541-73-1	1,3-Dichlorobenzene	1200	U
106-46-7	1,4-Dichlorobenzene	1200	U
95-50-1	1,2-Dichlorobenzene	1200	U
95-48-7	2-Methylphenol	1200	U
108-60-1	2,2'-oxybis(1-Chloropropane)	1200	U
106-44-5	4-Methylphenol	890	J
621-64-7	N-Nitroso-di-n-propylamine	1200	U
67-72-1	Hexachloroethane	1200	U
98-95-3	Nitrobenzene	1200	U
78-59-1	Isophorone	1200	U
88-75-5	2-Nitrophenol	1200	U
105-67-9	2,4-Dimethylphenol	1200	U
120-83-2	2,4-Dichlorophenol	1200	U
120-82-1	1,2,4-Trichlorobenzene	1000	J
91-20-3	Naphthalene	1200	
106-47-8	4-Chloroaniline	1200	U
87-68-3	Hexachlorobutadiene	1200	U
111-91-1	bis(2-Chloroethoxy)methane	1200	U
59-50-7	4-Chloro-3-Methylphenol	1200	U
91-57-6	2-Methylnaphthalene	1800	
77-47-4	Hexachlorocyclopentadiene	1200	U
88-06-2	2,4,6-Trichlorophenol	1200	U
95-95-4	2,4,5-Trichlorophenol	2800	U
91-58-7	2-Chloronaphthalene	1200	U
88-74-4	2-Nitroaniline	2800	U
131-11-3	Dimethylphthalate	1200	U
208-96-8	Acenaphthylene	1200	U
606-20-2	2,6-Dinitrotoluene	1200	U
99-09-2	3-Nitroaniline	2800	U
83-32-9	Acenaphthene	440	J

1C

NYSDEC SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

D-4W

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: SDG No.: FMC1A

Matrix: (soil/water) SOIL Lab Sample ID: 2208107

Sample wt/vol: 30.0 (g/mL) G Lab File ID: R1040.D

Level: (low/med) LOW Date Received: 09/22/94

% Moisture: 44 decanted: (Y/N) N Date Extracted:09/27/94

Concentrated Extract Volume: 500(UL) Date Analyzed: 10/27/94

Injection Volume: 2.0(uL) Dilution Factor: 2.0

GPC Cleanup: (Y/N) Y pH: 8.4

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	2800	U
100-02-7	4-Nitrophenol	2800	U
132-64-9	Dibenzofuran	380	J
121-14-2	2,4-Dinitrotoluene	1200	U
84-66-2	Diethylphthalate	1200	U
7005-72-3	4-Chlorophenyl-phenylether	1200	U
86-73-7	Fluorene	540	J
100-01-6	4-Nitroaniline	2800	U
534-52-1	4,6-Dinitro-2-methylphenol	2800	U
86-30-6	N-Nitrosodiphenylamine (1)	1200	U
101-55-3	4-Bromophenyl-phenylether	1200	U
118-74-1	Hexachlorobenzene	1200	U
87-86-5	Pentachlorophenol	2800	U
85-01-8	Phenanthrene	4700	
120-12-7	Anthracene	1200	U
86-74-8	Carbazole	1200	U
84-74-2	Di-n-butylphthalate	1200	U
206-44-0	Fluoranthene	1700	
129-00-0	Pyrene	1900	
85-68-7	Butylbenzylphthalate	660	J
91-94-1	3,3'-Dichlorobenzidine	1200	U
56-55-3	Benzo(a)anthracene	1100	J
218-01-9	Chrysene	1300	
117-81-7	bis(2-Ethylhexyl)phthalate	3800	B
117-84-0	Di-n-octylphthalate	1200	U
205-99-2	Benzo(b)fluoranthene	700	J
207-08-9	Benzo(k)fluoranthene	680	J
50-32-8	Benzo(a)pyrene	310	J
193-39-5	Indeno(1,2,3-cd)pyrene	220	J
53-70-3	Dibenz(a,h)anthracene	140	J
191-24-2	Benzo(g,h,i)perylene	150	J

(1) - Cannot be separated from Diphenylamine

000033

1F

NYSDEC SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

D-4W

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: SDG No.: FMC1A

Matrix: (soil/water) SOIL Lab Sample ID: 2208107

Sample wt/vol: 30.0 (g/mL) G Lab File ID: R1040.D

Level: (low/med) LOW Date Received: 09/22/94

% Moisture: 44 decanted: (Y/N) N Date Extracted:09/27/94

Concentrated Extract Volume: 500(uL) Date Analyzed: 10/27/94

Injection Volume: 2.0(uL) Dilution Factor: 2.0

GPC Cleanup: (Y/N) Y pH: 8.4

Number TICs found: 15

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN	5.021	9700	JAB
2.		UNKNOWN HYDROCARBON	14.362	4800	J
3.		UNKNOWN AROMATIC	15.197	4700	J
4.		UNKNOWN HYDROCARBON	15.614	3800	J
5.		UNKNOWN	16.606	34000	J
6.		UNKNOWN HYDROCARBON	16.797	6500	J
7.		UNKNOWN	17.406	4300	J
8.		UNKNOWN	17.858	9300	J
9.		UNKNOWN	19.058	150000	J
10.		UNKNOWN	19.876	8600	J
11.		UNKNOWN	21.198	220000	J
12.		UNKNOWN	29.338	4100	J
13.		UNKNOWN	33.044	6000	J
14.		UNKNOWN	34.487	4900	J
15.		UNKNOWN	37.444	7000	J
16.					
17.					
18.					
19.					
20.					
21.					
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29.					
30.					

000034

1D

EPA SAMPLE NO.

PESTICIDE ORGANICS ANALYSIS DATA SHEET

D-4W

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: _____ SDG No.: FMC1

Matrix: (soil/water) SOIL Lab Sample ID: 2208107

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 44 decanted: (Y/N) N Date Received: 09/22/94

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 09/25/94

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 10/31/94

Injection Volume: 1.00 (uL) Dilution Factor: 2.00

GPC Cleanup: (Y/N) Y pH: 8.4 Sulfur Cleanup: (Y/N) Y

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	6.1	U
319-85-7	beta-BHC	6.1	U
319-86-8	delta-BHC	6.1	U
58-89-9	gamma-BHC (Lindane)	6.1	U
76-44-8	Heptachlor	6.1	U
309-00-2	Aldrin	6.1	U
1024-57-3	Heptachlor epoxide	6.1	U
959-98-8	Endosulfan I	6.1	U
60-57-1	Dieldrin	12	U
72-55-9	4,4'-DDE	12	U
72-20-8	Endrin	12	U
33213-65-9	Endosulfan II	12	U
72-54-8	4,4'-DDD	12	U
1031-07-8	Endosulfan sulfate	12	U
50-29-3	4,4'-DDT	12	U
72-43-5	Methoxychlor	61	U
53494-70-5	Endrin ketone	12	U
7421-93-4	Endrin aldehyde	12	U
5103-71-9	alpha-Chlordane	6.1	U
5103-74-2	gamma-Chlordane	6.1	U
8001-35-2	Toxaphene	610	U
12674-11-2	Aroclor-1016	120	U
11104-28-2	Aroclor-1221	240	U
11141-16-5	Aroclor-1232	120	U
53469-21-9	Aroclor-1242	120	U
12672-29-6	Aroclor-1248	120	U
11097-69-1	Aroclor-1254	120	U
11096-82-5	Aroclor-1260	120	U

000037

1D

EPA SAMPLE NO.

PESTICIDE ORGANICS ANALYSIS DATA SHEET

D-4WDL

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: _____ SDG No.: FMC1

Matrix: (soil/water) SOIL Lab Sample ID: 2208107DL

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 44 decanted: (Y/N) N Date Received: 09/22/94

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 09/25/94

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 10/31/94

Injection Volume: 1.00 (uL) Dilution Factor: 20.0

GPC Cleanup: (Y/N) Y pH: 8.4 Sulfur Cleanup: (Y/N) Y

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	61	U
319-85-7	beta-BHC	61	U
319-86-8	delta-BHC	61	U
58-89-9	gamma-BHC (Lindane)	61	U
76-44-8	Heptachlor	61	U
309-00-2	Aldrin	61	U
1024-57-3	Heptachlor epoxide	61	U
959-98-8	Endosulfan I	61	U
60-57-1	Dieldrin	120	U
72-55-9	4,4'-DDE	120	U
72-20-8	Endrin	120	U
33213-65-9	Endosulfan II	120	U
72-54-8	4,4'-DDD	120	U
1031-07-8	Endosulfan sulfate	120	U
50-29-3	4,4'-DDT	120	U
72-43-5	Methoxychlor	610	U
53494-70-5	Endrin ketone	120	U
7421-93-4	Endrin aldehyde	120	U
5103-71-9	alpha-Chlordane	61	U
5103-74-2	gamma-Chlordane	61	U
8001-35-2	Toxaphene	6100	U
12674-11-2	Aroclor-1016	1200	U
11104-28-2	Aroclor-1221	2400	U
11141-16-5	Aroclor-1232	1200	U
53469-21-9	Aroclor-1242	1200	U
12672-29-6	Aroclor-1248	1200	U
11097-69-1	Aroclor-1254	13000	DP
11096-82-5	Aroclor-1260	14000	D

000038

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

D-4W

Lab Name: NYTEST_ENVIRONMENTAL_INC. Contract: 9421340___

Lab Code: 10195_ Case No.: 22081_ SAS No.: _____ SDG No.: FMC1__

Matrix (soil/water): WATER Lab Sample ID: T208107___

Level (low/med): LOW__ Date Received: 09/22/94

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic	92.5			P
7440-39-3	Barium	26900			P
7440-41-7	Beryllium				NR
7440-43-9	Cadmium	2.0	U		P
7440-70-2	Calcium				NR
7440-47-3	Chromium	19.6			P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	26.0	U		P
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium	90.0	U		P
7440-22-4	Silver	5.0	U		P
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
5955-70-0	Cyanide				NR

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

TCLP_EXTRACT_____

2-J - VOA

TCLP Results

Sample ID: QA-1W
Lab ID: 2208109

EPA Hazardous Waste Number	TCLP Contaminant	Regulatory levels mg/l	Practical Quantitation Limit mg/l	Found mg/l
D018	Benzene	0.50	0.05	ND
D019	Carbon tetrachloride	0.50	0.05	ND
D021	Chlorobenzene	100.0	10	ND
D022	Chloroform	6.0	0.6	ND
D028	1,2-Dichloroethane	0.5	0.05	ND
D029	1,1-Dichloroethylene	0.7	0.07	ND
D035	Methyl ethyl ketone	200.0	20	ND
D039	Tetrachloroethylene	0.7	0.07	ND
D040	Trichloroethylene	0.5	0.05	ND
D043	Vinyl chloride	0.20	0.02	ND
	1,1,1-Trichloroethane	-	-	ND

ND - None Detected

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

QA-1W

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: _____ SDG No.: FMC1

Matrix: (soil/water) SOIL Lab Sample ID: 2208109

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 41 decanted: (Y/N) N Date Received: 09/22/94

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 09/25/94

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 10/31/94

Injection Volume: 1.00 (uL) Dilution Factor: 2.00

GPC Cleanup: (Y/N) Y pH: 8.1 Sulfur Cleanup: (Y/N) Y

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	5.8	U
319-85-7	beta-BHC	5.8	U
319-86-8	delta-BHC	5.8	U
58-89-9	gamma-BHC (Lindane)	5.8	U
76-44-8	Heptachlor	5.8	U
309-00-2	Aldrin	5.8	U
1024-57-3	Heptachlor epoxide	5.8	U
959-98-8	Endosulfan I	5.8	U
60-57-1	Dieldrin	11	U
72-55-9	4,4'-DDE	11	U
72-20-8	Endrin	11	U
33213-65-9	Endosulfan II	11	U
72-54-8	4,4'-DDD	11	U
1031-07-8	Endosulfan sulfate	11	U
50-29-3	4,4'-DDT	11	U
72-43-5	Methoxychlor	58	U
53494-70-5	Endrin ketone	11	U
7421-93-4	Endrin aldehyde	11	U
5103-71-9	alpha-Chlordane	5.8	U
5103-74-2	gamma-Chlordane	5.8	U
8001-35-2	Toxaphene	580	U
12674-11-2	Aroclor-1016	110	U
11104-28-2	Aroclor-1221	230	U
11141-16-5	Aroclor-1232	110	U
53469-21-9	Aroclor-1242	110	U
12672-29-6	Aroclor-1248	110	U
11097-69-1	Aroclor-1254	110	U
11096-82-5	Aroclor-1260	110	U

000040

1D

EPA SAMPLE NO.

PESTICIDE ORGANICS ANALYSIS DATA SHEET

QA-1WDL

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: SDG No.: FMC1

Matrix: (soil/water) SOIL Lab Sample ID: 2208109DL

Sample wt/vol: 30.0 (g/mL) G Lab File ID:

% Moisture: 41 decanted: (Y/N) N Date Received: 09/22/94

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 09/25/94

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 10/31/94

Injection Volume: 1.00 (uL) Dilution Factor: 20.0

GPC Cleanup: (Y/N) Y pH: 8.1 Sulfur Cleanup: (Y/N) Y

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	58	U
319-85-7	beta-BHC	58	U
319-86-8	delta-BHC	58	U
58-89-9	gamma-BHC (Lindane)	58	U
76-44-8	Heptachlor	58	U
309-00-2	Aldrin	58	U
1024-57-3	Heptachlor epoxide	58	U
959-98-8	Endosulfan I	58	U
60-57-1	Dieldrin	110	U
72-55-9	4,4'-DDE	110	U
72-20-8	Endrin	110	U
33213-65-9	Endosulfan II	110	U
72-54-8	4,4'-DDD	110	U
1031-07-8	Endosulfan sulfate	110	U
50-29-3	4,4'-DDT	110	U
72-43-5	Methoxychlor	580	U
53494-70-5	Endrin ketone	110	U
7421-93-4	Endrin aldehyde	110	U
5103-71-9	alpha-Chlordane	58	U
5103-74-2	gamma-Chlordane	58	U
8001-35-2	Toxaphene	5800	U
12674-11-2	Aroclor-1016	1100	U
11104-28-2	Aroclor-1221	2300	U
11141-16-5	Aroclor-1232	1100	U
53469-21-9	Aroclor-1242	1100	U
12672-29-6	Aroclor-1248	1100	U
11097-69-1	Aroclor-1254	7300	DP
11096-82-5	Aroclor-1260	6800	D

000041

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

QA-1W

Lab Name: NYTEST_ENVIRONMENTAL_INC. Contract: 9421340___

Lab Code: 10195_ Case No.: 22081_ SAS No.: _____ SDG No.: FMC1__

Matrix (soil/water): WATER Lab Sample ID: T208109___

Level (low/med): LOW__ Date Received: 09/22/94

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic	155			P
7440-39-3	Barium	16800			P
7440-41-7	Beryllium				NR
7440-43-9	Cadmium	2.0	U		P
7440-70-2	Calcium				NR
7440-47-3	Chromium	20.8			P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	26.0	U		P
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium	90.0	U		P
7440-22-4	Silver	5.0	U		P
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
5955-70-0	Cyanide				NR

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

TCLP_EXTRACT_____

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

NYSDEC SAMPLE NO.

A-5S

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: SDG No.: FMC1

Matrix: (soil/water) SOIL Lab Sample ID: 2208104

Sample wt/vol: 5.0 (g/mL) G Lab File ID: P0886.D

Level: (low/med) LOW Date Received: 09/22/94

% Moisture: not dec. 16 Date Analyzed: 09/29/94

GC Column:CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	12	U
74-83-9	Bromomethane	12	U
75-01-4	Vinyl Chloride	12	U
75-00-3	Chloroethane	12	U
75-09-2	Methylene Chloride	6	JB
67-64-1	Acetone	60	B
75-15-0	Carbon Disulfide	12	U
75-35-4	1,1-Dichloroethene	12	U
75-34-3	1,1-Dichloroethane	2	J
540-59-0	1,2-Dichloroethene (total)	12	U
67-66-3	Chloroform	12	U
107-06-2	1,2-Dichloroethane	14	
78-93-3	2-Butanone	10	JB
71-55-6	1,1,1-Trichloroethane	12	U
56-23-5	Carbon Tetrachloride	12	U
75-27-4	Bromodichloromethane	12	U
78-87-5	1,2-Dichloropropane	12	U
10061-01-5	cis-1,3-Dichloropropene	12	U
79-01-6	Trichloroethene	2	J
124-48-1	Dibromochloromethane	12	U
79-00-5	1,1,2-Trichloroethane	12	U
71-43-2	Benzene	1	J
10061-02-6	trans-1,3-Dichloropropene	12	U
75-25-2	Bromoform	12	U
108-10-1	4-Methyl-2-Pentanone	12	U
591-78-6	2-Hexanone	12	U
127-18-4	Tetrachloroethene	63	
79-34-5	1,1,2,2-Tetrachloroethane	12	U
108-88-3	Toluene	12	U
108-90-7	Chlorobenzene	2	J
100-41-4	Ethylbenzene	3	J
100-42-5	Styrene	12	U
1330-20-7	Xylene (total)	96	

1E

NYSDEC SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

A-5S

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: SDG No.: FMC1

Matrix: (soil/water) SOIL Lab Sample ID: 2208104

Sample wt/vol: 5.0 (g/mL) G Lab File ID: P0886.D

Level: (low/med) LOW Date Received: 09/22/94

% Moisture: not dec. 16 Data Analyzed: 09/29/94

GC Column:CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 10

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN HYDROCARBON	23.320	66	J
2.		UNKNOWN HYDROCARBON	23.541	40	J
3.		UNKNOWN HYDROCARBON	23.780	100	J
4.		UNKNOWN HYDROCARBON	24.830	160	J
5.		UNKNOWN HYDROCARBON	25.080	83	J
6.		UNKNOWN HYDROCARBON	25.670	67	J
7.		UNKNOWN HYDROCARBON	25.950	99	J
8.		UNKNOWN HYDROCARBON	26.180	64	J
9.		UNKNOWN HYDROCARBON	26.430	73	J
10.		UNKNOWN	26.650	33	J
11.					
12.					
13.					
14.					
15.					
16.					
17.					
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1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
A-5S

Lab Name: NYTEST_ENV_INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: _____ SDG No.: FMC1

Matrix (soil/water): SOIL Lab Sample ID: 208104

Level (low/med): LOW Date Received: 09/22/94

% Solids: 83.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic	3.6	B		F
7440-39-3	Barium	116			P
7440-41-7	Beryllium				NR
7440-43-9	Cadmium	0.58	B		P
7440-70-2	Calcium				NR
7440-47-3	Chromium	22.1			P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	13.0		N	F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.12	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium	1.1	U	N	F
7440-22-4	Silver	1.2	U	N	P
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
5955-70-0	Cyanide				NR

Color Before: BROWN Clarity Before: _____ Texture: MEDIUM

Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:

2-J - VOA

TCLP Results

Sample ID: A-5-W
Lab ID: 2208101

EPA Hazardous Waste Number	TCLP Contaminant	Regulatory levels mg/l	Practical Quantitation Limit mg/l	Found mg/l
D018	Benzene	0.50	0.05	ND
D019	Carbon tetrachloride	0.50	0.05	ND
D021	Chlorobenzene	100.0	10	ND
D022	Chloroform	6.0	0.6	ND
D028	1,2-Dichloroethane	0.5	0.05	ND
D029	1,1-Dichloroethylene	0.7	0.07	ND
D035	Methyl ethyl ketone	200.0	20	ND
D039	Tetrachloroethylene	0.7	0.07	ND
D040	Trichloroethylene	0.5	0.05	ND
D043	Vinyl chloride	0.20	0.02	ND
	1,1,1-Trichloroethane	-	-	ND

ND - None Detected

1D

EPA SAMPLE NO.

PESTICIDE ORGANICS ANALYSIS DATA SHEET

A-5-W

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: _____ SDG No.: FMC1

Matrix: (soil/water) SOIL Lab Sample ID: 2208101

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 25 decanted: (Y/N) N Date Received: 09/22/94

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 09/25/94

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 10/31/94

Injection Volume: 1.00 (uL) Dilution Factor: 500

GPC Cleanup: (Y/N) Y pH: 6.1 Sulfur Cleanup: (Y/N) Y

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	1100	U
319-85-7	beta-BHC	1100	U
319-86-8	delta-BHC	1100	U
58-89-9	gamma-BHC (Lindane)	1100	U
76-44-8	Heptachlor	1100	U
309-00-2	Aldrin	1100	U
1024-57-3	Heptachlor epoxide	1100	U
959-98-8	Endosulfan I	1100	U
60-57-1	Dieldrin	2200	U
72-55-9	4,4'-DDE	2200	U
72-20-8	Endrin	2200	U
33213-65-9	Endosulfan II	2200	U
72-54-8	4,4'-DDD	2200	U
1031-07-8	Endosulfan sulfate	2200	U
50-29-3	4,4'-DDT	2200	U
72-43-5	Methoxychlor	11000	U
53494-70-5	Endrin ketone	2200	U
7421-93-4	Endrin aldehyde	2200	U
5103-71-9	alpha-Chlordane	1100	U
5103-74-2	gamma-Chlordane	1100	U
8001-35-2	Toxaphene	110000	U
12674-11-2	Aroclor-1016	22000	U
11104-28-2	Aroclor-1221	45000	U
11141-16-5	Aroclor-1232	22000	U
53469-21-9	Aroclor-1242	22000	U
12672-29-6	Aroclor-1248	22000	U
11097-69-1	Aroclor-1254	22000	U
11096-82-5	Aroclor-1260	22000	U

000035

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

A-5-WDL

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: _____ SDG No.: FMC1

Matrix: (soil/water) SOIL Lab Sample ID: 2208101DL

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 25 decanted: (Y/N) N Date Received: 09/22/94

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 09/25/94

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 10/31/94

Injection Volume: 1.00 (uL) Dilution Factor: 25000

GPC Cleanup: (Y/N) Y pH: 6.1 Sulfur Cleanup: (Y/N) Y

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	~~57000~~	~~U~~
319-85-7	beta-BHC	57000	U
319-86-8	delta-BHC	57000	U
58-89-9	gamma-BHC (Lindane)	57000	U
76-44-8	Heptachlor	57000	U
309-00-2	Aldrin	57000	U
1024-57-3	Heptachlor epoxide	57000	U
959-98-8	Endosulfan I	57000	U
60-57-1	Dieldrin	110000	U
72-55-9	4,4'-DDE	110000	U
72-20-8	Endrin	110000	U
33213-65-9	Endosulfan II	110000	U
72-54-8	4,4'-DDD	110000	U
1031-07-8	Endosulfan sulfate	110000	U
50-29-3	4,4'-DDT	110000	U
72-43-5	Methoxychlor	570000	U
53494-70-5	Endrin ketone	110000	U
7421-93-4	Endrin aldehyde	110000	U
5103-71-9	alpha-Chlordane	57000	U
5103-74-2	gamma-Chlordane	57000	U
8001-35-2	Toxaphene	~~5700000~~	~~U~~
12674-11-2	Aroclor-1016	1100000	U
11104-28-2	Aroclor-1221	2200000	U
11141-16-5	Aroclor-1232	1100000	U
53469-21-9	Aroclor-1242	1100000	U
12672-29-6	Aroclor-1248	1100000	U
11097-69-1	Aroclor-1254	1100000	U
11096-82-5	Aroclor-1260	16000000	D

000036

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

A-5-W

Lab Name: NYTEST_ENVIRONMENTAL_INC. Contract: 9421340___

Lab Code: 10195_ Case No.: 22081_ SAS No.: _____ SDG No.: FMC1__

Matrix (soil/water): WATER Lab Sample ID: T208101___

Level (low/med): LOW__ Date Received: 09/22/94

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic	52.0	U		P
7440-39-3	Barium	989			P
7440-41-7	Beryllium				NR
7440-43-9	Cadmium	12.5			P
7440-70-2	Calcium				NR
7440-47-3	Chromium	5.0	U		P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	3180			P
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium	90.0	U		P
7440-22-4	Silver	5.0	U		P
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
5955-70-0	Cyanide				NR

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:

TCLP_EXTRACT_____

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

NYSDEC SAMPLE NO.

EB-1

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: SDG No.: FMC1

Matrix: (soil/water) WATER Lab Sample ID: 2208111

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: N9256.D

Level: (low/med) LOW Date Received: 09/22/94

% Moisture: not dec. _____ Date Analyzed: 09/28/94

GC Column:CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	9	JB
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-3	1,1-Dichloroethane	10	U
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	12	
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

1E

NYSDEC SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EB-1

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: SDG No.: FMC1

Matrix: (soil/water) WATER Lab Sample ID: 2208111

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: N9256.D

Level: (low/med) LOW Date Received: 09/22/94

% Moisture: not dec. _____ Data Analyzed: 09/28/94

GC Column:CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
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23.					
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27.					
28.					
29.					
30.					

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

EB-1

Lab Name: NYTEST ENV INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: _____ SDG No.: FMC1

Matrix: (soil/water) WATER Lab Sample ID: 2208111

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ decanted: (Y/N) ___ Date Received: 09/22/94

Extraction: (SepF/Cont/Sonc) SEPF Date Extracted: 09/25/94

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 10/23/94

Injection Volume: 1.00 (uL) Dilution Factor: 1.00

GPC Cleanup: (Y/N) N pH: 5.0 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

000039

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

EB-1

Lab Name: NYTEST_ENV_INC Contract: 9421340

Lab Code: NYTEST Case No.: 22081 SAS No.: SDG No.: FMC1

Matrix (soil/water): WATER Lab Sample ID: 208111

Level (low/med): LOW Date Received: 09/22/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic	5.0	U		F
7440-39-3	Barium	11.0	U		P
7440-41-7	Beryllium				NR
7440-43-9	Cadmium	2.0	U		P
7440-70-2	Calcium				NR
7440-47-3	Chromium	5.0	U		P
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead	3.0	U	N	F
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium	5.0	U	N	F
7440-22-4	Silver	6.5	B	N	P
7440-23-5	Sodium				NR
7440-28-0	Thallium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR
5955-70-0	Cyanide				NR

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

APPENDIX B

GEOPHYSICAL TEST RESULTS

Woodward-Clyde

TO: Mr. Frank Garbe
Woodward-Clyde Consultants
15 Hazelwood Drive - Suite 110
Amherst, NY 14228

DATE: November 16, 1994
NAME: Duane Tso
PROJECT NO.: 93C2339-3

Transmittal

X	Enclosed	__	Copy of Letter	__	Prints	__	As Requested
__	Under Separate Cover	__	Contracts	__	Photostats	__	Approved
		__	Documents	__	Tracings	__	Approved As Noted
__	First Class Mail	X	Test Results	__	Sepias	__	Re-Submit
__	Messenger	__	Specifications	__	For Comments	__	Return
__	Special Delivery	__	Drilling Logs	__	For Approval	__	Corrected Prints
__	Air Mail	__	Photos	__	For Your Use	__	_____
X	Fed. Express	__	Project Memo	__	For Your Files		

ITEM NO.	DESCRIPTION
1	Original test results of permeability tests and associated index tests for tube samples identified as Site 1 and Site 2.

REMARKS: _____

Copies to: file
93\C2339-3/d001trm.win

From: Duane Tso

Geotechnical Laboratory
45 H Commerce Way
Totowa, NJ 07512
• (201) 812-1818 • Fax (201) 812-8640

Project No.: 93C2339-3 File: INDX1.XLS

TABLE _____

LABORATORY TESTING ASSIGNMENT AND DATA SUMMARY

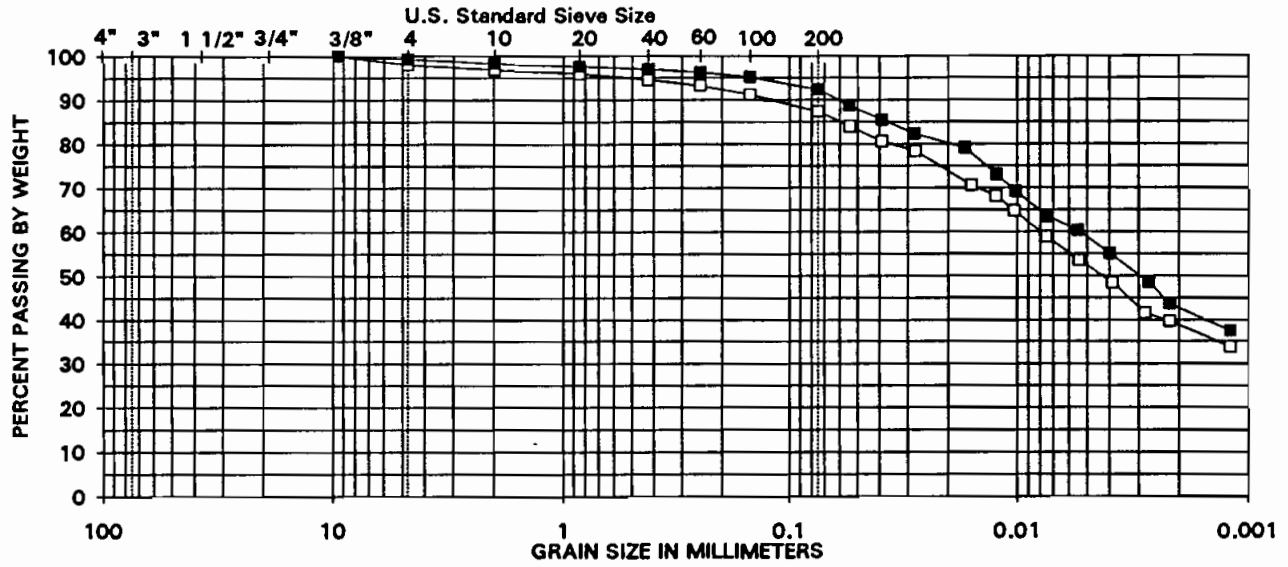
BORING NO.	SAMPLE NO.	DEPTH (ft)	IDENTIFICATION TESTS											PERMEABILITY (cm/sec)	REMARKS
			WATER CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLAS. IND.	USCS SYMB. (1)	SIEVE MINUS NO. 200 (%)	HYDROMETER % MINUS 2 um (%)	pH	ORGANIC CONTENT (110 C) (%)	TOTAL UNIT WEIGHT (pcf)	SPECIFIC GRAVITY		
Site 1												130.3			
Site 1	B		18.0				CL	87.4	39			133.6		(2)	
Site 2															
Site 2	C		16.6				CL	92.4	43			134.5		(2)	

Note: (1) Plasticity of fines for USCS symbol based on visual observation.
(2) Refer to Summary of Permeability Tests.

Prepared by: CMT Reviewed by: DJ Date: 11/14/94

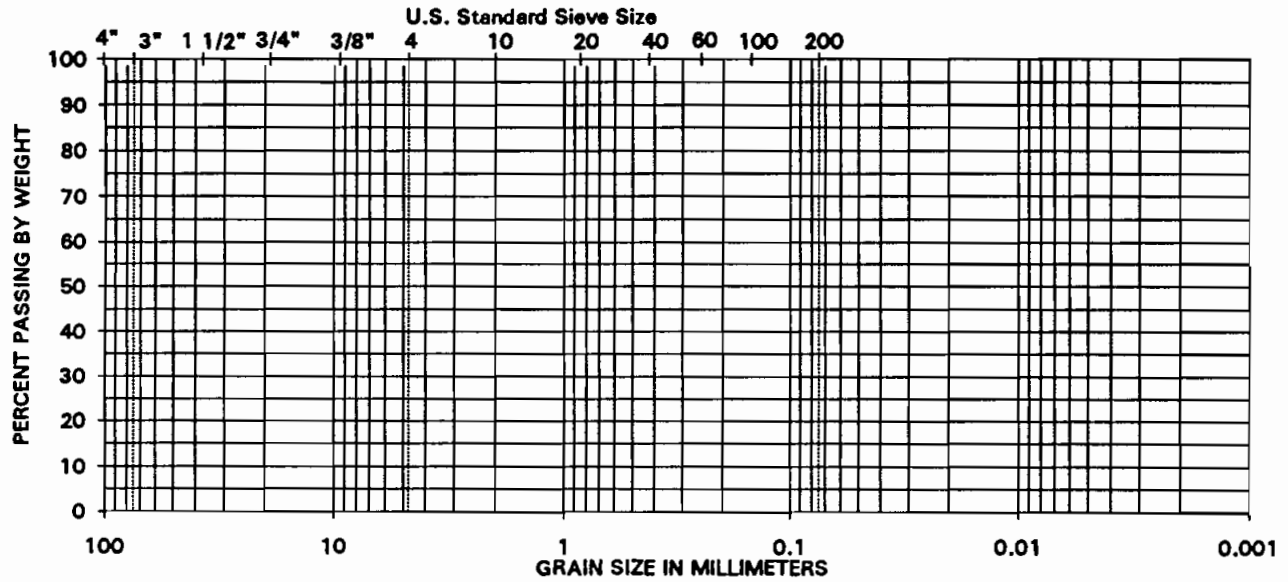
PARTICLE-SIZE DISTRIBUTION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



BORING	SAMPLE	DEPTH (FT)	SYMBOL	DESCRIPTION	w (%)	LL	PL
---	Site 1 B	---	□	CL, brown slightly plastic silty CLAY, trace f. gravel to	---	---	---
(Perm. specimen)				f. sand.			
---	Site 2 C	---	■	CL, red-brown medium plastic silty CLAY, trace c-f sand.	---	---	---
(Perm. specimen)							

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



BORING	SAMPLE	DEPTH (FT)	SYMBOL	DESCRIPTION	w (%)	LL	PL
---	---	---	□		---	---	---
---	---	---	■		---	---	---

File: SIEV1.XLS Project No.: 93C2339-3 Plotted by: CMT Reviewed by: DT Date: 11/14/94

HYDROMETER TEST

L-102
4/81

Project No. 93C2339.3 Project Engineer _____ Date Set up 10-14-94
Boring No. SITE 1 Sample No. B Depth (ft) _____ to _____
Initial Visual Classification _____

Sample Preparation
- ☐ Oven dried ☐ Air dried ☒ Natural State
- Soil broken up by: ☐ Mortar + pestle ☒ Other _____
- Soil passing Sieve No. 10
- Dispersing Agent:(1) ☒ $(NaPO_3)_6$ at 4.0gm/Liter ☐ Other _____
- Time Soaked: ☒ Overnight ☐ Other _____
- ☒ ASTM Dispersion Cup & Mixer used for one minute
- ☐ Air Dispersion device used for _____ minute
- ☐ Other _____
- De-foaming agent used ☒ Yes ☐ No

Drying Container No.	
Wgt Container + Dry Soil (gm)	
Wgt Container (gm)	
Wgt Dry Soil (gm)	

Water Content ☐ Natural ☐ Air-Dried	
Container No.	
Wgt Container + Wet Soil (gm)	
Wgt Container + Dry Soil (gm)	
Wgt Container (gm)	
Water Content, w (%)	

DISPERSING AGENT $(NaPO_3)_6$
Sodium Meta-phosphate

Weight of Soil Used in Test, Ws

For Oven-dry set-up, Ws(gm) _____

For Wet or _____ set up
W_{wet} = Estimated Ws x (1+w)
W_{wet} = _____ x(1+_____)
W_{wet} = 65.85 (gm)

After Test-Actual Ws

Container No.	P-104
Wgt Container + Dispersant + Dry Soil + _____(gm)	609.68
Wgt Container (gm)	551.03
Wgt Dry Soil + Dispersant + _____(gm)	58.65
Wgt Dispersant + _____ (gm)	4.0
Wgt Dry Soil, Ws (gm)	54.65

Soaking Beaker No. 1 Graduate No. K-3 Hydrometer No. 79-625 Meniscus Correction, Cm = 0.6

Date	Time hr: min	Elap. Time, Δt (min)	Temp. °C	Hyd. Reading, R (1)	Hyd. Reading H_2O/Disper. Rw (1)	Diameter D (mm)	Total Sam. % Finer N'
10/17/94	8:34	0	—	—	—	—	—
		1/2	19.9	34.0	3.9	0.0541	84.0
		1	"	32.8	"	0.0390	80.6
		2	"	32.0	"	0.0279	78.4
		6	"	29.2	"	0.0158	70.6
		10	"	28.3	"	0.0124	68.1
		15	"	27.1	"	0.0103	64.7
		30	"	25.0	"	0.0075	58.9
		60	20.0	23.4	4.2	0.0054	53.6
		120	20.4	21.4	4.0	0.0039	48.5
	12:55	261		18.9	4.0	0.0028	41.6
	15:35	421	21.1	18.0	3.8	0.0022	39.6
10/18/94	8:06	1412	20.0	15.9	"	0.0012	33.7

Sieving Performed After Hyd. Test
Complete Sieve Analysis Performed ☐ Yes ☐ No

Soil Retained After Washing on No. 200 Sieve

Container No.	676
Wgt. Container + Dry Soil (gm)	139.57
Wgt. Container (gm)	134.29
Wgt. Dry Soil (gm)	

% Passing No. 200 Sieve

Sieve No.	Cumulative Wgt. Retained (gm)	Total Sam. % Finer, N
200		
Pan		

Calculations: Average temperature used in calculating test, °C = 20.07 ☐ This average used to calculate all points "✓" in Temperature column indicates where actual temperature used, not average

Specific Gravity, G_s = 2.74 ☐ Tested ☐ Assumed

$N' = \frac{100\ G_s}{W_s^{(2)}(G_s-1)}(R-Rw) = 2.789\ (R-Rw)$ in %

$D = \sqrt{\frac{18\mu}{G_s G_w}}\sqrt{\frac{Zr}{t}} = 0.01326\sqrt{\frac{Zr}{t}}$

2) Where: $W_s^{(2)} = W_s \times 100 \div$ % Passing Sieve No. 10 $= (54.65) \times 100 = 56.46$ (gm)
(96.8)

(1) R = (Reading - 1) 1000

Remarks: PERM (+10 from sieve).

PE

L-103
(6/75)

PARTICLE-SIZE ANALYSIS
(by sieving)

Project Number 93C2339.3 Project Engineer _____ Date 10-19-94

Boring Number Stc 1 Sample Number B Depth (ft) _____ to _____

Initial Visual Classification _____

Shape of Grains	Gravel Portion: ☐ Angular ☐ Subangular ☐ Rounded ☐ Subrounded
	Sand Portion: (coarse to medium) ☐ Angular ☐ Subangular ☐ Rounded ☐ Subrounded

Specimen Tested	☐ Jar Sample	☐ Bag or _____ Sample
	_____ Sieves - whole sample used	_____ Sieves - whole sample used
	_____ Sieves - partial sample used + obtained by:	_____ Sieves - partial sample by method _____
Method: (a) ☐ splitter (b) ☐ quartering (c) ☐ representative scoop after mixing		_____ Sieves - partial sample by method _____

Sample Preparation		
	☐ Natural state ☐ Air-dried ☐ Oven-dried	Soil broken up: ☐ No ☐ Yes, by: ☐ Mortar and pestle ☐ Other _____ ☐ Pulverizer (Test lab L280) for ____ hr
	Soil soaked ☐ No ☐ Yes, for ____ hr	Sample washed on No. 200 sieve ☐ No ☐ Yes
	Sample from Hydrometer Test ☐ No ☒ Yes	

Total Weight of Test Specimen Using Air-dried or _____ Method of Sample Preparation	
Scalped on _____ Sieve	
Wgt Air-dried or (1) _____ soil (gm) (2) (3)	
Total wgt of above scalped soil (gm)	
Dry wgt of above scalped soil = Wad/1 + (wad) = Wad/_____ (gm)	
Wgt 3/4 or _____ oven-dried or _____ soil	
Total Wgt of Test Specimen, W_s (gm)	

WEIGHT OF TEST SPECIMEN

	Total Test Specimen	Partial Test Specimen	Soil Retained (after washing)
Sieve Range	All	-10	+200
Container Number		↓ Hyd	676
Wgt Container + Dry Soil (gm)			139.57
Wgt Container (gm)			134.29
Wgt Dry Soil, W_s (gm)		54.65	5.28
Wgt Dry Soil From Hydrometer Test (gm)			

Water Content	☐ Natural ☐ Air-dried
Container Number	
Wgt Container + Wet Soil (gm)	
Wgt Container + Dry Soil (gm)	
Wgt Container (gm)	
Water Content, w (gm)	

Sieve No.	Cum. Weight Retained (gm)	% Finer than ____ Sieve	Tot'l Sample % Finer N'
3"			
1 1/2"			
3/4"			
3/8"			
4			
10			
Pan			

Sieve No.	Cum. Wgt Retained (gm)	% Finer than ____ Sieve	Total Sample % Finer N'
3/8"			
4			
10			
20	0.49		95.9
40	1.20		94.6
60	1.97		93.3
100	3.20		91.1
200	5.29		87.4
Pan	5.35		

Maximum particle size if greater than 3" _____

Remarks _____

Maximum Particle Size	Required Wgt of Test Specimen[1]	
	(kg)	(lb)
6"	60	130
3"	30 - 40	66 - 88
1 1/2"	15 - 20	33 - 44
1"	10 - 15	22 - 33
3/4"	5 - 10	11 - 22
3/8"	1 - 2	2 - 4
No. 4	0.5 - 1	1 - 2
No. 10	0.1 - 0.5	1/2 - 1

Note (1) Reference - AASHO Designation : T 27-60

L-103
(6/75)

PARTICLE-SIZE ANALYSIS
(by sieving)

Project Number 93C2339.3 Project Engineer _____ Date 10/5/94

Boring Number SITE 1 Sample Number B Depth (ft) _____ to _____

Initial Visual Classification Brown, silty, low plasticity clay with some gravel (CL)

Shape of Grains	
	Gravel Portion: ☐ Angular ☒ Subangular ☐ Rounded ☐ Subrounded
	Sand Portion: (coarse to medium) ☐ Angular ☒ Subangular ☐ Rounded ☐ Subrounded

Specimen Tested	
	☐ Jar Sample
	_____ Sieves - whole sample used
	_____ Sieves - partial sample used + obtained by:
Method: (a) ☐ splitter (b) ☐ quartering (c) ☐ representative scoop after mixing	

	☐ Bag or PERM Sample
	_____ Sieves - whole sample used
	X Sieves - partial sample by method C
	_____ Sieves - partial sample by method _____

Sample Preparation		
☐ Natural state ☐ Air-dried ☒ Oven-dried	Soil broken up: ☒ No ☐ Yes, by:	☐ Mortar and pestle ☐ Other _____ ☐ Pulverizer (Test lab L280) for ____ hr
Soil soaked ☐ No ☒ Yes, for ____ hr	Sample washed on No. 200 sieve ☐ No ☒ Yes	
Sample from Hydrometer Test ☐ No ☐ Yes		

Total Weight of Test Specimen Using Air-dried or _____ Method of Sample Preparation	
Scalped on _____ Sieve	
Wgt Air-dried or _____ soil (gm) (1)	
(2)	
(3)	
Total wgt of above scalped soil (gm)	
Total wgt of above scalped soil = Wad/1 + (wad) = Wad/_____ (gm)	
Wgt 3/4 or _____ oven-dried or _____ soil	
Total Wgt of Test Specimen, W_s (gm)	

WEIGHT OF TEST SPECIMEN

	Total Test Specimen	Partial Test Specimen	Soil Retained (after washing)
Sieve Range	ALL		+ 200
Container Number	A		A
Wgt Container + Dry Soil (gm)	407.85		160.71
Wgt Container (gm)	131.07		131.07
Wgt Dry Soil, W_s (gm)	276.78		29.64
Wgt Dry Soil From Hydrometer Test (gm)			

Water Content	☐ Natural ☐ Air-dried
Container Number	
Wgt Container + Wet Soil (gm)	
Wgt Container + Dry Soil (gm)	
Wgt Container (gm)	
Water Content, w (gm)	

Sieve No.	Cum. Weight Retained (gm)	% Finer than ____ Sieve	Total % Sample % Finer N'
3"			
1 1/2"			
3/4"			
3/8"			
4			
10			
Pan			

Sieve No.	Cum. Wgt Retained (gm)	% Finer than ____ Sieve	Total Sample % Finer N'
3/8"	Ø		100.0
4	5.82		97.9
10	8.99		96.8
20	11.67		~~95.8~~
40	14.33		94.8
60	17.44		~~93.7~~
100	21.56		~~92.2~~
200	29.45		~~89.4~~
Pan	29.78		

Maximum particle size if greater than 3" _____

Remarks _____

Maximum Particle Size	Required Wgt of Test Specimen[1]	
	(kg)	(lb)
6"	60	130
3"	30 - 40	66 - 88
1 1/2"	15 - 20	33 - 44
1"	10 - 15	22 - 33
3/4"	5 - 10	11 - 22
3/8"	1 - 2	2 - 4
No. 4	0.5 - 1	1 - 2
No. 10	0.1 - 0.5	1/2 - 1

Note (1) Reference - AASHO Designation : T 27-60

HYDROMETER TEST

L-102
4/81

Project No. 93C233P-3 Project Engineer _____ Date Set up 10-03-94
Boring No. SITE 2 Sample No. C Depth (ft) _____ to _____
Initial Visual Classification Red/Brown moist, plastic silty Clay, some sand

Sample Preparation
- ☐ Oven dried ☐ Air dried ☑ Natural State
- Soil broken up by: ☐ Mortar + pestle ☒ Other _____
- Soil passing Sieve No. 10
- Dispersing Agent: (1) ☒ $(NaPO_3)_6$ at 4.0gm/Liter ☐ Other _____
- Time Soaked: ☒ Overnight ☐ Other _____
- ☒ ASTM Dispersion Cup & Mixer used for one minute ☐ Air Dispersion device used for _____ minute ☐ Other _____
- De-foaming agent used ☒ Yes ☐ No

Drying Container No.	
Wgt Container + Dry Soil (gm)	
Wgt Container (gm)	
Wgt Dry Soil (gm)	

Water Content ☐ Natural ☐ Air-Dried	
Container No.	
Wgt Container + Wet Soil (gm)	
Wgt Container + Dry Soil (gm)	
Wgt Container (gm)	
Water Content, w (%)	

DISPERSING AGENT $(NaPO_3)_6$
Sodium Meta-phosphate

Weight of Soil Used in Test, Ws

For Oven-dry set-up, Ws (gm)	
For Wet or _____ set up	

W_{wet} = Estimated Ws x (1+w)
W_{wet} = _____ x (1+_____)
W_{wet} = 60 gm

After Test-Actual Ws

Container No.	P-52
Wgt Container + Dispersant + Dry Soil + _____ (gm)	599.8
Wgt Container (gm)	546.80
Wgt Dry Soil + Dispersant + _____ (gm)	53.04
Wgt Dispersant + _____ (gm)	4.0
Wgt Dry Soil, Ws (gm)	49.04

Soaking Beaker No. LT-4 Graduate No. K-3 Hydrometer No. 79-625 Meniscus Correction, Cm = 0.6

Date	Time hr: min	Elap. Time, Δt (min)	Temp. °C	Hyd. Reading, R (1)	Hyd. Reading H_2O / Disper. Rw (1)	Diameter D (mm)	Total Sam. % Finer N'
10/4/94	8:52	0	—	—	—	—	—
		1/2	21.4	32.0	3.8	0.0545	88.6
		1	"	31.0	"	0.0391	85.4
		2	"	30.0	"	0.0280	82.3
		5	"	29.0	"	0.0169	79.1
		10	"	27.0	"	0.0123	72.9
		15	"	25.8	"	0.0102	69.1
		30	21.7	24.0	"	0.0074	63.4
		56	21.9	22.7	3.5	0.0055	60.3
		113	22.3	21.0	"	0.0040	55.0
	13:07	255	22.8	19.0	3.6	0.0027	48.4
	15:27	395	23.1	17.4	3.5	0.0022	43.6
10/5/94	7:55	1383	22.1	15.0	3.1	0.0012	37.4

Sieving Performed After Hyd. Test
- Complete Sieve Analysis Performed ☐ Yes ☐ No
- Soil Retained After Washing on No. 200 Sieve

Container No.	21
Wgt. Container + Dry Soil (gm)	
Wgt. Container (gm)	
Wgt. Dry Soil (gm)	

% Passing No. 200 Sieve

Sieve No.	Cumulative Wgt. Retained (gm)	Total Sam. % Finer, N
200		
Pan		

Calculations:
Average temperature used in calculating test, °C = 21.86
☐ This average used to calculate all points "✓" in Temperature column indicates where actual temperature used, not average
Specific Gravity, G_s = 2.76 ☐ Tested ☒ Assumed

$N' = \frac{100\ G_s}{W_s^{(2)}(G_s-1)}(R-Rw) = 3.140\ (R-Rw)$ in %

$D = \sqrt{\frac{18\mu}{G_s G_w}}\sqrt{\frac{Zr}{t}} = 0.01293\sqrt{\frac{Zr}{t}}$

Where: $W_s^{(2)} = W_s \times 100 \div$ % Passing Sieve No. 10 $= (49.04) \times 100 = 49.94$ (gm)

(1) R = (Reading - 1) 1000

Remarks: PERM +10 → dish 661

Set-up by PT Run by EK Taken down by EK Sieved by _____ Calculated by MC

L-103 (6/75)

PARTICLE-SIZE ANALYSIS
(by sieving)

Project Number 93C233P-3 Project Engineer _____ Date 10-3-94
Boring Number SITE 2 Sample Number C Depth (ft) — to —
Initial Visual Classification _____

Shape of Grains	Gravel Portion: ☐ Angular ☐ Subangular ☐ Rounded ☐ Subrounded
	Sand Portion: (coarse to medium) ☐ Angular ☐ Subangular ☐ Rounded ☐ Subrounded

Specimen Tested	☐ Jar Sample _____ Sieves - whole sample used _____ Sieves - partial sample used + obtained by: method: (a) ☐ splitter (b) ☐ quartering (c) ☐ representative scoop after mixing
	☐ Bag or _____ Sample _____ Sieves - whole sample used _____ Sieves - partial sample by method ___ _____ Sieves - partial sample by method ___

Sample Preparation	☐ Natural state ☐ Air-dried ☐ Oven-dried Soil broken up: ☐ No ☐ Yes, by: ☐ Mortar and pestle ☐ Other _____ ☐ Pulverizer (Test lab L280) for ___ h
	Soil soaked ☐ No ☐ Yes, for ___ hr Sample washed on No. 200 sieve ☐ No ☐ Yes
	Sample from Hydrometer Test ☐ No ☒ Yes

Total Weight of Test Specimen Using Air-dried or _____ Method of Sample Preparation	
Scalped on _____ Sieve	
Wgt Air-dried or (1) _____ soil (gm) (2)	
(3)	
Total wgt of above scalped soil (gm)	
Dry wgt of above scalped soil = Wad/1 + (wad) = Wad/_____ (gm)	
Wgt + 3/4 or _____ oven-dried or _____ soil	
Total Wgt of Test Specimen, W_s (gm)	

WEIGHT OF TEST SPECIMEN

	Total Test Specimen	Partial Test Specimen		Soil Retained Per (after washing)
Sieve Range	All	+10	-10	+200
Container Number		661		21
Wgt Container + Dry Soil (gm)		149.57		137.01
Wgt Container (gm)		149.36		134.26
Wgt Dry Soil, W_s (gm)	49.25	0.21		
Wgt Dry Soil From Hydrometer Test (gm)			49.04	

Water Content ☐ Natural ☐ Air-dried	
Container Number	
Wgt Container + Wet Soil (gm)	
Wgt Container + Dry Soil (gm)	
Wgt Container (gm)	
Water Content, w (gm)	

Sieve No.	Cum. Weight Retained (gm)	% Finer than ___ Sieve	Tot'l Sample % Finer N'
3"			
1.1/2"			
3/4"			
3/8"			
4			
10			
Pan			

Sieve No.	Cum. Wgt Retained (gm)	% Finer than ___ Sieve	Total Samp % Finer N
3/8"			
4	0		~~100~~
10	.35		~~99.3~~
20	.40		97.4
40	.66		96.9
60	1.05		96.1
100	1.58		95.1
200	2.91		92.4
Pan	3.05		—

Maximum particle size if greater than 3" _____

Remarks _____

Set up by _____ Washed by _____ Sieved by _____ Calculated by MC Reviewed by _____

Maximum Particle Size	Required Wgt of Test Specimen[1]	
	(kg)	(lb)
6"	60	130
3"	30-40	66-88
1 1/2"	15-20	33-44
1"	10-15	22-33
3/4"	5-10	11-22
3/8"	1-2	2-4
No. 4	0.5-1	1-2
No. 10	0.1-0.5	1/2-1

Note (1) Reference - AASHO Designation : T 27-60

PARTICLE-SIZE ANALYSIS
(by sieving)

(6/75)

Project Number 93C233 P.3 Project Engineer _____ Date 10-4-94

Boring Number Site 2 Sample Number C Depth (ft) _____ to _____

Initial Visual Classification _____

Shape of Grains	Gravel Portion: ☐ Angular ☐ Subangular ☐ Rounded ☐ Subrounded
	Sand Portion: (coarse to medium) ☐ Angular ☐ Subangular ☐ Rounded ☐ Subrounded

Specimen Tested	☐ Jar Sample _____ Sieves - whole sample used _____ Sieves - partial sample used + obtained by: Method: (a) ☐ splitter (b) ☐ quartering (c) ☐ representative scoop after mixing
	☐ Bag or _____ Sample _____ Sieves - whole sample used _____ Sieves - partial sample by method ____ _____ Sieves - partial sample by method ____

Sample Preparation	☐ Natural state ☐ Air-dried ☒ Oven-dried Soil broken up: ☒ No ☐ Yes, by: ☐ Mortar and pestle ☐ Other _____ ☐ Pulverizer (Test lab L280) for ____ hr
	Soil soaked ☐ No ☒ Yes, for ____ hr Sample washed on No. 200 sieve ☐ No ☒ Yes
	Sample from Hydrometer Test ☒ No ☐ Yes

Total Weight of Test Specimen Using Air-dried or _____ Method of Sample Preparation	
Scalped on _____ Sieve	
Wgt Air-dried or (1) _____ soil (gm) (2)	
(3)	
Total wgt of above scalped soil (gm)	
Dry wgt of above scalped soil = Wad/1 + (wad) = Wad/_____ (gm)	
Wgt + 3/4 or _____ oven-dried or _____ soil	
Total Wgt of Test Specimen, W_s (gm)	

Water Content	☐ Natural ☐ Air-dried
Container Number	
Wgt Container + Wet Soil (gm)	
Wgt Container + Dry Soil (gm)	
Wgt Container (gm)	
Water Content, w (gm)	

WEIGHT OF TEST SPECIMEN

	Total Test Specimen	Partial Test Specimen	Soil Retained (after washing)
Sieve Range	All		+ 200
Container Number	767		767
Wgt Container + Dry Soil (gm)	307.28		144.40
Wgt Container (gm)	130.13		130.13
Wgt Dry Soil, W_s (gm)	177.15		14.27
Wgt Dry Soil From Hydrometer Test (gm)			

Sieve No.	Cum. Weight Retained (gm)	% Finer than ____ Sieve	Total Sample % Finer N'
3"			
1 1/2"			
3/4"			
3/8"			
4			
10			
Pan			

Sieve No.	Cum. Wgt Retained (gm)	% Finer than ____ Sieve	Total Sample % Finer N'
3/8"	0		100.0
4	1.41		99.2
10	3.16		98.2
20	4.75		~~97.3~~
40	6.24		~~96.5~~
60	7.85		~~95.6~~
100	10.13		~~94.3~~
200	14.24		~~92.0~~
Pan	14.31		

Maximum particle size if greater than 3" _____

Remarks From perm spec

MC

Maximum Particle Size	Required Wgt of Test Specimen[1]	
	(kg)	(lb)
6"	60	130
3"	30 - 40	66 - 88
1 1/2"	15 - 20	33 - 44
1"	10 - 15	22 - 33
3/4"	5 - 10	11 - 22
3/8"	1 - 2	2 - 4
No. 4	0.5 - 1	1 - 2
No. 10	0.1 - 0.5	1/2 - 1

Note (1) Reference - AASHO Designation : T 27-60

Project No.: 93C2339-3 .File: UDPRM1.XLS

TABLE _____

SUMMARY OF LABORATORY PERMEABILITY TESTS PERFORMED ON THIN-WALLED TUBE SAMPLES

BORING NO.	SAMPLE NO.	DEPTH	LIMITS		WATER CONTENTS	TOTAL UNIT WGTS	DRY UNIT WGTS.	STRESSES	DURING CONSOL.	DURING TEST	COEFFICIENT OF PERM. K, (@ 20 C)	REMARKS
			LIQUID	PLAS. INDEX	INITIAL	INITIAL	INITIAL	EFFECTIVE	TIME	PERMEANT		
			PLASTIC	USCS SYMBOL	PRE-TEST	PRE-TEST	PRE-TEST	BACK PRESSURE	VOLUMETRIC STRAIN	INITIAL GRADIENT		
		(ft)			(%)	(pcf)	(pcf)	(psi)	(days, %)		(cm/sec)	
Site 1	B				18.0	133.6	113.2	5.0	1	tap water	3.3E-7	
					19.2	135.5	113.7	100.0	1.47	22		
Site 2	C				16.6	134.5	115.3	5.0	1	tap water	1.1E-6	
					17.7	137.4	116.7	100.0	1.22	20		
					"	"	"	15.0	1	tap water	2.0E-7	
					17.1	138.2	118.0	100.0	2.26	20		

Prepared by: CMT Reviewed by: DT Date: 11/16/94

L-107
(6/75)

LABORATORY LOG OF TUBE SAMPLE

Proj No. 93c2339-3 Proj Eng. _____ Date Opened 9/29/94 By DJ

Boring No. Site 1 Sample No. _____ Depth _____ To _____

Tag No. _____

Tube Seals	Wax	Mech	Good	Fair	Loose	Leaking Water	Leaking Soil
Top	X						
Bottom	<						

Cutting Edge	Sharp	Dull	Nicked <Mod.>	Dented	Neck Down <OK>

Remarks _____

Tube Scale Ft	Jar No.	Sample Use	Depth in Ground, ft	DESCRIPTION OF SOIL AND REMARKS
0.0				0.0'-0.8' VOID
0.2	A			CL, Red-brown stiff to plastic silty CLAY
0.4				Some c-f Red, f gravel
0.6	B	Pen		Ditto A
0.8		S/Hyd		
1.0	C			Ditto A
1.2				
1.4				1.4'-2.0' VOID
1.6				
1.8				
2.0				
2.2				
2.4				

Measured length of tube = 1.39 ft Recovery 1.29 ft

Type Tube _____ O.D. Brass / Steel Shelby _____ I.D. { Cutting edge (D_e) 2.833 in. / Tube (D_i) 2.878 in.

Inside Clearance Ratio = $\frac{D_i - D_e}{D_e} \times 100 = 1.5\%$

Total Unit Weight of Soil

Wgt. soil + tube 4575 qm

Wgt. tube 1184.6 qm

Wgt. wet soil 3390.4 qm

Calculated by MC

Total Unit Weight by

CUTTING EDGE (D_e)	TUBE (D_i)	AVE
γ_t 132.4	128.3	130.3 lb/ft^3

Reviewed by DJ

SPECIMEN - (Set Up / Take Down)

L-202 (8/83)

Proj. No [redacted] Proj. Eng. _____ Cell No 6 Piston dia.: ☒ 3/8"; ☐ 1/2"

Type Test Con File No P3211

Loading Conditions: ☐ Cyclic ☐ Static	☐ Undrained ☐ Drained	☐ Compression ☐ Extension	☒ Constant Cell pressure ☐ Variable cell pressure
Type Consolidation: ☒ Isotropic ☐ Anisotropic	☐ K_o stress path ☐ 45° Stress path	Piston Screwed in: ☐ Yes; ☐ No	

☒ Tube ☐ Block ☐ Reconstituted

Boring No Site 1 Sample No B Depth (ft) _____

Composite No _____ Specimen No _____ Remarks _____

☐ Ends capped with Castone; ☐ Geomarine Sample

☐ Impact ☐ Static ☐ Kneading ☐ Tamping ☐ Other

☐ Constant Effort _____ layers; _____ lb {Hammer Tamp.} _____ Blows - Tamps / layer ☐ Undercompaction _____ layers; _____ Uni (%)

Water Content				Final
Location				Ave
Container No				A
Wgt. Container + Wet Soil (gm)				460.88
Wgt Container + Dry Soil (gm)				407.85
Wgt. Container (gm)				131.07
Wgt Dry Soil (gm)				
WATER CONTENT (%)				19.16

☐ See attached data sheet(s) for additional water contents

SIEVE / 1440

Specimen Weight

Wet + Stone (etc): _____ gm

Stone (etc): _____ gm

Wet Initial: 891.2 gm

Wet Final: 892.9 gm

Excess Ovendry - Dish No P-94

Wgt Dish + Dry Soil 131.77 gm

Wgt. Dish 131.33 gm

Wgt. Excess Dry Soil 0.44 gm

Dimentions of Specimen — Height (in) / Diameter (in) or _____

	Initial (L_o)	Final (L_s)	Initial	Final	
1	3.988		1-T 2.857		
2	3.998		2-M 2.845		*
3	3.968		3-B 2.855		
4	4.010		1'-T		
5	3.983		2'-M		*
Ave	3.9896		3'-B		
			Ave 2.8523		

$D_{ave}^* = (D_T + 2D_M + D_B)/4$

ΔL_c = _____ in

ΔL_t = _____ in

$\Sigma \Delta L$ = _____ in

$L_o - L_s$ = _____ in

$A_o = \pi D^2/4 =$ 6.3898 in^2

$V_o = in^3 \cdot 16.387 1 =$ 417.750 cm^3

$A_{sm} \stackrel{\text{a}}{=} 5.5542 (D^*)^2 =$ _____ $10^{-3} ft^2$

Membrane: Thickness = 0.012 in; Circumference (C_m) = _____ in; Diam = C_m/π = _____ in

Filter Paper: Top + bottom: ☐ Yes; ☐ No

Filter Strips: ☐ Yes; ☐ No

_____ Vertical at 1/4" - Whatman #54 or _____

_____ Spiral at 1/4" - Whatman #1 or _____

Wgt top cap. = _____ gm; _____ 10^{-3} tons

Wgt (cap, dial + piston) = _____ gm, _____ 10^{-3} tons

Preliminary

γ_{to} = _____ lb/ft^3 γ_{do} = _____ lb/ft^3

Failure Sketch

Ea = 20.9%

Final Visual Classification: ☐ See more detailed sketch on attached sheet; ☒ Photo Taken.

Moist brown silty clay (low plasticity) with some gravel (CL)

Other Remarks: _____

Preliminary Cal. by _____ Reviewed by PT

☐ Trimmed by PT Setup by PT Taken down by TO

☐ Reconstituted Date 10/2/94 Date 10/2/94 Date 10/4/94

See back for Summary Calculations

SPECIMEN - SUMMARY CALCULATIONS

Type Test: _____ ☐ Undisturbed; ☐ Reconstituted - Specimen

☐ Cyclic e 1/Hz or _____ ☐ sinusoidal or _____ ☐ Static e _____ %/hr.

Consolidation History Units: tsf or _____	Max. Induced Past Pressure Uncorr.	Corr. *	☐ Preshear/perm. ☐ Pre cy-loading Uncorr.	Corr. *	Preshear after Cy-loading Uncorr.	Corr. *
σ_{cell}						
u						
$\bar{\sigma}_v$						
$\bar{\sigma}_h$						
$\bar{\sigma}_p = (\bar{\sigma}_v + \bar{\sigma}_h)/2$						
$K_c = \bar{\sigma}_v/\bar{\sigma}_h$						
OCR						
Consol. Time	☐ Overnight -days	hours	☐ Overnight days	hours	☐ Overnight days	hours

* Corrected for effects of membrane, filter strips, etc.

H_o = _____ in
A_o = _____ in²
V_o = _____ cm³
Dos/Dom = _____
G_s = _____ ☐ Assumed ☐ Measured
B_{cg} = _____ %
Area Corr. Factors: C
Undrained = _____
$C = \frac{1}{\epsilon_f}(1 - A_c/A_{sm})$
Drained = _____
$C = \frac{1}{\epsilon_f}\left[1 - \frac{A_c(1+\epsilon_{vt})}{A_{sm}}\right]$

Calculate Wgt. of Dry Soil	By Initial Water Content	By Final Water Content	By Total Ovendried Specimen
w_1 (%)			
w_2 (%)			
w_{ave} (%)			
Wgt. Wet Soil, W_T (gm)			
Partial Wgt. Dry Soil (gm)	ΔV_T (cm³) during test	(-) In ; (+) out	
Wgt. Excess Oven Dry Soil	Corr. Wet Wgt. $\bar{W}_T = W_T + \Delta V_T$		
Total Wgt. Oven Dry Soil, W_s (gm)			

W_s used: = _____ gm

Variations in Height and Volume During Consolidation	During Initial Consol. without back-pressure	During Back-Pressuring ΔV_b = vol. in	After Backpressuring $\bar{\sigma}_h$ (psi) From _____ To _____	$\bar{\sigma}_h$ (psi) From _____ To _____	$\bar{\sigma}_h$ (psi) From _____ To _____
	Sign Convention: (-) ΔV in, (+) ΔV out, (-) ΔL up, (+) ΔL down				
ΔL (in)					
ΔV_m (cm³)					
$= \Delta V_a = 3V_o(\Delta H/H_o)$					
$R = \Delta V_m/\Delta V_a$	R used = _____				
Corrected $\Delta V_m = R \cdot \Delta V_a$					
Circle Selected Value.	ΔV_1	ΔV_2	ΔV_3	ΔV_4	ΔV_5

ΔL_{cg} = _____ in

$\Delta V_{rebound} = \sigma_{max}$ to σ_{test} = _____ cm³

ΔV_T (during drained loading) = _____ cm³

Calculation of ΔV_c During Consolidation by Different Procedures	ΔV_c by Wgt. Change $= W_o - W_s - (\Delta V_b + \Delta V_T)$	ΔV_c by recorded/calculated volume changes $= \Sigma$ selected ΔV	ΔV_c assuming S = 100% $V_F = (1/G_s + w_s)W_s/\gamma_w$
			Undrained: $\Delta V_c = V_o - V_F$
	$\Delta W_{gt.}$ = _____ gm	ΔV_c = _____ + _____ + _____	Drained: $\Delta V_c = V_o - (V_F + \Delta V_T)$
	$\Sigma(\Delta V_b + \Delta V_T)$ = _____ cm³	= _____ cm³	w_s = _____ % V_F = _____ cm³
	∴ ΔV_c = _____ cm³		$V_F + \Delta V_T$ = _____ cm³
			∴ ΔV_c = _____ cm³

Conclusions

ΔV_c used (ave ✓ values) = _____ cm³ ∴ V_c = _____ cm³; ΔL_c = _____ in; ∴ L_c = _____ in

$A_c = V_c/L_c$ (cm³/in)/16.3871 = _____ in²; ÷ 0.144 = _____ ft² x10⁻³; x 6.4516 = _____ cm²

ϵ_{ac} = _____ %; ϵ_{vc} = _____ %; $1 - \epsilon_v$ = _____ ϵ_f^* = _____ ; ϵ_{vt}^* = _____ * not in percent.

At max. induced past pressure: $\Delta V_{max} = \Delta V_c - \Delta V_{rebound}$ = _____ cm³; ΔL_{max} = _____ in

Sumary	Height (in or cm)	Area (in^2 or cm^2 $ft^2 \times 10^{-3}$)	Volume (cm^3)	Water Content (%) (1)	Total / Dry Density (lb/ft^3)	Saturation (%) (2)		
Initial								
/								
Pre-Test								

(1) - ( ) indicates calculated value assuming S = 100%

(2) Approximate value especially if G_s is assumed.

Calculated by _____ Reviewed by _____

Psi x 0.072 = tsf; $in^2 \times 6.4516 = cm^2$; G_o for S=100% = $\gamma_d/(\gamma_w - w\gamma_d)$; $S = wG_s\gamma_d/(G_s\gamma_w - \gamma_d)$

w for S=100% = $(G_s\cdot\gamma_w - \gamma_d)/G_s\cdot\gamma_d$ = $G_s\gamma_w - \gamma_c/G(\gamma_c - \gamma_w)$; γ_w @ 20°C (tsf) = 62.32 lb/ft³ = 0.9982 gm/cm³; (GaH) = 64.2 (lb/ft³)

SPECIMEN - SUMMARY CALCULATIONS

Boring No.: Site 1 Sample No.: _____ Specimen: _____ Depth(ft): _____

Type test: Perm Specimen Type: Undisturbed

Consolidation History	Max. induced Past Pressure		Preshear/perm Pre cyclic loading		Preshear after cyclic loading	
Units: psi	Uncorr.	Corr.*	Uncorr.	Corr.*	Uncorr.	Corr.*
σ cell			105.0			
ı			100.0			
σ v			-----			
σ h			5.0			
σ p			-----			
Kc			1.0			
OCR						
Consolidation Time		overnight		X overnight		overnight
	days 0	hours 0	days 0	hours 0	days 0	hours 0

* Corrected for effects of membrane, filter strips, etc.

Ho = 3.990 in
Ao = 6.390 in^2
Vo = 417.752 cm^3
Dos/Dom =
Gs = 2.80 (assumed)
Bf = 0.0 %
Area corr. factors: C
C =
undrained = C = 1/Ef*(1-Ac/Afm)
drained = C = 1/Ef(1-Ac(1+Evt)/Afm)

Calculate wgt of dry soil	By initial water content	By final water content	By total ovendried specimen	Variations in height and Volume during Consol.	Initial consol w/o back-pressure	Back-pressuring dVb = vol. in	After backpressuring		
w 1 (%)	19.12	19.16							
w 2 (%)	16.32				sign convention: (-)dV = in, (+)dV = out, (-)dL = up, (+)dL = down				
w avg (%)	17.72	19.16		dL (in)	0.017	0.005	0.000	0.000	0.000
Wgt wet	Wo	Wf		dVm (cm^3 (+ values)	3.94	0.32	0.00	0.00	0.00
soil Wt (gm)	891.20	893.42	892.90	dVm (cm^3 (- values)	0.00	-10.73	0.00	0.00	0.00
Partial wgt dry				dVa = 3Vo(dH/Ho)	5.18	1.41	0.00	0.00	0.00
soil Wt (gm)			749.33	R = dVm/dVa	Rused =				
Wgt excess				corr. dVm = R*dVa					
ovendry soil			0.44	Selected dV	dV1	dV2	dV3	dV4	dV5
Total wgt oven	Ws initial	Ws final		dLcy = 0.000 in	V rebound (max stress to test stress) = 0.000 cm^3				
dry soil (gm)	757.05	749.77	749.77		dVt (during drained loading) = 0.000 cm^3				
Ws	Ws avg = 753.41		Ws used = 749.77 gm						

Calculation of dVc during consol. by different procedures	dVc by Wgt change Wo-Wf-(dVb+dVt)	dVc by recorded/calculated volume changes = sum of selected dV	dVc assuming S=100% Vf=(1/Gs+wf)Ws/0.9982
	Wo-Wf = -2.22 gm	dVc = dVa1+dVa2+dVa3+dVa4	undrained dVc = Vo-Vf
	dVb+dVt = -10.73 cm^3	+dVa5	drained dVc = Vo-(Vf+dVt)
	dVc = 8.51 cm^3	dVc = 6.60 cm^3	Vf = 412.17 cm^3
			dVo = 5.58 cm^3

dVc used (avg selected values) = 6.09 cm^3 Vc = 411.664 cm^3 dLc = 0.021 in Lc = 3.969 in

Ac = (Vc/Lc)/16.3871 = 6.330 in^2 ; /0.144 43.958 ft^2x10^-3; x6.4516 = 40.84 cm^2

Eac = 0.53% Evc = 1.46% 1-Ev = Ef = Evt =

At max induced past pressure: dVmax = dVc-dV rebound 0.000 cm^3 dLmax = 0.000 in

Summary	Height (in)	Height (cm)	Area (cm^2)	Volume (cm^3)	Water Content (%) (1)	Total Density (pcf)	Dry Density (pcf)	Saturetion (%) (2)	Total Wet Weight (gm)
Initial	3.962	10.063	41.085	413.438	18.02	133.62	113.22	93.2	884.9
2nd setup	3.990	10.134	41.224	417.752	18.86	133.18	112.05	94.8	891.2
Pre-test	3.969	10.080	40.839	411.664	19.16	135.49	113.70	100.3	893.4

(1) - ( ) indicated calculated value assuing S = 100% (2) - Approximate value especially if Gs is assumed

Calculated by: CMT Reviewed by:

PERMEABILITY TEST: FALLING HEAD - CONSTANT VOLUME U-TUBE

Project No. 9302339.3 Project Eng. _____ Cell No. 6 Apparatus No. 7

Specimen - Apparatus set-up - Test Information

1) Specimen Tested in : Triaxial Cell or ____ Compaction Mold or _____
with stones or ____ Stones with filter paper or ____ No 200 screen reinforced with No 10 screen or _____ top + bottom
2) Specimen orientation for Vertical or ____ Horizontal permeability determination
3) During saturation: Water flushed up sides of specimen to remove air: No or ____ Yes
4) During consolidation: Top and bottom drainage or ____ Top only or ____ Bottom only
5) During permeation: Direction of permeant was: Up or ____ Down
6) Permeant: Water (Demineralized or Distilled or Tap) or ____ 0.01 N calcium sulfate or _____

Remarks: _____

Consol Stage-Trial No.	Read-ings By	Date	Temp. °C	Time hr:min	Δ_t min	Initial σ_c psi	Initial Ub psi	Initial Dial in	Mercury U-tube Reading Right, hr cm	Mercury U-tube Reading Left, hl cm	Permeability Preliminary / Final at 20°C cm/sec
1-1	DM	10-3-94	20.9	7:14	11:53	105	100	.020"	61.00	43.70	659 x 10^{-7}
	DM	"	20.6	7:26	11.88				56.50	45.10	647 x 10^{-7}
		RT= 0.982				$\bar{\sigma}_c$= ____ tsf or ____			io = 21.58		
1-2	DM	10-3-94	20.6	7:28	20:25				61.00	43.70	5.33 x 10^{-7}
	DM	"	20.6	7.47	20.42				55.20	45.52	5.25 x 10^{-7}
		RT= 0.986				$\bar{\sigma}_c$= ____ tsf or ____			io = 21.58		
1-3	DM	10-3-94	20.6	7:40	18:38				61.00	43.70	6.84 x 10^{-7}
	DM	"	20.5	8:07	18.63				54.50	45.85	6.75 x 10^{-7}
		RT= 0.987				$\bar{\sigma}_c$= ____ tsf or ____			io = 21.58		

Preliminary Length/Area Calculations

Lo = 3.9896 in Vo = 417.750 cm^3
Δ Lc = 0.0202 in
Lc = 3.9694 in Δ Vc = 3 Vo (Δ Lc/Lo)
= 10.082 cm = 6.3454 cm^3
Vc = 411.405 cm^3
Ac = 40.806 cm^2

Mercury Head Settings

1) Δ Hg in cm for 50% or ____ % $\bar{\sigma}_c$
=0.5 or ____ [$\bar{\sigma}$ c (psi)/0.1784]
= _____ cm Hg
2) i = h/L = Δ Hg(cm)/Lc (cm) * 12.572
@ 21.7 ° C

Lc = 10.080 cm Remarks _____
Ac = 40.839 cm _____
Calculated using Prog. No. HP-30 or _____

ave k @ 20 °C = _____ x 10^{-} cm/sec
Calculated by MC
Reviewed by _____

Conversion Factors: 1 cm/sec = 1.969 ft/min = 2835 ft/day = 1.035 E-6 ft/yr = 14.73 (gal/min)/ft^2
1 cm of mercury in U-tube corrected for water leg = 0.012544 kg/cm^2 = 0.1784 psi @ 21.7°C

(1) $$k = \frac{(a_1)(L)(1/60)\ ln(h_o/h_f)}{A(\Delta T)(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)}$$

where $h_o = (h_i)(\gamma_{Hg}/\gamma_w-1)$

$hf = (h_i)(\gamma_{Hg}/\gamma_w-1)-(\Delta X)(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)$

(K_T) - permeability of specimen at test temperature (cm/sec)

(a_1) - area of right tube in which initially the mercury is higher (cm^2): tail water

(a_2) - area of left tube in which initially the mercury is lower (cm^2): head water

(γ_{Hg}) - specific gravity of mercury at test temperature = 13.542 @ 71 F or 21.7 C

(γ_w) - specific gravity of water at test temperature = 0.9978 @ 71 F or 21.7 C

(h_i) - difference in mercury levels at time zero (cm)

(ΔX) - drop in mercury in tube with area (a_1) during time ΔT (cm)

(ΔT) - elasped time (minutes)

$$\frac{(a_1)(1/60)}{(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)} = \text{apparatus constant } \left[(cm^2)\ \frac{(min)}{sec}\right]$$

(L/A) - specimen constant (1/cm) (L in cm and A in cm^2)

$(1+a_1/a_2)$ - tubes constant

(γ_{Hg}/γ_w-1) - specific gravity constant = 12.572 @ 71 F or 21.7 C

Therefore

$k =$ [(apparatus constant)(specimen constant) / (ΔT)] ln (h_o/h_f)

= [test constant (cm min/sec) / ΔT(min)] ln (h_o/h_f)

Item	Apparatus Constant	Tubes Constant
Apparatus 1	7.60E-05	1.319
Apparatus 2	7.52E-05	1.322
Apparatus 3	7.56E-05	1.316
Apparatus 4	7.73E-05	1.3133
Apparatus 5	7.48E-05	1.3223
Apparatus 6	7.64E-05	1.3196
Apparatus 7	7.57E-05	1.3155
Apparatus 8	7.85E-05	1.3507

L-501 12/91

PERMEABILITY TEST: FALLING HEAD - CONSTANT VOLUME U-TUBE

oject No. 9362339.3 Project Eng. _____ Cell No. 6 Apparatus No. 7

pecimen - Apparatus set-up - Test Information

1) Specimen Tested in : Triaxial Cell or ____ Compaction Mold or _____
   with stones or ____ Stones with filter paper or ____ No 200 screen reinforced with No 10 screen or _____ top + bottom
2) Specimen orientation for Vertical or ____ Horizontal permeability determination
3) During saturation: Water flushed up sides of specimen to remove air: No or ____ Yes
4) During consolidation: Top and bottom drainage or ____ Top only or ____ Bottom only
5) During permeation: Direction of permeant was: Up or ____ Down
6) Permeant: Water (Demineralized or Distilled or Tap) or ____ 0.01 N calcium sulfate or _____

Remarks: _____

onsol tage- Trial No.	Read- ings By	Date	Temp. °C	Time hr:min	Δ_t min	Initial σ_c psi	Initial Ub psi	Initial Dial in	Mercury U-tube Reading Right, hr cm	Mercury U-tube Reading Left, hl cm	Permeability Preliminary / Final at 20°C cm/sec
	DM	10-3-94	20.5	8:21	26.40	105	100	.020"	61.00	43.70	5.78 x 10⁻⁷
1-4	DM	"	20.9	8:47	26.67				53.62	46.03	5.67 x 10⁻⁷
		RT= 0.983				$\bar{\sigma}_c$= ____ tsf or ____			io = 21.58		
	DM	10-3-94	20.9	8:53	13.5				61.00	43.70	1.05 x 10⁻⁶
-5	DM	"	20.8	9:06					54.00	45.90	1.03 x 10⁻⁶
		RT= 0.980				$\bar{\sigma}_c$= ____ tsf or ____			io = 21.58		
	DM	10-3-94	20.9	9:17	10.20				61.00	43.70	1.06 x 10⁻⁶
1-6	DM	"	21.0	9:28	10.75				55.00	45.60	1.04 x 10⁻⁶
		RT= 0.978				$\bar{\sigma}_c$= ____ tsf or ____			io = 21.58		

Preliminary Length/Area Calculations

Lo = _____ in Vo = _____ cm^3
Δ Lc = _____ in
Lc = _____ in Δ Vc = 3 Vo (Δ Lc/Lo)
= _____ cm = _____ cm^3
Vc = _____ cm^3
Ac = _____ cm^2

Mercury Head Settings

1) Δ Hg in cm for 50% or ____ % $\bar{\sigma}_c$
   =0.5 or ____ [$\bar{\sigma}$ c (psi)/0.1784]
   = _____ cm Hg
2) i = h/L = Δ Hg(cm)/Lc (cm) * 12.572
   @ 21.7 ° C

c = 10.080 cm Remarks _____
c = 40.839 cm _____
alculated using Prog. No. HP-30 or _____

ave k @ 20 °C = _____ x 10⁻ cm/sec
Calculated by MC
Reviewed by _____

onversion factors: 1 cm/sec = 1.969 ft/min = 2835 ft/day = 1.035 E-6 ft/yr = 14.73 (gal/min)/ft^2
1 cm of mercury in U-tube corrected for water leg = 0.012544 kg/cm^2 = 0.1784 psi @ 21.7°C

(1) $k = \dfrac{(a_1)(L)(1/60)\ ln(h_o/h_f)}{A(\Delta T)(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)}$

where $h_o = (h_i)(\gamma_{Hg}/\gamma_w-1)$

$hf = (h_i)(\gamma_{Hg}/\gamma_w-1)-(\Delta X)(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)$

(K_T) - permeability of specimen at test temperature (cm/sec)

(a_1) - area of right tube in which initially the mercury is higher (cm^2): tail water

(a_2) - area of left tube in which initially the mercury is lower (cm^2): head water

(γ_{Hg}) - specific gravity of mercury at test temperature = 13.542 @ 71 F or 21.7 C

(γ_w) - specific gravity of water at test temperature = 0.9978 @ 71 F or 21.7 C

(h_i) - difference in mercury levels at time zero (cm)

(ΔX) - drop in mercury in tube with area (a_1) during time ΔT (cm)

(ΔT) - elasped time (minutes)

$\dfrac{(a_1)(1/60)}{(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)}$ = apparatus constant [(cm^2) (min)/sec]

(L/A) - specimen constant (1/cm) (L in cm and A in cm^2)

$(1+a_1/a_2)$ - tubes constant

(γ_{Hg}/γ_w-1) - specific gravity constant = 12.572 @ 71 F or 21.7 C

Therefore

k = [(apparatus constant)(specimen constant) / (ΔT)] ln (h_o/h_f)

= [test constant (cm min/sec) / ΔT(min)] ln (h_o/h_f)

Item	Apparatus Constant	Tubes Constant
Apparatus 1	7.60E-05	1.319
Apparatus 2	7.52E-05	1.322
Apparatus 3	7.56E-05	1.316
Apparatus 4	7.73E-05	1.3133
Apparatus 5	7.48E-05	1.3223
Apparatus 6	7.64E-05	1.3196
Apparatus 7	7.57E-05	1.3155
Apparatus 8	7.85E-05	1.3507

L-501 12/91

PERMEABILITY TEST: FALLING HEAD - CONSTANT VOLUME U-TUBE

Project No. 93C 233P.3 Project Eng. _____ Cell No. 6 Apparatus No. 7

Specimen - Apparatus set-up - Test Information

1) Specimen Tested in : Triaxial Cell or ____ Compaction Mold or _____
   with stones or ____ Stones with filter paper or ____ No 200 screen reinforced with No 10 screen or _____ top + bottom
2) Specimen orientation for Vertical or ____ Horizontal permeability determination
3) During saturation: Water flushed up sides of specimen to remove air: No or ____ Yes
4) During consolidation: Top and bottom drainage or ____ Top only or ____ Bottom only
5) During permeation: Direction of permeant was: Up or ____ Down
6) Permeant: Water (Demineralized or Distilled or Tap) or ____ 0.01 N calcium sulfate or _____

Remarks: _____

Consol Stage-Trial No.	Read-ings By	Date	Temp. °C	Time hr:min	Δ_t min	Initial σ_c psi	Initial Ub psi	Initial Dial in	Mercury U-tube Reading Right, hr cm	Mercury U-tube Reading Left, hl cm	Permeability Preliminary / Final at 20°C cm/sec
1-7	DM	10/3/94	20.9	12:05	66.5	105	100	.021	61.0	43.7	3.75 x 10⁻⁷
			21.2	13:12					51.64	46.65	3.41 x 10⁻⁷
		RT= 0.975				$\bar{\sigma}_c$= ____ tsf or ____			io = ~~20~~ 21.58		
1r 8	DM	10/3/94	21.2	13:13	85.5				61.0	43.7	3.40 x 10⁻⁷
	DM	"	21.1	14:52					50.63	46.99	3.30 x 10⁻⁷
		RT= 0.973				$\bar{\sigma}_c$= ____ tsf or ____			io = 21.6		
1-9	DM	10-3-94	21.1	14:56	70				61.00	43.70	3.58 x 10⁻⁷
	TO	10/3/94	20.9	1606					51.55	46.70	3.30 x 10⁻⁷
		RT= 0.976				$\bar{\sigma}_c$= ____ tsf or ____			io = 21.58		

Lc = 10.080 cm Remarks Avg of trials 1-7 to 1-9 ave k @ 20 °C = 3.34 x 10⁻⁷ cm/sec

Ac = 40.839 cm i avg = 21.6

Calculated using Prog. No. HP-30 or _____ Calculated by MC

Reviewed by DM

Preliminary Length/Area Calculations

Lo = _____ in Vo = _____ cm^3

Δ Lc = _____ in

Lc = _____ in Δ Vc = 3 Vo (Δ Lc/Lo)

= 10.082 cm = _____ cm^3

Vc = 41.405 cm^3

Ac = 40.806 cm^2

Mercury Head Settings

1) Δ Hg in cm for 50% or ____ % $\bar{\sigma}_c$

=0.5 or ____ [$\bar{\sigma}$ c (psi)/0.1784]

= _____ cm Hg

2) i = h/L = Δ Hg(cm)/Lc (cm) * 12.572

@ 21.7 ° C

Conversion Factors: 1 cm/sec = 1.969 ft/min = 2835 ft/day = 1.035 E-6 ft/yr = 14.73 (gal/min)/ft^2

1 cm of mercury in U-tube corrected for water leg = 0.012544 kg/cm^2 = 0.1784 psi @ 21.7°C

(1) $k = \dfrac{(a_1)(L)(1/60)\ ln(h_o/h_f)}{A(\Delta T)(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)}$

where $h_o = (h_i)(\gamma_{Hg}/\gamma_w-1)$

$hf = (h_i)(\gamma_{Hg}/\gamma_w-1)-(\Delta X)(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)$

(K_T) - permeability of specimen at test temperature (cm/sec)

(a_1) - area of right tube in which initially the mercury is higher (cm^2): tail water

(a_2) - area of left tube in which initially the mercury is lower (cm^2): head water

(γ_{Hg}) - specific gravity of mercury at test temperature = 13.542 @ 71 F or 21.7 C

(γ_w) - specific gravity of water at test temperature = 0.9978 @ 71 F or 21.7 C

(h_i) - difference in mercury levels at time zero (cm)

(ΔX) - drop in mercury in tube with area (a_1) during time ΔT (cm)

(ΔT) - elasped time (minutes)

$\dfrac{(a_1)(1/60)}{(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)}$ = apparatus constant [(cm^2) (min)] / sec

(L/A) - specimen constant (1/cm) (L in cm and A in cm^2)

$(1+a_1/a_2)$ - tubes constant

(γ_{Hg}/γ_w-1) - specific gravity constant = 12.572 @ 71 F or 21.7 C

Therefore

k = [(apparatus constant)(specimen constant) / (ΔT)] ln (h_o/h_f)

= [test constant (cm min/sec) / ΔT(min)] ln (h_o/h_f)

Item	Apparatus Constant	Tubes Constant
Apparatus 1	7.60E-05	1.319
Apparatus 2	7.52E-05	1.322
Apparatus 3	7.56E-05	1.316
Apparatus 4	7.73E-05	1.3133
Apparatus 5	7.48E-05	1.3223
Apparatus 6	7.64E-05	1.3196
Apparatus 7	7.57E-05	1.3155
Apparatus 8	7.85E-05	1.3507

2nd set-up

L203
(11/75)

TRIAXIAL TEST
(Stage Back Pressuring/Consolidation)

Project No. 93c2338.3 Cell No. 6 Test No. pw Tested By _____

Piston Screwed Into Top Cap : ☐ Yes ; ☒ No Piston Weights Used: ☐ Yes ; ☒ No

Flow Into Specimen For: ☒ Increasing ; ☐ Decreasing Burrett Reading

Proving Ring No. _____ Load Cell: No. _____ Channel No. _____ Vertical Dial No. _____

Stage No.	Date	Time	Elapsed Time (min)	Cell Pressure σ_c tsf/psi	Back Pressure U_b tsf/psi	Axial Load Div-lbs	Volume Change, CC			Vertical Dial (inch)	
							Reading Δv	Reading Δv	Total Change		
1C	10/2/94	12:11	0	5.0	0		8.0			0.000	
			1				5.31			.013	
			2				—			—	
			38				4.37			.015	
		13:38					4.16	(3.94)	(3.94)	.0165	(0.0165)
2B	10/3/94	13:40		5.0	0			0.0		.0165	
		13:58			5			2.43		.018	
		14:11			10			4.17		.0205	
		14:29			15			5.49		.024	
		14:42			20			6.34		.0275	
		15:01			30		(-7.84)	7.84		.027	
		15:14					0.0			—	
		15:27			40		0.68			.028	
		15:31			50		1.93			.0295	
		15:44			60		2.04			.0295	
		16:01			70		2.13			.0305	
		16:14			80		2.38			.033	
		16:22			90		2.56			.034	
		16:31		105	100		2.68			.0345	
	10-3-94	6:09		104.7	99.8		2.89	(-7.84)		.020	
		6:34					2.82			.0202	
		6:43					2.80	(0.09)		.0202	
				Back to consol							
		9:44						4.79		.0202	
		10:10						4.68		.020	
		11:56					(0.23)	4.56	(0.32 / -10.73)	.021	(0.0045)
				To	Pe						

Reviewed By _____

SPECIMEN - (Set Up / Take Down)

L-202 (8/83)

Proj. No 93C 2339.3 Proj. Eng. _____ Cell No #1 Piston dia.: ☒ 3/8"; ☐ 1/2"

Type Test Perm (1st Set-up) File No _____

Loading Conditions: ☐ Cyclic ☐ Static	☐ Undrained ☐ Drained	☐ Compression ☐ Extension	☒ Constant Cell pressure ☐ Variable cell pressure
Consolidation Type: ☒ Isotropic ☐ Anisotropic	☐ K_o stress path ☐ 45° Stress path	Piston Screwed in: ☐ Yes; ☐ No	

☒ Tube ☐ Block ☐ Reconstituted ☐ Impact ☐ Static ☐ Kneading ☐ Tamping ☐ Other ☐ Constant Effort

Boring No Site 1 Composite No _____ _____ layers; _____ lb {Hammer Tamp.

Sample No B Specimen No _____ _____ Blows - Tamps / layer

Depth (ft) _____ Remarks _____ ☐ Undercompaction

☐ Ends capped with Castone; ☐ Geomarine Sample _____ layers; _____ Uni (%)

Water Content			Silt	Final
Location	Top	Bot		Ave
Container No	LC-2	LB-17		
Wgt. Container + Wet Soil (gm)	63.30	127.94		
Wgt Container + Dry Soil (gm)	58.50	114.60		
Wgt. Container (gm)	33.40	32.85		
Wgt Dry Soil (gm)			Wbw	
WATER CONTENT (%)	19.12	16.32	17.7	

☐ See attached data sheet(s) for additional water contents

Specimen Weight

Wet + Stone (etc): _____ gm

Stone (etc): _____ gm

Wet Initial: 884.9 gm

Wet Final: _____ gm

Excess Ovendry - Dish No _____

Wgt Dish + Dry Soil _____ gm

Wgt. Dish _____ gm

Wgt. Excess Dry Soil _____ gm

Dimentions of Specimen

Height (in) — Diameter (in) or _____

	Initial (L_o)	Final (L_f)	Initial		Final	
1	4.004		1-T	2.866		
2	3.978		2-M	2.850		*
3	3.929		3-B	2.881		
4	3.924		1'-T	2.844		
5	3.974		2'-M	2.822		*
Ave	3.9618		3'-B	2.822		
			Ave	2.8475		

* $D_{ave} = (D_T + 2D_M + D_B)/4$

ΔL_c = _____ in

ΔL_t = _____ in

$\Sigma \Delta L$ = _____ in

$L_o - L_f$ = _____ in

$A_o = \pi D^2/4 = 6.3682$ in²

$V_o = in^3 \cdot 16.387 = 413.438$ cm³

$A_{6m} = 5.5542 (D^*)^2 =$ _____ 10^{-3} ft²

Membrane { Thickness = _____ in; Circumference (C_m) = _____ in; Diam = C_m/π = _____ in

Filter Paper: Top + bottom: ☐ Yes; ☐ No

Filter Strips: ☐ Yes; ☐ No

_____ Vertical at 1/4" - Whatman #54 or _____

_____ Spiral at 1/4" - Whatman #1 or _____

Wgt top cap. = _____ gm; _____ 10^{-3} tons

Wgt. (cap, dial + piston) = _____ gm, _____ 10^{-3} tons

Preliminary

$\gamma_{co} = 83.62$ lb/ft³ $\gamma_{do} = 113.57$ lb/ft³

Failure Sketch

$\varepsilon_a = 20\%$

Final Visual Classification: ☐ See more detailed sketch on attached sheet; ☐ Photo Taken.

Other Remarks: Sieve / Hyd

Preliminary Cal. by _____ Reviewed by _____

☐ Trimmed by DT Setup by TO Taken down by _____

☐ Reconstituted Date 8/29/94 Date 9/29/94 Date _____

See back for Summary Calculations

SPECIMEN - SUMMARY CALCULATIONS

Type Test: _____ ☐ Undisturbed; ☐ Reconstituted - Specimen

☐ Cyclic e / H_3 or _____ ± sinusoidal or _____ ☐ Static e _____ %/hr.

Consolidation History Units: tsf or _____	Max. Induced Past Pressure Uncorr.	Corr. *	☐ Preshear/perm. ☐ Pre cy-loading Uncorr.	Corr. *	Preshear after Cy-loading Uncorr.	Corr. *
$\bar{\sigma}_{cell}$						
u						
$\bar{\sigma}_v$						
$\bar{\sigma}_h$						
$\bar{\sigma}_p = (\bar{\sigma}_v + \bar{\sigma}_h)/2$						
$K_c = \bar{\sigma}_v / \bar{\sigma}_h$						
OCR						
Consol. Time	☐ Overnight _____ days _____ hours		☐ Overnight _____ days _____ hours		☐ Overnight _____ days _____ hours	

* Corrected for effects of membrane, filter strips, etc.

H_o = _____ in

A_o = _____ in^2

V_o = _____ cm^3

Dos/Dom = _____

G_s = _____ ☐ Assumed ☐ Measured

B_{cu} = _____ %

Area Corr. Factors: C

Undrained = _____

$C = \frac{1}{\epsilon_{ct}}\left(1 - \frac{A_c}{A_{sm}}\right)$

Drained = _____

$C = \frac{1}{\epsilon_{ct}}\left[1 - \frac{A_c(1+\epsilon_{vt})}{A_{sm}}\right]$

Calculate Wgt. of Dry Soil	By Initial Water Content	By Final Water Content	By Total Ovendried Specimen
w_1 (%)			
w_2 (%)			
w_{ave} (%)			
Wgt. Wet Soil, W_T (gm)			
Partial Wgt. Dry Soil (gm)	ΔV_T (cm^3) during test	(-) In ; (+) out	
Wgt. Excess Ovendry Soil	Corr. Wet Wgt. = $W_T + \Delta V_T$		
Total Wgt. Oven Dry Soil, W_s (gm)			

W_s used: _____ = _____ gm

Variations in Height and Volume During Consolidation	During Initial Consol. without back-pressure	During Back-Pressuring ΔV_b = vol. in	After Backpressuring $\bar{\sigma}_h$ (psi) From _____ To _____	$\bar{\sigma}_h$ (psi) From _____ To _____	$\bar{\sigma}_h$ (psi) From _____ To _____
	Sign Convention: (-) ΔV in, (+) ΔV out, (-) ΔL up, (+) ΔL down				
ΔL (in)					
ΔV_m (cm^3)					
$= \Delta V_a = 3V_o(\Delta H/H_o)$					
$R = \Delta V_m / \Delta V_a$	R_{used} = _____				
Corrected $\Delta V_m = R \cdot \Delta V_a$					
Circle Selected Value:	ΔV_1	ΔV_2	ΔV_3	ΔV_4	ΔV_5

ΔL_{cy} = _____ in

$\Delta V_{rebound} = \sigma_{max}$ to σ_{test} = _____ cm^3

ΔV_T (during drained loading) = _____ cm^3

Calculation of ΔV_c During Consolidation by Different Procedures.

ΔV_c by Wgt. Change = $W_o - W_s - (\Delta V_b + \Delta V_T)$

$\Delta W_{gt.}$ = _____ gm

$\Sigma(\Delta V_b + \Delta V_T)$ = _____ cm^3

$\therefore \Delta V_c$ = _____ cm^3

ΔV_c by recorded/calculated volume changes = Σ selected ΔV

ΔV_c = _____ (ΔV_1) + _____ (ΔV_2) + _____ (ΔV)

= _____ cm^3

ΔV_c assuming S = 100% $V_F = (1/G_s + w_s)W_s/\gamma_w$

Undrained: $\Delta V_c = V_o - V_F$

w_s = _____ % V_F = _____ cm^3

$V_F + \Delta V_T$ = _____ cm^3

$\therefore \Delta V_c$ = _____ cm^3

Drained: $\Delta V_c = V_o - (V_F + \Delta V_T)$

Conclusions

ΔV_c used (ave ✓ values) = _____ cm^3 $\therefore V_c$ = _____ cm^3; ΔL_c = _____ in; $\therefore L_c$ = _____ in

$A_c = V_c/L_c$ (cm^3/in) / 16.3871 = _____ in^2; ÷ 0.144 = _____ $ft^2 \times 10^{-3}$; × 6.4516 = _____ cm^2

ϵ_{ac} = _____ %; ϵ_{vc} = _____ %; $1 - \epsilon_v$ = _____ ϵ_{ct}^* = _____ ; ϵ_{vt}^* = _____ * not in percent.

At max. induced past pressure: $\Delta V_{max} = \Delta V_c - \Delta V_{rebound}$ = _____ cm^3; ΔL_{max} = _____ in

Sumary	Height (in or cm)	Area (in^2 or cm^2 $ft^2 \times 10^{-3}$)	Volume (cm^3)	Water Content (%) (1)	Total / Dry Density (lb/ft^3)	Saturation (%) (2)		
Initial								
Pre-Test								

(1) - ( ) indicates calculated value assuming S = 100%

(2) Approximate value especially if G_s is assumed.

Calculated by _____ Reviewed by _____

$S = w G_s \cdot \gamma_d / (G_s \cdot \gamma_w - \gamma_d)$

γ_w @ 20°C (Stresh) = 62.32 lb/ft^3 = 0.9982 gm/cm^3; (SaHT) = 64.2 (lb/ft^3)

$= \gamma_d / \gamma_w - w \gamma_d$

G_s for S = 100% $= \gamma_w / (\gamma_w - \gamma_d)$

$= G_s \cdot \gamma_w - \gamma_e / G_s (\gamma_e - \gamma_w)$

$= (G_s \cdot \gamma_w - \gamma_d) / G_s \cdot \gamma_d$

$in^2 \times 6.4516 = cm^2$

$tsf = psi \times 0.0172$

w for S = 100%

1st set-up

L-501 12/91

PERMEABILITY TEST: FALLING HEAD - CONSTANT VOLUME U-TUBE

Project No. 93C2339.3 Project Eng. _____ Cell No. P1 Apparatus No. 2

Specimen - Apparatus set-up - Test Information

1) Specimen Tested in : Triaxial Cell or ____ Compaction Mold or _____
with stones or ____ Stones with filter paper or ____ No 200 screen reinforced with No 10 screen or _____ top + bottom
2) Specimen orientation for Vertical or ____ Horizontal permeability determination
3) During saturation: Water flushed up sides of specimen to remove air: No or ____ Yes
4) During consolidation: Top and bottom drainage or ____ Top only or ____ Bottom only
5) During permeation: Direction of permeant was: Up or ____ Down
6) Permeant: Water (Demineralized or Distilled or Tap) or ____ 0.01 N calcium sulfate or _____

Remarks: _____

Consol Stage-Trial No.	Read-ings By	Date	Temp. °C	Time hr:min	Δ_t min	Initial σ_c psi	Initial Ub psi	Initial Dial in	Mercury U-tube Reading Right, hr cm	Mercury U-tube Reading Left, hl cm	Permeability Preliminary / Final at 20°C cm/sec
1-1	DM	9-30-94	21.5	6:40	14 sec	1050	1000	.1123	58.50	46.60	7.61 x 10^{-5}
	DM	"	21.5	6:40	0.23				53.00	48.35	____ x 10^{-}
		RT= ____				$\bar{\sigma}_c$= ____ tsf or ____			io = .15		
1-2	DM	9-30-94	21.5	6:42	17 sec	—	—	—	58.50	46.60	6.25 x 10^{-5}
	DM	"	21.5	6:42	0.28				53.00	48.35	____ x 10^{-}
		RT= ____				$\bar{\sigma}_c$= ____ tsf or ____			io = .15		
1-3	DM	9-30-94	21.5	6:43	16 sec	—	—	—	58.50	46.60	6.48 x 10^{-5}
	DM	"	21.5	6:43	0.27				53.00	48.35	____ x 10^{-}
		RT= ____				$\bar{\sigma}_c$= ____ tsf or ____			io = .15		

Lc = ____ cm Remarks _____

Ac = ____ cm _____

Calculated using Prog. No. HP-30 or _____

ave k @ 20 °C = _____ x 10^{-} cm/sec

Calculated by _____

Reviewed by _____

Preliminary Length/Area Calculations

Lo = 2.9618 in Vo = 413.438 cm^3

Δ Lc = 0.023 in

Lc = 2.9388 in Δ Vc = 3 Vo (Δ Lc/Lo)

= 0.005 cm = 7.201 cm^3

Vc = 406.23 cm^3

Ac = 40.603 cm^2

Mercury Head Settings

1) Δ Hg in cm for 50% or ____ % $\bar{\sigma}$c

=0.5 or ____ [$\bar{\sigma}$ c (psi)/0.1784]

= _____ cm Hg

2) i = h/L = Δ Hg(cm)/Lc (cm) * 12.572

@ 21.7 ° C

Conversion Factors: 1 cm/sec = 1.969 ft/min = 2835 ft/day = 1.035 E-6 ft/yr = 14.73 (gal/min)/ft^2

1 cm of mercury in U-tube corrected for water leg = 0.012544 kg/cm^2 = 0.1784 psi @ 21.7°C

(1) $$k = \frac{(a_1)(L)(1/60)\ ln(h_o/h_f)}{A(\Delta T)(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)}$$

where $h_o = (h_i)(\gamma_{Hg}/\gamma_w-1)$

$hf = (h_i)(\gamma_{Hg}/\gamma_w-1)-(\Delta X)(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)$

(K_T) - permeability of specimen at test temperature (cm/sec)

(a_1) - area of right tube in which initially the mercury is higher (cm^2): tail water

(a_2) - area of left tube in which initially the mercury is lower (cm^2): head water

(γ_{Hg}) - specific gravity of mercury at test temperature = 13.542 @ 71 F or 21.7 C

(γ_w) - specific gravity of water at test temperature = 0.9978 @ 71 F or 21.7 C

(h_i) - difference in mercury levels at time zero (cm)

(ΔX) - drop in mercury in tube with area (a_1) during time ΔT (cm)

(ΔT) - elasped time (minutes)

$$\frac{(a_1)(1/60)}{(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)} = \text{apparatus constant } [(cm^2)\ (\underline{min})/sec]$$

(L/A) - specimen constant (1/cm) (L in cm and A in cm^2)

$(1+a_1/a_2)$ - tubes constant

(γ_{Hg}/γ_w-1) - specific gravity constant = 12.572 @ 71 F or 21.7 C

Therefore

$k =$ [(apparatus constant)(specimen constant) / (ΔT)] ln (h_o/h_f)

= [test constant (cm min/sec) / ΔT(min)] ln (h_o/h_f)

Item	Apparatus Constant	Tubes Constant
Apparatus 1	7.60E-05	1.319
Apparatus 2	7.52E-05	1.322
Apparatus 3	7.56E-05	1.316
Apparatus 4	7.73E-05	1.3133
Apparatus 5	7.48E-05	1.3223
Apparatus 6	7.64E-05	1.3196
Apparatus 7	7.57E-05	1.3155
Apparatus 8	7.85E-05	1.3507

1st Set-up

L-501 12/91

PERMEABILITY TEST: FALLING HEAD - CONSTANT VOLUME U-TUBE

Project No. 83c 2339.3 Project Eng. _____ Cell No. P-1 Apparatus No. 2

Specimen - Apparatus set-up - Test Information

1) Specimen Tested in : Triaxial Cell or ____ Compaction Mold or _____
   with stones or ____ Stones with filter paper or ____ No 200 screen reinforced with No 10 screen or _____ top + bottom
2) Specimen orientation for Vertical or ____ Horizontal permeability determination
3) During saturation: Water flushed up sides of specimen to remove air: No or ____ Yes
4) During consolidation: Top and bottom drainage or ____ Top only or ____ Bottom only
5) During permeation: Direction of permeant was: Up or ____ Down
6) Permeant: Water (Demineralized or Distilled or Tap) or ____ 0.01 N calcium sulfate or _____

Remarks: _____

Consol Stage-Trial No.	Read-ings By	Date	Temp. °C	Time hr:min	Δ_t min	Initial σ_c psi	Initial Ub psi	Initial Dial in	Mercury U-tube Reading Right, hr cm	Mercury U-tube Reading Left, hl cm	Permeability Preliminary / Final at 20°C cm/sec
1A-	DT	9/30/94	21.8	16:42	6 1/2	415	100	.440	62.0	45.55	____ x 10⁻
									54.1	—	____ x 10⁻
1		RT= _____				$\bar{\sigma}_c$= ____ tsf or ____			io = _____		
1B-	DT	9/30/94	21.8	16:44	59 sec	—	—		62.0	45.55	____ x 10⁻
									54.0	—	____ x 10⁻
✓		RT= _____				$\bar{\sigma}_c$= ____ tsf or ____			io = _____		
1A-	DT	9/30/94	21.8	16:46	1:13	—	—		62.0	45.55	____ x 10⁻
									53.0	—	____ x 10⁻
3		RT= _____				$\bar{\sigma}_c$= ____ tsf or ____			io = _____		

Lc = _____ cm Remarks _____

Ac = _____ cm _____

Calculated using Prog. No. HP-30 or _____

ave k @ 20 °C = _____ x 10⁻ cm/sec

Calculated by _____

Reviewed by _____

Preliminary Length/Area Calculations

Lo = _____ in Vo = _____ cm^3

Δ Lc = _____ in

Lc = _____ in Δ Vc = 3 Vo (Δ Lc/Lo)

= _____ cm =_____cm^3

Vc = _____ cm^3

Ac = _____ cm^2

Mercury Head Settings

1) Δ Hg in cm for 50% or ____ % $\bar{\sigma}$c

=0.5 or ____ [$\bar{\sigma}$ c (psi)/0.1784]

= _____ cm Hg

2) i = h/L =Δ Hg(cm)/Lc (cm) * 12.572

@ 21.7 ° C

Conversion Factors: 1 cm/sec = 1.969 ft/min = 2835 ft/day = 1.035 E-6 ft/yr = 14.73 (gal/min)/ft^2

1 cm of mercury in U-tube corrected for water leg = 0.012544 kg/cm^2 = 0.1784 psi @ 21.7°C

(1) $k = \dfrac{(a_1)(L)(1/60)\ ln(h_o/h_f)}{A(\Delta T)(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)}$

where $h_o = (h_i)(\gamma_{Hg}/\gamma_w-1)$

$hf = (h_i)(\gamma_{Hg}/\gamma_w-1)-(\Delta X)(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)$

(K_T) - permeability of specimen at test temperature (cm/sec)

(a_1) - area of right tube in which initially the mercury is higher (cm^2): tail water

(a_2) - area of left tube in which initially the mercury is lower (cm^2): head water

(γ_{Hg}) - specific gravity of mercury at test temperature = 13.542 @ 71 F or 21.7 C

(γ_w) - specific gravity of water at test temperature = 0.9978 @ 71 F or 21.7 C

(h_i) - difference in mercury levels at time zero (cm)

(ΔX) - drop in mercury in tube with area (a_1) during time ΔT (cm)

(ΔT) - elasped time (minutes)

$\dfrac{(a_1)(1/60)}{(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)}$ = apparatus constant [(cm^2) (min)/sec]

(L/A) - specimen constant (1/cm) (L in cm and A in cm^2)

$(1+a_1/a_2)$ - tubes constant

(γ_{Hg}/γ_w-1) - specific gravity constant = 12.572 @ 71 F or 21.7 C

Therefore

k = [(apparatus constant)(specimen constant) / (ΔT)] ln (h_o/h_f)

= [test constant (cm min/sec) / ΔT(min)] ln (h_o/h_f)

Item	Apparatus Constant	Tubes Constant
Apparatus 1	7.60E-05	1.319
Apparatus 2	7.52E-05	1.322
Apparatus 3	7.56E-05	1.316
Apparatus 4	7.73E-05	1.3133
Apparatus 5	7.48E-05	1.3223
Apparatus 6	7.64E-05	1.3196
Apparatus 7	7.57E-05	1.3155
Apparatus 8	7.85E-05	1.3507

1st Set-up

L203
(11/75)

TRIAXIAL TEST
(Stage Back Pressuring/Consolidation)

Project No. 93C2331.3 Cell No. P1 Test No. PERM SITE 1, B Tested By TO

Piston Screwed Into Top Cap : ☐ Yes ; ☒ No Piston Weights Used: ☐ Yes ; ☒ No

Flow Into Specimen For: ☒ Increasing ; ☐ Decreasing Burrett Reading

Proving Ring No. _____ Load Cell: No. _____ Channel No. _____ Vertical Dial No. _____

Stage No.	Date	Time	Elapsed Time (min)	Cell Pressure σ_c ~~tsf~~/psi	Back Pressure U_b ~~tsf~~/psi	Axial Load Div-lbs	Volume Change, CC: Reading Δv	Reading Δv	Total Change	Vertical Dial (inch)	
SET	9/29/94	1530		—	—					0.100	
1C	9/29	1537	0	5	—		17.00			.100	
			.5				12.70			.106	
			1				12.60			.1065	
			2				12.50			.107	
		1638					11.70	(5.30)	(5.30)	.1073	0.0073
2B	9/29	1638		5	—		11.70			.1073	
		1704			5		17.80	(-6.10)		.108	
					~~10~~						
		1704			5			2.00		.108	
		1750			10			8.40		.102	
		1805			20			13.40		.117	
		1830			30		(-15.15)	17.15		.119	
		1830			30		3.00			.119	
		1844			40		5.28			.1225	
		1855			50		6.52			.1225	
		1913			60		7.62			.1225	
		1930			70		8.45			.1225	
		18:42			80		8.88			.123	
		18:54			90		9.36			.1235	
		20:02		105	100		9.60			.1245	
	9/30/94	0600					10.88			.124	
		6:12		104.9	99.9		10.84	(-7.84)	(0.01)	.123	(0.0157)
		6:36			all		10.83	(0.01)	(29.09)	.123	
					To Perm						
3C	9/30/94	7:48	0	115	100			15.0		.123	
			1					12.69		.133	
			2					12.18		.1355	
		11:36						9.69		.1435	
		16:38					(5.58)	9.42		.144	
				To	Perm						

Reviewed By _____

1st Set-up

L203
(11/75)

TRIAXIAL TEST
(Stage Back Pressuring/Consolidation)

Project No. 93L233F3 Cell No. P1 Test No. Pen Tested By _____

Piston Screwed Into Top Cap : ☐ Yes ; ☒ No Piston Weights Used: ☐ Yes ; ☒ No

Flow Into Specimen For: ☒ Increasing ; ☐ Decreasing Burrett Reading

Proving Ring No. _____ Load Cell: No. _____ Channel No. _____ Vertical Dial No. _____

Stage No.	Date	Time	Elapsed Time (min)	Cell Pressure σ_c tsf/psi	Back Pressure U_b tsf/psi	Axial Load Div-lbs	Volume Change, CC			Vertical Dial (inch)	
							Reading Δv	Reading Δv	Total Change		
		Basic		Consol							
3L	9/30/94	18:44		115	100		20.42			.144	
	10/1/94	0839		115	100		20.40			.144	
		1347					20.40			.144	
		1811					20.43			.144	
	10/2/94	10:53					20.46	(-0.04)	(5.58 -0.04)	.1445	(0.0715)
				Take down							

Reviewed By

L-107
(6/75)

LABORATORY LOG OF TUBE SAMPLE

Proj No. 93c2339-3 Proj Eng. _____ Date Opened 9/29/94 By DJ

Boring No. Site 2 Sample No. _____ Depth _____ To _____

Tag No. _____

Tube Seals	Wax	Mech	Good	Fair	Loose	Leaking Water	Leaking Soil
Top	X						
Bottom	X						

Cutting Edge	Sharp	Dull	Nicked < Mod. >			Dented	Neck Down < OK >		

Remarks sample slide out of Tube

Tube Scale Ft	Jar No.	Sample Use	Depth in Ground, ft	DESCRIPTION OF SOIL AND REMARKS
0.0				
0.2	A			CL, red-brown stiff m plastic silty CLAY some m-f sand, trace gravel.
0.4				
0.6	B			Ditto sect. A
0.8				
1.0	C	pen S/M-10		CL, red-brown stiff m-plastic silty CLAY some gravel, m-f sand Some gauges noted (cause by gravel)
1.2				
1.4				
1.6	D			Ditto sect C
1.8				
2.0				0.12' VOID
2.2				
2.4				

Measured length of tube = 2.09 ft Recovery _____ ft

Type Tube _____ O.D. Brass Steel Shelby _____ I.D. { Cutting edge(D_e) 2.834 in. / Tube(D_i) 2.875 in.

Inside Clearence Ratio = $\frac{D_i - D_e}{D_e} \times 100 =$ _____ %

Total Unit Weight of Soil					
	Wgt. soil + tube _____ qm	Total Unit Weight by			
	Wgt. tube 1799.0 qm		CUTTING EDGE (D_e)	TUBE (D_i)	AVE
	Wgt. wet soil _____ qm	γ_t	_____	_____	_____ lb/ft^3
	Calculated by _____	Reviewed by		DJ	

L-202 (8/83)

SPECIMEN - (Set Up / Take Down)

Proj. No 93C2339.3 Proj. Eng. _____ Cell No P2 Piston dia.: ☒ 3/8"; ☐ 1/2"

Type Test Piezo File No P3210

Loading Conditions					
☐ Cyclic	☐ Undrained	☐ Compression	☒ Constant Cell pressure
☒ Static	☐ Drained	☐ Extension	☐ Variable cell pressure

Type Consolidation			Piston Screwed in:
☐ Isotropic	☐ K_o stress path	☐ Yes; ☒ No
☐ Anisotropic	☐ 45° Stress path	

☒ Tube ☐ Block ☐ Reconstituted

Boring No SITE 2 Composite No _____

Sample No C Specimen No C

Depth (ft) _____ Remarks _____

☐ Ends capped with Castone; ☐ Geomarine Sample

☐ Impact ☐ Constant Effort

☐ Static _____ layers; _____ lb {Hammer Tamp.

☐ Kneading _____ Blows - Tamps / layer

☐ Tamping ☐ Undercompaction

☐ Other 10 layers; _____ Unif (%)

Water Content	INT	IHT		Final
Location	BOTT	TOP		Ave
Container No	15	10		767
Wgt. Container + Wet Soil (gm)	281.97	335.31		337.65
Wgt Container + Dry Soil (gm)	259.56	306.66		307.28
Wgt. Container (gm)	124.24	134.21		130.13
Wgt Dry Soil (gm)			Way	
WATER CONTENT (%)	16.56	16.61	16.5	17.14

☐ See attached data sheet(s) for additional water contents

Specimen Weight

Wet + Stone (etc): _____ gm

Stone (etc): _____ gm

Wet Initial: 879.2 gm

Wet Final: 883.3 gm

Excess Ovendry - Dish No _____

Wgt Dish + Dry Soil _____ gm

Wgt. Dish _____ gm

Wgt. Excess Dry Soil _____ gm

Dimentions of Specimen — Height (in) or Diameter (in)

	Initial (L_o)	Final (L_f)		Initial	Final	
1	3.992		1-T	2.830		
2	3.973		2-M	2.823		*
3	3.998		3-B	2.816		
4	3.976		1'-T	2.835		
5	3.999		2'-M	2.811		*
Ave	3.988		3'-B	2.804		
			Ave	2.820		

* Dave = $(D_T + 2D_M + D_B)/4$

ΔL_c = _____ in

ΔL_t = _____ in

$\Sigma \Delta L$ = _____ in

$L_o - L_f$ = _____ in

$A_o = \pi D^2/4 = 6.246$ in^2

$V_o = 1 in^3 \cdot 16.3871 = 408.173$ cm^3

$A_{6m} = 5.5542 (D^2)^2 =$ _____ 10^{-3} ft^2

Membrane { Thickness = 0.025 in; Circumference (C_m) = _____ in; Diam = C_m/π = _____ in

Filter Paper: Top + bottom: ☐ Yes; ☒ No

Filter Strips: ☐ Yes; ☒ No

_____ Vertical at 1/4" - Whatman #54 or _____

_____ Spiral at 1/4" - Whatman #1 or _____

Wgt top cap. = _____ gm; _____ 10^{-3} tons

Wgt. (cap, dial + piston) = _____ gm; _____ 10^{-3} tons

Preliminary

γ_{to} = 134.5 lb/ft^3 γ_{do} = 115.3 lb/ft^3

Failure Sketch

$\varepsilon_a = 20\%$

Final Visual Classification: ☐ See more detailed sketch on attached sheet; ☐ Photo Taken.

Slightly moist, brown silty high plasticity clay with some coarse sand and evidence of gravel (CH) (Vert. seams water (Silty)

Other Remarks: Sieve / Hyd

Preliminary Cal. by TO Reviewed by DM

☒ Trimmed by TO Setup by TO Taken down by DM

☐ Reconstituted Date 9/29/94 Date 9/29/94 Date 10-3-94

See back for Summary Calculations

SPECIMEN - SUMMARY CALCULATIONS

Type Test: _____ ☐ Undisturbed; ☐ Reconstituted - Specimen:

☐ Cyclic - e / Hz or _____ ☐ Sinusoidal or _____ ☐ Static e _____ %/hr.

Consolidation History Units: tsf or _____	Max. Induced Past Pressure Uncorr.	Corr. *	☐ Preshear/perm. ☐ Pre cy-loading Uncorr.	Corr. *	Preshear after Cy-loading Uncorr.	Corr. *
σ_{cell}						
u						
$\bar{\sigma}_v$						
$\bar{\sigma}_h$						
$\bar{\sigma}_p = (\bar{\sigma}_v + \bar{\sigma}_h)/2$						
$K_c = \bar{\sigma}_v / \bar{\sigma}_h$						
OCR						
Consol. Time	☐ Overnight _____ days _____ hours		☐ Overnight _____ days _____ hours		☐ Overnight _____ days _____ hours	

* Corrected for effects of membrane, filter strips, etc.

H_o = _____ in

A_o = _____ in²

V_o = _____ cm³

Dos/Dom = _____

G_s = _____ ☐ Assumed ☐ Measured

B_f = _____ %

Area Corr. Factors: C

Undrained = _____

$C = \frac{1}{\epsilon_f}\left(1 - \frac{A_c}{A_{sm}}\right)$

Drained = _____

$C = \frac{1}{\epsilon_f}\left[1 - \frac{A_c(1+\epsilon_{vt})}{A_{sm}}\right]$

Calculate Wgt. of Dry Soil	By Initial Water Content	By Final Water Content	By Total Ovendried Specimen
w_1 (%)			
w_2 (%)			
w_{ave} (%)			
Wgt. Wet Soil, W_T (gm)			
Partial Wgt. Dry Soil (gm)	ΔV_T (cm³) during test	(-) In ; (+) out	
Wgt. Excess Oven Dry Soil	Corr. Wet Wgt. @ $\bar{\sigma}_f$: $W_T + \Delta V_T$		
Total Wgt. Oven Dry Soil, W_s (gm)			
W_s used:	= _____ gm		

Variations in Height and Volume During Consolidation	During Initial Consol. without back-pressure	During Back-Pressuring ΔV_b = vol. in	After Backpressuring $\bar{\sigma}_h$ (psi) From _____ To _____	$\bar{\sigma}_h$ (psi) From _____ To _____	$\bar{\sigma}_h$ (psi) From _____ To _____
	Sign Convention: (-) ΔV^{in}, (+) ΔV^{out}, (-) ΔL^{up}, (+) ΔL^{down}				
ΔL (in)					
ΔV_m (cm³)					
$= \frac{\Delta V_a}{3V_o(\Delta H/H_o)}$					
$R = \Delta V_m / \Delta V_a$	R used = _____				
Corrected $\Delta V_m = R \cdot \Delta V_a$					
Circle Selected Value:	ΔV_1	ΔV_2	ΔV_3	ΔV_4	ΔV_5

ΔL_{c_4} = _____ in

$\Delta V_{rebound} = \bar{\sigma}_{max}$ to $\bar{\sigma}_{test}$ = _____ cm³

ΔV_T (during drained loading) = _____ cm³

Calculation of ΔV_c During Consolidation by Different Procedures	ΔV_c by Wgt. Change $= W_o - W_s - (\Delta V_b + \Delta V_T)$	ΔV_c by recorded/calculated volume changes $= \Sigma$ selected ΔV	ΔV_c assuming S = 100% $V_F = (1/G_s + w_s) W_s / \gamma_w$
	$\Delta W_{gt.}$ = _____ gm	ΔV_1 ΔV_2 ΔV	Undrained: $\Delta V_c = V_o - V_F$
	$\Sigma(\Delta V_b + \Delta V_T)$ = _____ cm³	ΔV_c = _____ + _____ + _____	Drained: $\Delta V_c = V_o - (V_F + \Delta V_T)$
	$\therefore \Delta V_c$ = _____ cm³	= _____ cm³	w_s = _____ % V_F = _____ cm³
			$V_F + \Delta V_T$ = _____ cm³
			$\therefore \Delta V_c$ = _____ cm³

Conclusions

ΔV_c used (ave ✓ values) = _____ cm³ $\therefore V_c$ = _____ cm³; ΔL_c = _____ in; $\therefore L_c$ = _____ in

$A_c = V_c/L_c$ (cm³/in) / 16.387 = _____ in²; ÷ 0.144 = _____ ft² x 10⁻³; x 6.4516 = _____ cm²

ϵ_{ac} = _____ %; ϵ_{vc} = _____ %; $1 - \epsilon_v$ = _____ ϵ_f^* = _____ ; ϵ_{vt}^* = _____ (* not in percent.)

At max. induced past pressure: $\Delta V_{max} = \Delta V_c - \Delta V_{rebound}$ = _____ cm³; ΔL_{max} = _____ in

Sumary	Height (in or cm)	Area (in² or cm² or ft² x 10⁻³)	Volume (cm³)	Water Content (%) (1)	Total / Dry Density (lb/ft³)	Saturation (%) (2)		
Initial								
Pre-Test								

(1) - ( ) indicates calculated value assuming S = 100%

(2) Approximate value especially if G_s is assumed.

Calculated by _____ Reviewed by _____

Psi x 0.0172 = tsf; in² x 6.4516 = cm²; G_s for S = 100% = $\gamma_d/\gamma_w - w\gamma_d$; $S = w G_s \gamma_d / (G_s \gamma_w - \gamma_d)$

w for S = 100% = $(G_s\gamma_w - \gamma_d)/G_s\gamma_d = G_s\gamma_w - \gamma_e / G_s\gamma_d$; γ_w @ 20°C (Streeter) = 62.32 lb/ft³ = 0.9982 gm/cm³; (Sat'd) = 64.2 (lb/ft³)

SPECIMEN - SUMMARY CALCULATIONS

Boring No.: Site 2 Sample No.: --- Specimen: --- Depth(ft): ---

Type test: Perm Specimen Type: Undisturbed

Consolidation History Units: psi	Max. Induced Past Pressure Uncorr.	Corr.*	Stage 1 Uncorr.	Corr.*	Stage 2 Uncorr.	Corr.*
σ cell			105.0		115.0	
u			100.0		100.0	
σ v			---		---	
σ h			5.0		15.0	
σ p			---		---	
Kc			1.0		1.0	
OCR						
Consolidation Time	overnight days 0	hours 0	X overnight days 0	hours 0	X overnight days 0	hours 0

* Corrected for effects of membrane, filter strips, etc.

Ho= 3.988 in
Ao= 6.246 in^2
Vo= 408.187 cm^3
Dos/Dom=
Gs= 2.80 (assumed)
Bf=
Area corr. factors: C
C=
undrained = C=1/Ef*(1-Ac/Afm)
drained= C=1/Ef(1-Ac(1+Evt)/Afm)

Calculate wgt of dry soil	By initial water content	By final water content	By total ovendried specimen	Variations in height and Volume during Consol.	Initial consol w/o back-pressure	Back-pressuring dVb= vol. in	After backpressuring		
w 1 (%)	16.56	17.14			sign convention: (-)dV=in, (+)dV=out, (-)dL=up, (+)dL=down				
w 2 (%)	16.61								
w avg (%)	16.59	17.14		dL (in)	0.010	0.010	0.018	0.003	0.000
Wgt wet	Wo	Wf		dVm (cm^3) (+ values)	3.20	0.00	4.50	0.02	0.00
soil Wt (gm)	879.20	883.30		dVm (cm^3) (- values)	0.00	-25.81	1.00	-0.41	0.00
Partial wgt dry				dVa=3Vo(dH/Ho)	3.07	3.07	5.53	0.92	0.00
soil Wt (gm)				R=dVm/dVa	Rused=	0.81	0.81	0.02	#DIV/0!
Wgt excess				corr. dVm=R*dVa	2.49	2.49			
ovendry soil				Selected dV	dV1	dV2	dV3	dV4	dV5
Total wgt oven	Ws initial	Ws final		dLcy= 0.000 in	dV rebound (max stress to test stress)= 0.000 cm^3				
dry soil (gm)	754.13	754.05			dVt (during drained loading)= 0.000 cm^3				
Ws	Ws avg = 754.09		Ws used = 754.05 gm						

Calculation of dVc during consol. by different procedures	dVc by Wgt change Wo-Wf-(dVb+dVt)	dVc by recorded/calculated volume changes = sum of shaded dV	dVc assuming S=100% Vf=(1/Gs+wf)Ws/0.9982
	Wo-Wf= -4.10 gm		undrained dVc=Vo-Vf
	dVb+dVt= -25.22 cm^3		drained dVc=Vo-(Vf+dVt)
	dVc= 21.12 cm^3	dVc= 9.49 cm^3	Vf= 399.27 cm^3
			dVc= 8.92 cm^3

dVc used (avg shaded values)= 9.21 cm^3 Vc= 398.981 cm^3 dLc= 0.041 in Lc= 3.947 in

Ac=(Vc/Lc)/16.3871= 6.169 in^2 ; /0.144= 42.837 ft^2x10^-3; x6.4516= 39.80 cm^2

Eac= 1.03% Evc= 2.26% 1-Ev= Ef= Evt=

At max induced past pressure: dVmax=dVc-dV rebound= 0.000 cm^3 dLmax= 0.000 in

Summary	Height (in)	Height (cm)	Area (cm^2)	Volume (cm^3)	Water Content (%) (1)	Total Density (pcf)	Dry Density (pcf)	Saturation (%) (2)	Total Wgt of Specimen (gm)
Initial	3.988	10.130	40.297	408.187	16.60	134.47	115.33	90.6	879.20
Stage 1	3.968	10.079	40.035	403.501	17.74	137.36	116.67	100.2	887.82
Stage 2	3.947	10.025	39.797	398.981	17.14	138.21	117.99	100.2	883.30

(1) - ( ) indicated calculated value assuing S=100% (2) - Approximate value especially if Gs is assumed

Calculated by: CMT Reviewed by:

PERMEABILITY TEST: FALLING HEAD - CONSTANT VOLUME U-TUBE

Project No. 932233 P.3 Project Eng. _____ Cell No. P-2 Apparatus No. 3

Specimen - Apparatus set-up - Test Information

1) Specimen Tested in : Triaxial Cell or ____ Compaction Mold or _____
   with stones or ____ Stones with filter paper or ____ No 200 screen reinforced with No 10 screen or _____ top + bottom
2) Specimen orientation for Vertical or ____ Horizontal permeability determination
3) During saturation: Water flushed up sides of specimen to remove air: No or ____ Yes
4) During consolidation: Top and bottom drainage or ____ Top only or ____ Bottom only
5) During permeation: Direction of permeant was: Up or ____ Down
6) Permeant: Water (Demineralized or Distilled or Tap) or ____ 0.01 N calcium sulfate or _____

Remarks: _____

Consol Stage-Trial No.	Readings By	Date	Temp. °C	Time hr:min	Δ_t min	Initial σ_c psi	Initial Ub psi	Initial Dial in	Mercury U-tube Reading Right, hr cm	Mercury U-tube Reading Left, hl cm	Permeability Preliminary Final at 20°C cm/sec
1-1	DM	9-30-94	21.7	6:35	8:15	105	100	.120	64.00	48.05	1.33 x 10⁻⁶
	DM	"	21.5	6:43	8:25				58.70	49.70	1.28 x 10⁻⁶
		RT= 0.962				$\bar{\sigma}_c$= ____ tsf or ____			io = 19.9		
-2	DM	9-30-94	21.5	6:45	11:54				64.00	48.05	1.21 x 10⁻⁶
	DM	"	21.4	6:56	11:32				57.80	49.95	1.16 x 10⁻⁶
		RT= 0.966				$\bar{\sigma}_c$= ____ tsf or ____			io = 19.9		
-3	DM	9-30-94	21.4	6:57	12:45				64.00	48.05	1.08 x 10⁻⁶
	DM	"	21.3	7:10	12:68				57.80	49.95	1.04 x 10⁻⁶
		RT= 0.968				$\bar{\sigma}_c$= ____ tsf or ____			io = 19.9		

Preliminary Length/Area Calculations

Lo = 3.988 in Vo = 408.173 cm^3
Δ Lc = 0.020 in
Lc = 3.968 in ΔVc = 3 Vo (Δ Lc/Lo)
= 10.079 cm = 6.141 cm^3
Vc = 402.032 cm^3
Ac = 39.888 cm^2

Mercury Head Settings

1) Δ Hg in cm for 50% or ____ % $\bar{\sigma}_c$
   =0.5 or ____ [$\bar{\sigma}$ c (psi)/0.1784]
   = _____ cm Hg
2) i = h/L = Δ Hg(cm)/Lc (cm) * 12.572
   @ 21.7 °C

c = 10.079 cm Remarks Avg of trials 1-2+1-3
c = 40.035 cm Lavg = 19.9
alculated using Prog. No. HP-30 or _____

ave k @ 20 °C = 1.10 x 10⁻⁶ cm/sec
Calculated by PE
Reviewed by _____

onversion 1 cm/sec = 1.969 ft/min = 2835 ft/day = 1.035 E-6 ft/yr = 14.73 (gal/min)/ft^2
actors: 1 cm of mercury in U-tube corrected for water leg = 0.012544 kg/cm^2 = 0.1784 psi @ 21.7°C

(1) $k = \dfrac{(a_1)(L)(1/60)\ ln(h_o/h_f)}{A(\Delta T)(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)}$

where $h_o = (h_i)(\gamma_{Hg}/\gamma_w-1)$

$hf = (h_i)(\gamma_{Hg}/\gamma_w-1)-(\Delta X)(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)$

(K_T) - permeability of specimen at test temperature (cm/sec)

(a_1) - area of right tube in which initially the mercury is higher (cm^2): tail water

(a_2) - area of left tube in which initially the mercury is lower (cm^2): head water

(γ_{Hg}) - specific gravity of mercury at test temperature = 13.542 @ 71 F or 21.7 C

(γ_w) - specific gravity of water at test temperature = 0.9978 @ 71 F or 21.7 C

(h_i) - difference in mercury levels at time zero (cm)

(ΔX) - drop in mercury in tube with area (a_1) during time ΔT (cm)

(ΔT) - elasped time (minutes)

$\dfrac{(a_1)(1/60)}{(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)}$ = apparatus constant [(cm^2) (min)] / sec

(L/A) - specimen constant (1/cm) (L in cm and A in cm^2)

$(1+a_1/a_2)$ - tubes constant

(γ_{Hg}/γ_w-1) - specific gravity constant = 12.572 @ 71 F or 21.7 C

Therefore

k = [(apparatus constant)(specimen constant) / (ΔT)] ln (h_o/h_f)

= [test constant (cm min/sec) / ΔT(min)] ln (h_o/h_f)

Item	Apparatus Constant	Tubes Constant
Apparatus 1	7.60E-05	1.319
Apparatus 2	7.52E-05	1.322
Apparatus 3	7.56E-05	1.316
Apparatus 4	7.73E-05	1.3133
Apparatus 5	7.48E-05	1.3223
Apparatus 6	7.64E-05	1.3196
Apparatus 7	7.57E-05	1.3155
Apparatus 8	7.85E-05	1.3507

L-501 12/91

PERMEABILITY TEST: FALLING HEAD - CONSTANT VOLUME U-TUBE

Project No. 93 c 2339.3 Project Eng. — Cell No. P-2 Apparatus No. 3

Specimen - Apparatus set-up - Test Information

1) Specimen Tested in : Triaxial Cell or ____ Compaction Mold or ____
   with stones or ____ Stones with filter paper or ____ No 200 screen reinforced with No 10 screen or ____ top + bottom
2) Specimen orientation for Vertical or ____ Horizontal permeability determination
3) During saturation: Water flushed up sides of specimen to remove air: No or ____ Yes
4) During consolidation: Top and bottom drainage or ____ Top only or ____ Bottom only
5) During permeation: Direction of permeant was: Up or ____ Down
6) Permeant: Water (Demineralized or Distilled or Tap) or ____ 0.01 N calcium sulfate or ____

Remarks:

Consol Stage-Trial No.	Read-ings By	Date	Temp. °C	Time hr:min	Δ_t min	Initial σ_c psi	Initial Ub psi	Initial Dial in	Mercury U-tube Reading Right, hr cm	Mercury U-tube Reading Left, hl cm	Permeability Preliminary Final at 20°C cm/sec
A-1	DT	9/30/94	21.8	16:49	120	115	100	.138	63.9	48.05	2.96 x 10^{-7}
			21.6	18:49					53.75	51.2	2.83 x 10^{-7}
		RT= 0.963				$\bar{\sigma}_c$= 2.16 tsf or ksf			io = 19.86		
A-2	DT	9/30/94	21.6	18:45	13:39				64.0	48.05	X21 x 10^{-7}
	TO	10/1/94	21.3	0830	819	115	100	.136	57.95	51.80	x 10^{-}
		RT= 0.969				$\bar{\sigma}_c$= 2.16 tsf or ksf			io = 19.98		
A-3	TO	10/1/94	21.3	0838	40	115	100	.136	60.6	49.1	2.27 x 10^{-7}
	TO	10/1/94	21.4	0918		115	100	.137	57.3	50.15	2.19 x 10^{-7}
		RT= 0.971				$\bar{\sigma}_c$= 2.16 tsf or ksf			io = 14.41		

Preliminary Length/Area Calculations

Lo = 3.988 in Vo = 408.173 cm^3
Δ Lc = 0.037 in
Lc = 3.951 in Δ Vc = 3 Vo (Δ Lc/Lo)
= 10.036 cm = 11.361 cm^3
Vc = 396.812 cm^3
Ac = 39.541 cm^2

Mercury Head Settings

1) Δ Hg in cm for 50% or ____ % $\bar{\sigma}_c$
   =0.5 or ____ [$\bar{\sigma}$ c (psi)/0.1784]
   = ____ cm Hg
2) i = h/L = Δ Hg(cm)/Lc (cm) * 12.572
   @ 21.7 ° C

c = 10.025 cm Remarks ____
c = 39.797 cm
alculated using Prog. No. HP-30 or ____

ave k @ 20 °C = ____ x 10^{-} cm/sec
Calculated by MC
Reviewed by DT

onversion factors: 1 cm/sec = 1.969 ft/min = 2835 ft/day = 1.035 E-6 ft/yr = 14.73 (gal/min)/ft^2
1 cm of mercury in U-tube corrected for water leg = 0.012544 kg/cm^2 = 0.1784 psi @ 21.7°C

(1) $k = \dfrac{(a_1)(L)(1/60)\ ln(h_o/h_f)}{A(\Delta T)(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)}$

where $h_o = (h_i)(\gamma_{Hg}/\gamma_w-1)$

$hf = (h_i)(\gamma_{Hg}/\gamma_w-1)-(\Delta X)(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)$

(K_T) - permeability of specimen at test temperature (cm/sec)

(a_1) - area of right tube in which initially the mercury is higher (cm^2): tail water

(a_2) - area of left tube in which initially the mercury is lower (cm^2): head water

(γ_{Hg}) - specific gravity of mercury at test temperature = 13.542 @ 71 F or 21.7 C

(γ_w) - specific gravity of water at test temperature = 0.9978 @ 71 F or 21.7 C

(h_i) - difference in mercury levels at time zero (cm)

(ΔX) - drop in mercury in tube with area (a_1) during time ΔT (cm)

(ΔT) - elasped time (minutes)

$\dfrac{(a_1)(1/60)}{(1+a_1/a_2)(\gamma_{Hg}/\gamma_w-1)}$ = apparatus constant [(cm^2) (min/sec)]

(L/A) - specimen constant (1/cm) (L in cm and A in cm^2)

$(1+a_1/a_2)$ - tubes constant

(γ_{Hg}/γ_w-1) - specific gravity constant = 12.572 @ 71 F or 21.7 C

Therefore

k = [(apparatus constant)(specimen constant) / (ΔT)] ln (h_o/h_f)

= [test constant (cm min/sec) / ΔT(min)] ln (h_o/h_f)

Item	Apparatus Constant	Tubes Constant
Apparatus 1	7.60E-05	1.319
Apparatus 2	7.52E-05	1.322
Apparatus 3	7.56E-05	1.316
Apparatus 4	7.73E-05	1.3133
Apparatus 5	7.48E-05	1.3223
Apparatus 6	7.64E-05	1.3196
Apparatus 7	7.57E-05	1.3155
Apparatus 8	7.85E-05	1.3507

PERMEABILITY TEST: FALLING HEAD - CONSTANT VOLUME U-TUBE

Project No. 93C233 A3 Project Eng. _____ Cell No. A2 Apparatus No. 3

Specimen - Apparatus set-up - Test Information

1) Specimen Tested in : Triaxial Cell or ____ Compaction Mold or _____
with stones or ____ Stones with filter paper or ____ No 200 screen reinforced with No 10 screen or _____ top + bottom
2) Specimen orientation for Vertical or ____ Horizontal permeability determination
3) During saturation: Water flushed up sides of specimen to remove air: No or ____ Yes
4) During consolidation: Top and bottom drainage or ____ Top only or ____ Bottom only
5) During permeation: Direction of permeant was: Up or ____ Down
6) Permeant: Water (Demineralized or Distilled or Tap) or ____ 0.01 N calcium sulfate or _____

Remarks: _____

Consol Stage-Trial No.	Read-ings By	Date	Temp. °C	Time hr:min	Δ_t min	Initial σ_c psi	Initial Ub psi	Initial Dial in	Mercury U-tube Reading Right, hr cm	Mercury U-tube Reading Left, hl cm	Permeability Preliminary Final at 20°C cm/sec
1-1	DM	10-3-94	20.5	6:43	25.17	115	100	.141	64.10	47.97	2.07 x 10⁻⁷
	DM	"	20.5	7:08	25.28				61.17	48.86	2.03 x 10⁻⁷
		RT= 0.988				$\bar{\sigma}_c$= ____ tsf or ____			io = 20.23		
1-2	DM	10-3-94	20.5	7:10	35.49				64.10	47.97	1.99 x 10⁻⁷
	DM	"	20.4	7:45	35.82				60.30	49.13	1.95 x 10⁻⁷
		RT= 0.989				$\bar{\sigma}_c$= ____ tsf or ____			io = 20.23		
1-3	DM	10-3-94	20.4	7:46	38.08				64.10	47.97	1.95 x 10⁻⁷
					38.13				60.17	49.18	1.91 x 10⁻⁷
		RT= 0.990				$\bar{\sigma}_c$= ____ tsf or ____			io = 20.23		

Preliminary Length/Area Calculations

Lo = 3.988 in Vo = 408.173 cm^3
Δ Lc = 0.041 in
Lc = 3.947 in ΔVc = 3 Vo (Δ Lc/Lo)
= 10.025 cm = 12.589 cm^3
Vc = 395.584 cm^3
Ac = 39.460 cm^2

Mercury Head Settings

1) Δ Hg in cm for 50% or ____ % $\bar{\sigma}_c$
=0.5 or ____ [$\bar{\sigma}$ c (psi)/0.1784]
= _____ cm Hg
2) i = h/L = Δ Hg(cm)/Lc (cm) * 12.572
@ 21.7 ° C

Lc = 10.025 cm Remarks _____
Ac = 39.797 cm iavg = 20.23
Calculated using Prog. No. HP-30 or _____

ave k @ 20 °C = 1.96 x 10⁻⁷ cm/sec
Calculated by MC
Reviewed by DM

Conversion Factors: 1 cm/sec = 1.969 ft/min = 2835 ft/day = 1.035 E-6 ft/yr = 14.73 (gal/min)/ft^2
1 cm of mercury in U-tube corrected for water leg = 0.012544 kg/cm^2 = 0.1784 psi @ 21.7°C

(1) $$k = \frac{(a_1)(L)(1/60)\ ln(h_o/h_f)}{A(\Delta T)(1 + a_1/a_2)(\gamma_{Hg}/\gamma_w - 1)}$$

where $h_o = (h_i)(\gamma_{Hg}/\gamma_w - 1)$

$hf = (h_i)(\gamma_{Hg}/\gamma_w - 1) - (\Delta X)(1 + a_1/a_2)(\gamma_{Hg}/\gamma_w - 1)$

(K_T) - permeability of specimen at test temperature (cm/sec)
(a_1) - area of right tube in which initially the mercury is higher (cm^2): tail water
(a_2) - area of left tube in which initially the mercury is lower (cm^2): head water
(γ_{Hg}) - specific gravity of mercury at test temperature = 13.542 @ 71 F or 21.7 C
(γ_w) - specific gravity of water at test temperature = 0.9978 @ 71 F or 21.7 C
(h_i) - difference in mercury levels at time zero (cm)
(ΔX) - drop in mercury in tube with area (a_1) during time ΔT (cm)
(ΔT) - elasped time (minutes)

$$\frac{(a_1)(1/60)}{(1 + a_1/a_2)(\gamma_{Hg}/\gamma_w - 1)} = \text{apparatus constant } \left[(cm^2)\ \frac{(min)}{sec}\right]$$

(L/A) - specimen constant (1/cm) (L in cm and A in cm^2)
$(1 + a_1/a_2)$ - tubes constant
$(\gamma_{Hg}/\gamma_w - 1)$ - specific gravity constant = 12.572 @ 71 F or 21.7 C

Therefore

k = [(apparatus constant)(specimen constant) / (ΔT)] ln (h_o/h_f)
= [test constant (cm min/sec) / ΔT(min)] ln (h_o/h_f)

Item	Apparatus Constant	Tubes Constant
Apparatus 1	7.60E-05	1.319
Apparatus 2	7.52E-05	1.322
Apparatus 3	7.56E-05	1.316
Apparatus 4	7.73E-05	1.3133
Apparatus 5	7.48E-05	1.3223
Apparatus 6	1.088E-04	1.5298
Apparatus 7	7.57E-05	1.3155
Apparatus 8	7.85E-05	1.3507

L203
(11/75)

TRIAXIAL TEST
(Stage Back Pressuring/Consolidation)

Project No. 93C233 P.3 Cell No. P2 Test No. PERM SITE 2, C Tested By TO

Piston Screwed Into Top Cap : ☐ Yes ; ☒ No Piston Weights Used: ☐ Yes ; ☒ No

Flow Into Specimen For: ☒ Increasing ; ☐ Decreasing Burrett Reading

Proving Ring No. _____ Load Cell: No. _____ Channel No. _____ Vertical Dial No. _____

Stage No.	Date	Time	Elapsed Time (min)	Cell Pressure σ_c /psi	Back Pressure u_b /psi	Axial Load Div-lbs	Volume Change, CC Reading Δv	Volume Change, CC Reading Δv	Volume Change, CC Total Change	Vertical Dial (inch)	
SET	9/29/94	1420		—	—					0.100	
IC	9/29	1430	0	5	—		15.00			0.100	
			0.5				12.70			0.102	
			1				12.20			.106	
			2				12.10			.106	
		1570					11.85			.110	
		1538		5	—		11.80	(3.2)	(3.2)	.110	(0.010)
ZB	9/29	1539		5	—		11.80			.110	
		1547			5		16.95	(-5.15)		.113	
		1547		10	5			1.00		.113	
		1602			10			5.80		.1185	
		1617			20			10.45		.119	
		1636			30			13.55		.119	
		1701			40		(-14.90)	15.90		.119	
					~~50~~						
		1701			40		1.00			.119	
		1750			50		3.40			.119	
		1805			60		4.20			.119	
		1830			70		5.00			.119	
		1843			80		5.48			.1193	
		1855			90		5.85			.1195	
		1913		105	100		5.91			.1198	
	9/30/94	0559					6.78			.122	
		6.14		105	100		6.75			.1205	
		6.34					6.76	(-5.76)	(-25.81)	.120	(0.010)
3a	9/30/94	9:50	0	To Perm				15.10		-.120	
			1	115	100			13.42		.1305	
			2					12.96		.132	
		11:36						10.74		.1375	
		16:47					(4.50)	10.50	(4.50)	.138	(0.018)
					70						

Reviewed By TO

L203
(11/75)

TRIAXIAL TEST
(Stage Back Pressuring/Consolidation)

Project No. 93C233 P.3 Cell No. P2 Test No. PERM SITE 2, < Tested By TO

Piston Screwed Into Top Cap : ☐ Yes ; ☒ No Piston Weights Used: ☐ Yes ; ☒ No

Flow Into Specimen For: ☒ Increasing ; ☐ Decreasing Burrett Reading

Proving Ring No. _____ Load Cell: No. _____ Channel No. _____ Vertical Dial No. _____

Stage No.	Date	Time	Elapsed Time (min)	Cell Pressure σ_c psf/psi	Back Pressure u_b psf/psi	Axial Load Div-lbs	Volume Change, CC			Vertical Dial (inch)	
							Reading Δv	Reading Δv	Total Change		
AC	10/1/94	0922		115	100		11.98			.137	
		1348					12.10			.139	
		1811					12.11			.140	
	10-3-94	6:03		114.6	99.7		12.31	(-0.41)		.141	
		6:34					12.29			.141	
		6:40					12.29	(0.02)	(0.02) (-0.41)	.141	(0.0030)

Reviewed By _____

Appendix C

LOG OF TEST PIT A-1

DATE: 9-15-94 LOCATION: SITE 1, AREA A

DEPTH	DESCRIPTION	OVA
	Surface gravel underlain by plastic sheeting to 6"	
1	Brown clay with little gravel (Cap)	0
2	Black to black-grey clay, some sand. Dry.	0
	Orange (Iron stained) slag and gravel. Wet (perched water).	1-2 ppm
3	Black clay, some silt. Slightly moist.	0
4	Red-brown clay, some silt, little gravel (native,lacustrine) Slightly moist.	0
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT A-2

DATE: 9-15-94 LOCATION: SITE 1, AREA A

DEPTH	DESCRIPTION	OVA
	Surface gravel underlain by plastic sheeting to 6"	
1	Brown clay with little gravel (Cap).	0
	Black to black-grey clay, some sand. Dry.	0
2	Orange (Iron stained) slag and gravel. Wet (perched water).	1-2 ppm
3	Black clay, some silt. Slightly moist.	0
4		
	Red-brown clay, some silt, little gravel (native, lacustrine). Slightly moist	0
5		
	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT A-3

DATE: 9-15-94 LOCATION: SITE 1, AREA A

DEPTH	DESCRIPTION	OVA
	Surface gravel underlain by plastic sheeting to 6".	
1	Brown clay with little gravel (Cap).	0
	Black to black-grey clay, some sand. Dry.	0
2	Orange (Iron stained) slag and gravel. Wet (perched water).	1-2 ppm
3	Black clay, some silt. Slightly moist. Between -3.7 to -4.5 feet grading to...	0
4		0
5	Red-brown clay, some silt, little gravel (native, lacustrine). Slightly moist.	
	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT A-4

DATE: 9-15-94 LOCATION: SITE 1, AREA A

DEPTH	DESCRIPTION	OVA
	Surface gravel underlain by plastic sheeting to 6".	
1	Brown clay, some sand and gravel (Cap).	0
	Red-brown to black clay. Dry.	0
2	Black slag and gravel. Dry.	0
3	Black to black-grey clay, some silt. Dry, stiff. grading to...	0
4	Red-brown clay, some silt, little gravel (native, lacustrine). Dry.	0
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT A-5

DATE: 9-15-94 LOCATION: SITE 1, AREA A

DEPTH	DESCRIPTION	OVA
	Surface gravel underlain by plastic sheeting to 6".	
1	Red-brown clay, some gravel and sand. Dry.	0
2	Black clay, some silt, occasionally intermixed with red-brown clay. Moist.	0
3	Green clay, stiff, dry to slightly moist. Some fill/waste intermixed with clay and in voids within clay, consisting of wood fragments, wire, ceramic fragments, small amount of sand sized silver-grey to copper to red colored metallic like particles. Slightly moist.	0
4		
5	Black clay grading to green, mottled black and yellow clay. Slightly moist, odorous, grading to...	1-4 ppm
	Red-brown clay, some silt, trace gravel (native, lacustrine).	0
6	Bottom of pit	
7		
8	Note: Oxidizer field test conducted on metallic-like waste found from -2.5 to -4.5 feet. Results were negative.	
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT A-6

DATE: 9-15-94 LOCATION: SITE 1, AREA A

DEPTH	DESCRIPTION	OVA
	Surface gravel underlain by plastic sheeting to 6".	
1	Red-brown clay, some gravel. Dry.	0
2	Black clay intermixed with miscellaneous fill. Fill includes brick rubble, cement, iron rods, very small amount of sand-sized, copper colored metaalic-like particles. The east end of pit had a lense of black, dry, sand like material with a sugary appearance.	0
3	Black clay, some sand. Dry. grades through to...	0
4	Black clay, some sand, occasionally mottled green.	
5	Red-brown clay, some silt and gravel (native, lacustrine).	0
6	Bottom of pit	
7		
8	Note: Oxidizer field test conducted on fill materials found from -1.5 to -3 feet (including metallic like particles and black sand like material). Results were negative.	
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 6 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT A-7

DATE: 9-16-94 LOCATION: SITE 1, AREA A

DEPTH	DESCRIPTION	OVA
	Surface gravel with underlain plastic sheeting to 6".	
1	Red-brown clay, some sand and gravel.	0
2	Black clay and silt. Dry.	0
3	Black sand, some gravel, some to little black slag. Dry.	0
4	Black clay, moist (probably native, stained black) grading to...	0
5	Red-brown clay, some silt, trace gravel.(native, lacustrine).	0
6	Bottom of pit	
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 6.0 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT A-8

DATE: 9-16-94 LOCATION: SITE 1, AREA A

DEPTH	DESCRIPTION	OVA
1	Brown clay and gravel.	0
2	Brown clay and gravel, occasional seams of black clay and silt with small coal fragments (fly ash ?)	0
3	Red-copper to brown sand and silt. Dry.	0
4	Black to black-green, mottled yellow-red clay, some some black clay and silt with small coal fragments. Slight odor from mottled yellow-red clay.	3-5 ppm
5	Red-brown clay, some silt, trace gravel (native, lacustrine).	0
6	Bottom of pit	
7		
8	Note: Oxidizer field test conducted on material collected from -2.5 to -3 feet. Results were negative.	
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 6.0 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT A-9

DATE: 9-16-94 LOCATION: SITE 1, AREA A

DEPTH	DESCRIPTION	OVA
	Surface gravel with underlain plastic sheeting to 6".	
1	Red-brown clay and gravel.	0
2	Red-brown to black clay and gravel with black clay and silt seams (fly ash ?).	0
	Intermixed red-brown and black clay.	0
3	Orange (Iron stained) slag and gravel, some red brick rubble, little cement and decomposed cardboard and a cardboard drum metal ring. Dry.	0
4	Black clay, occasionally green-black, grading to...	0
5	Red-brown clay, some silt, trace gravel (native, lacustrine).	0
6	Bottom of pit	
7		
8	Note: Oxidizer field test conducted on materials collected from -3 to -4 feet. Results were negative.	
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 6.0 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT A-10

DATE: 9-22-94 LOCATION: SITE 1, AREA A

DEPTH	DESCRIPTION	Hnu
1	Surface gravel underlain by plastic sheeting.	
	Brown silt and clay	0
	Red-brown clay (reworked), grading to...	0
2		
	Black clay and silt (fly ash ?)	0
3		
4		
	Black clay, mottled green.	0
5		
	Red-brown clay, some silt, trace gravel (native, lacustrine).	0
6		
	Bottom of pit	
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 6.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT B-1

DATE: 9-19-94 LOCATION: SITE 1, AREA B

DEPTH	DESCRIPTION	OVA
	Gravel underlain by plastic sheeting	N/A
1	Red-brown clay (cap)	
2		
3	Black silt and clay, little fill (brick rubble, wood)	
4	grading to ...	
5	Red-brown clay, little silt, trace gravel (native, lacustrine)	
	Bottom	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT B-2

DATE: 9-19-94 LOCATION: SITE 1, AREA B

DEPTH	DESCRIPTION	OVA
	Gravel underlain by plastic sheeting	N/A
1	Red-brown clay	
2		
3	Red brown clay and black clay and silt (fly ash?)	
4		
5	Red-brown clay, little silt, trace gravel (native, lacustrine)	
6	Bottom of pit	
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 6 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT B-3

DATE: 9-19-94 LOCATION: SITE 1, AREA B

DEPTH	DESCRIPTION	OVA
	Gravel underlain with plastic sheeting	N/A
1	Red brown clay	
2		
	Black slag and gravel. Dry	
3	Black clay, some silt, tr. gravel	
4	grading to ...	
	Red-brown clay, little silt, trace gravel (native, lacustrine)	
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT B-4

DATE: 9-19-94 LOCATION: SITE 1, AREA B

DEPTH	DESCRIPTION	OVA
	Gravel w/plastic sheeting	N/A
1	Red-brown clay and gravel	
2	Red-brown clay, some to little intermixed black clay, some silt, little fill at 1.5' (metal (muffler?), ceramic).	
3	grading to ...	
4	Red-brown clay, some silt, trace gravel (native, lacutrine)	
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT B-5

DATE: 9-19-94 LOCATION: SITE 1, AREA B

DEPTH	DESCRIPTION	OVA
0	Gravel	N/A
1	Red brown clay and gravel	
2	Black & grey slag and gravel. Dry	
3	Black clay and silt, some sand (fly ash?)	
	grading to ...	
4	Red-brown clay, little silt, trace gravel (native, lacustrine)	
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT B-6

DATE: 9-19-94 LOCATION: SITE 1, AREA B

DEPTH	DESCRIPTION	OVA
1	Gravel Red-brown clay and gravel and sand	N/A
2		
3	Red brown clay little black clay grading to ...	
4	Red-brown clay, some silt, trace gravel (native, lacustrine)	
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 4.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT B-7

DATE: 9-19-94 LOCATION: SITE 1, AREA B

DEPTH	DESCRIPTION	OVA
	Gravel	0
1	Brown clay and gravel	0
2	black slag and gravel, some sand. Dry	0
3	Black clay and silt (fly ash?)	0
	grading to ...	
4	Red-brown clay, some silt, tr. gravel (N-L)	0
5	Bottom	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 4.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT C-1

DATE: 9-19-94 LOCATION: SITE 1, AREA C

DEPTH	DESCRIPTION	OVA
0	Gravel	N/A
	Red-brown clay and gravel	
1	Black silt and sand, some clay (fly ash?)	
2	grading to ...	
3	Red-brown clay, some silt, trace gravel (native, lacustrine)	
4	Bottom of pit	
5		
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 4 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

WOODWARD-CLYDE CONSULTANTS

LOG OF TEST PIT C-2

DATE: 9-19-94 LOCATION: SITE 1, AREA C

DEPTH	DESCRIPTION	OVA
0	Gravel	N/A
	Red-brown clay and gravel	
1	Black sand and silt (fly ash?), some clay	
	grading to ...	
2	Red-brown clay, some silt, trace gravel (native, lacustrine)	
3	Bottom of pit	
4		
5		
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 3 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT C-3

DATE: 9-19-94 LOCATION: SITE 1, AREA C

DEPTH	DESCRIPTION	OVA
0	Gravel	N/A
	Red-brown clay and gravel	
1		
	red brown clay, little gravel	
2		
	Black sand and silt (flyash?), little clay	
3		
	grading to ...	
	Red-brown clay, some silt, trace gravel (native, lacustrine)	
4	Bottom of pit	
5		
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 4 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT C-4

DATE: 9-19-94 LOCATION: SITE 1, AREA C

DEPTH	DESCRIPTION	OVA
1	Gravel Red-brown clay and gravel	N/A
2	Red brown clay and black sand and silt lenses (fly ash?) – at south end of pit small amount of white, friable salt like substance at ~ -3'. One piece approx. 3"x3"x4".	
3	grading to ...	
4	Red-brown clay, some silt, trace gravel (native, lacustrine)	
5	Bottom of pit	
6		
7	Note: Oxidizer field test conducted on white, friable substance found at – 3'. Results were negative.	
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 4.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

WOODWARD-CLYDE CONSULTANTS

LOG OF TEST PIT C-5

DATE: 9-19-94 LOCATION: SITE 1, AREA C

DEPTH	DESCRIPTION	OVA
	Gravel	N/A
1	Brown-black sand silt (fly ash?), little clay	
2		
	Brown sand and silt (fly ash?), some black clay grading from 3' to 4'...	
3		
4	Red-brown clay, some silt, trace gravel (native, lacustrine)	
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT C-6

DATE: 9-19-94 LOCATION: SITE 1, AREA C

DEPTH	DESCRIPTION	OVA
0	Gravel	N/A
1	Red-brown clay and sand, some gravel	
2	grading to ...	
3	Red-brown clay with thin black silt and clay (fly ash?) lenses	
4	grading from 4' to 4.5'...	
5	Red-brown clay, some silt, trace gravel (native, lacustrine)	
	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT C-7

DATE: 0-19-94 LOCATION: SITE 1, AREA C

DEPTH	DESCRIPTION	OVA
	Gravel	N/A
1	Red brown clay, some gravel	
	grading to ...	
2	Red-brown clay and black silt and clay (fly ash?)	
3		
	grading form 4' to 4.5'...	
4	Red-brown clay, some silt, trace gravel (native, lacustrine)	
5	Bottom of pit	
6	Note: Site 1 Shelby tube sample taken here.	
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT C-8

DATE: 9-19-94 LOCATION: SITE 1, AREA C

DEPTH	DESCRIPTION	OVA
	Gravel	N/A
	Red brown clay, some sand and gravel	
1	Black sand and silt (fly ash?)	
2	Red brown clay, w/occasional seams up to 3" thick, of black silt and clay (fly ash?) grading from 3' to 3.5'to...	
3	Red-brown clay, some silt, trace gravel (native, lacustrine)	
4		
	Bottom of pit	
5		
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 4.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT C-9

DATE: 9-22-94 LOCATION: SITE 1, AREA C

DEPTH	DESCRIPTION	HNU
1	Brown to tan silt and sand, some gravel	0
2	Black clay and silt (flyash?)	0
3	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
4	Bottom of pit	
5		
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 4 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

WOODWARD-CLYDE CONSULTANTS

LOG OF TEST PIT D-1

DATE: 9-16-94 LOCATION: SITE 1, AREA D

DEPTH	DESCRIPTION	OVA
	Gravel underlain by plastic sheeting.	
1	Red-brown clay, some black clay and silt (fly ash ?) intermixed with black mottled grey clay.	0
2	Black clay and silt, some fill (including wood and lumber fragments, red brick rubble)	0
3		
4		20-250 ppm off freshly broken surfaces
	Green-black clay grading to...	
5	Red-brown clay, some silt, trace gravel (native, lacustrine).	0
	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT D-2

DATE: 9-16-94 LOCATION: SITE 1, AREA D

DEPTH	DESCRIPTION	OVA
	Gravel underlain by plastic sheeting.	
1	Red-brown clay, little silt. (Cap).	0
2		
3	Intermixed red-brown and black clay, little silt.	0
4	Black clay, some silt (fly ash?) mixed with some fill (including wood and lumber fragments, brick rubble, metal, cardboard, and cardboard drum ring and cover. Wet. Little perched water.	0-8 ppm
5		
6	Red-brown clay, some silt, trace gravel (native, lacustrine).	0
7	Bottom of pit	
8		
9	Note: Oxidizer field test conducted on black clay and silt collected from drum ring found in -3.5 to -5,5 foot interval. Results were negative.	
10		
11	Note: The west end of pit D-2 contained no fill or black clay. The red-brown clay extended from -1 to -7 feet	

SURFACE ELEVATION: COMPLETION DEPTH: 7.0 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT D-3

DATE: 9-16-94 LOCATION: SITE 1, AREA D

DEPTH	DESCRIPTION	OVA
	Gravel underlain by plastic sheeting.	
1	Red-brown clay, some silt, occasionally mottled black, some gravel grading to...	0
2	...increasing black clay, little gravel.	
3	Fill (including brick rubble, wood fragments, little metal) and black clay and silt (fly ash?). Wet. Perched water.	1-3 ppm
4		
5		
6	Grading to...	
	Red-brown clay, some silt, little gravel (native, lacustrine).	0
7	Bottom of pit	
8		
9	Note: Oxidizer field test conducted on black silt and brick fragments collected from -2.5 to -6 foot interval. Results were negative.	
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 7.0 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT D-4

DATE: 9-16-94 LOCATION: SITE 1, AREA D

DEPTH	DESCRIPTION	OVA
1	Gravel underlain by plastic sheeting.	
	Brown clay grading to...	0
2	Black clay grading to...	
3	Black clay and fill. Fill includes brick rubble, wood and lumber fragments, metal/cans, some hard, white masses of salt like material, one mass of white, lard-like substance wrapped in plastic, oil/tar like substance and miscellaneous rubbish. Wet with a fair amount of perched water.	0-3 ppm
4		
5		
6		
7	Red-brown clay, some silt, trace gravel (native, lacustrine).	N/A
8		
9	Note: Oxidizer field test conducted on white, salt like masses. The masses were broken apart to obtain unexposed material. Result was negative.	
10	Note: Due to the loose nature of the fill and clay and the presence of water the sides of the pit were very unstable and slumped often.	
11		

SURFACE ELEVATION: COMPLETION DEPTH: 8.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT D-5

DATE: 9-16-94 LOCATION: SITE 1, AREA D

DEPTH	DESCRIPTION	OVA
	Gravel underlain by plastic sheeting.	
1	Red-brown clay, occasionally mottled black, some silt.	0
2	Black clay, some to little red-brown clay, some fill (including brick rubble, wood, little plastic, small seam of white to yellow-white, hard to friable, salt-like substance, metal cable). Dry.	4-8 ppm
3		
4		
5		
6	Black clay only grading to...	
	Red-brown clay, some silt, trace gravel (native, lacustrine).	0
7	Bottom of pit	
8		
9	Note: Oxidizer field test conducted on salt-like substance from fill. Results were negative.	
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 7.0 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT D-6

DATE: 9-16-94 LOCATION: SITE 1, AREA D

DEPTH	DESCRIPTION	OVA
0	Gravel underlain by plastic sheeting.	
1	Grey silt and sand. Dry.	0
2	Red-brown clay, occasionally mottled black and brick rubble fill.	3-10 ppm
3	Black silt (fly ash?), uniform, moist. Grading to...	200-400 ppm
4	Dark green to black clay grading to...	0
5	Red-brown clay, some silt, little gravel (native, lacustrine).	0
6	Bottom of pit	
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT D-7

DATE: 9-16-94 LOCATION: SITE 1, AREA D

DEPTH	DESCRIPTION	OVA
	Gravel underlain by plastic sheeting.	
1	Red-brown clay, occasionally mottled black.	0.5 ppm
2		
3		
4	Black silt (fly ash?), uniform, moist. Grading to...	1-8 ppm
5	Red-brown clay, some silt, little gravel, (native, lacustrine).	0
6	Bottom of pit	
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 6.0 Feet WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT D-8

DATE: 9-16-94 LOCATION: SITE 1, AREA D

DEPTH	DESCRIPTION	OVA
	Gravel underlain by plastic sheeting.	
1	Red-brown clay, occasionally mottled black.	30-40 ppm
2	One small mass of white, hard salt-like material at 2'	
3		
4	Black silt (fly ash?), uniform, moist. Grading to...	100-300 ppm
5		
	Red-brown clay, some silt, little gravel (native, lacustrine).	
6	Bottom of pit	
7		
8	Note: Oxidizer field test conducted on white, salt-like substance found at -2 feet. Results were negative.	
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 6.0 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT D-9

DATE: 9-16-94 LOCATION: SITE 1, AREA D

DEPTH	DESCRIPTION	OVA
	Gravel	0
1	Red-Brown clay	0
2		0
	↖ Thin, discontinuous seam of copper-brown metallic like sand sized particles mixed with black silt.	
3	Black silt (fly ash?), little clay, little brick rubble	0
4	grading to ...	
5	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT D-10

DATE: 9-16-94 LOCATION: SITE 1, AREA D

DEPTH	DESCRIPTION	OVA
0	Gravel	
1	Red-Brown clay	0
2	Thin, discontinuous seam of copper-brown, metallic like, sand sized particles mixed in with black silt.	0
3	Black silt (fly ash?), little clay, little brick rubble, metal (pipe)	0
4	grading to ...	
5	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
6	Bottom of pit	
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT E-1

DATE: 9-21-94 LOCATION: SITE 2, AREA E

DEPTH	DESCRIPTION	HNU
1	Grey silt and clay, some large cobbles, little fill (cement, wire). Very dense and dry.	0
2		
3	Brown-black silt and clay	0
4		
5	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
6	Bottom of pit	
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 6 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT E-2

DATE: 9-21-94 LOCATION: SITE 2, AREA E

DEPTH	DESCRIPTION	HNU
1	Brown silt and sand, some fine to coarse gravel, some rubble (brick,cement). Very dense, dry	0
2		
3	Black silt, some clay	0
4	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
5		
	Green-brown clay, some silt, trace gravel (native, lacustrine)	0
6	Bottom of pit	
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 6 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT E-3

DATE: 9-21-94 LOCATION: SITE 2, AREA E

DEPTH	DESCRIPTION	HNU
1	Light brown to brown silt and gravel, some clay. Very dense and dry.	0
5	Black silt, loose, slightly moist	0
6	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
7	Green-brown clay, some silt, trace gravel (native, lacustrine)	0
8	Bottom of pit	

SURFACE ELEVATION: COMPLETION DEPTH: 7.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT E-4

DATE: 9-21-94 LOCATION: SITE 2, AREA E

DEPTH	DESCRIPTION	HNU
1	Grey to brown silt, some sand, some fine to medium coarse gravel. Dry.	0
2	Black silt, loose, slightly moist	0
3		
4	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
5		
6	Bottom of pit	
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT E-5

DATE: 9-22-94 LOCATION: SITE 2, AREA E

DEPTH	DESCRIPTION	HNU
1	Grey silt and clay, some gravel, little fill (bricks, cement). Very dry	0
2		
3		
4	Black silt and fill (brick, red clay tile, asphalt sheets). Wet (perched water), sewer like odor	0
5		
6		
7	Black silt and clay	0
	grading to ...	
8	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
	Bottom of pit	
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 8.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

WOODWARD-CLYDE CONSULTANTS

LOG OF TEST PIT E-6

DATE: 9-22-94 LOCATION: SITE 2, AREA E

DEPTH	DESCRIPTION	HNU
1	Tan-brown silt and gravel, very dense & dry. Some brick rubble fill.	0
2	Black silt, some fill (brick, cement). Dry	0
3	Red-brown clay, occasional voids with black silt or gravel in filling, clay appears reworked.	0
4		
5		
6	Black silt and clay	0
7	grading to ...	
8	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
9	Bottom of pit	
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 8.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT E-7

DATE: 9-22-94 LOCATION: SITE 2, AREA E

DEPTH	DESCRIPTION	HNU
1	Brown silt and gravel, dry, little fill (cement)	0
2	Black silt and gravel, little cement fill	0
3		
4	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
5		
6		
7	Bottom of pit	
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 6.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

WOODWARD-CLYDE CONSULTANTS

LOG OF TEST PIT E-8

DATE: 9-22-94 LOCATION: SITE 2, AREA E

DEPTH	DESCRIPTION	HNU
1	Tan silt, little gravel, little fill (cement) Dry	0
2	Red-brown clay (reworked), little fill (cement)	0
3	Red-brown clay (reworked), some fill (red clay tile, cement, brick rubble, metal tubes), some black clay and silt (fly ash?). Dry	0
4		
5		
6	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
7		
8	Bottom of pit	
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 7.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT F-1

DATE: 9-20-94 LOCATION: SITE 2, AREA F

DEPTH	DESCRIPTION	OVA
0 – 2	Black-grey silt and sand, some gravel	N/A
2 – 6	Red-brown caly, some silt, trace gravel (native, lacustrine)	
6	Bottom of pit	

SURFACE ELEVATION: COMPLETION DEPTH: 6 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT F-2

DATE: 9-20-94 LOCATION: SITE 2, AREA F

DEPTH	DESCRIPTION	OVA
1	Black-grey silt, some gravel	N/A
2		
3	Red-brown clay, some silt, trace gravel (native, lacustrine)	
4	Bottom of pit	
5		
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 3.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT F-3

DATE: 9-21-94 LOCATION: SITE 2, AREA F

DEPTH	DESCRIPTION	HNU
1	Black silt, some sand, little roots, little brick fill	0
2		
3	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
4		
5	Green-brown clay, some silt, trace gravel (native, lacustrine)	0
	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT F-4

DATE: 9-21-94 LOCATION: SITE 2, AREA F

DEPTH	DESCRIPTION	HNU
1	Black silt and sand	0
2	Red-brown clay, some silt, trace gravel (native, lacustrine). Old sewer line at -2' running perpendicularly across pit	0
3		
4	Bottom of pit	
5		
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 4 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT F-5

DATE: 9-22-94 LOCATION: SITE 2, AREA F

DEPTH	DESCRIPTION	HNU
	Gravel	
1	Black-grey silt and gravel, some concrete block fill	0
2		
3	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
4		
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 4.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT F-6

DATE: 9-22-94 LOCATION: SITE 2, AREA F

DEPTH	DESCRIPTION	HNU
0	Gravel	
	Grey-black silt and gravel	0
1		
2		
3	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
4		
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT F-7

DATE: 9-22-94 LOCATION: SITE 2, AREA F

DEPTH	DESCRIPTION	HNU
	Gravel underlain by plastic	
1	Grey black silt, some gravel, little brick fill	0
2		
3	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
4		
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT F-8

DATE: 9-22-94 LOCATION: SITE 2, AREA F

DEPTH	DESCRIPTION	HNU
	Gravel underlain by plastic sheeting	
1	Grey black silt and gravel, little 'shot rock' gravel. (Black silt and ceramic chip layer at -.3' to -.4')	0
2		
3	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
4		
5		
6	Bottom of pit Note: Took Site 2 Shelby tube here.	
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMEN

LOG OF TEST PIT F-9

DATE: 9-22-94 LOCATION: SITE 2, AREA F

DEPTH	DESCRIPTION	HNU
	Gravel w/plastic sheeting underneath	
	Black silt, some ceramic chips	0
1	Grey black silt and gravel ('shot rock')	0
2	Red brown clay, some silt, little gravel (appears reworked)	0
3		
4	Red-brown clay, some silt, little gravel (native, lacustrine)	0
5		
6	Bottom of pit	
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT G-1

DATE: 9-20-94 LOCATION: SITE 2, AREA G

DEPTH	DESCRIPTION	OVA
1	Black silt, some gravel and ceramic chips	N/A
2	Black slag and gravel, some black silt. Dry	
3	Black clay, little silt grading to ...	
4	Red-brown clay, some silt, trace gravel (native, lacustrine)	
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT G-2

DATE: 9-21-94 LOCATION: SITE 2, AREA G

DEPTH	DESCRIPTION	OVA
0	Topsoil	
1	Brown to black silt, some gravel, many large roots	N/A
2	Black silt and intermittent gravel lenses	
3	Red-brown clay, some silt, trace gravel (native, lacustrine)	
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT G-3

DATE: 9-21-94 LOCATION: SITE 2, AREA G

DEPTH	DESCRIPTION	OVA
0	Topsoil	
1	Grey-black sand like material (fly ash like but much less dense), some brick rubble fill	0
2	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
3		
4	Bottom of pit	
5		
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 4 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT G-4

DATE: 9-22-94 LOCATION: SITE 2, AREA G

DEPTH	DESCRIPTION	OVA
	Gravel, some ceramic chips	
1	Black silt, some gravel. Dry.	0
	Black slag and gravel, some silt. Dry.	0
2	Black clay, some silt.	0
3	grades to...	
4	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT H-1

DATE: 9-19-94 LOCATION: SITE 2, AREA H

DEPTH	DESCRIPTION	OVA
	Gravel	N/A
1	Black clay, some sand and gravel.	
2	Black slag and gravel, some sand and clay. Wet (small amount of perched water)	
3	Black clay and sand (fly ash?) grading to....	
4	Red-brown clay, some silt, trace gravel (native, lacustrine)	
	Bottom of pit	
5		
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 4 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT H-2

DATE: 9-19-94 LOCATION: SITE 2, AREA H

DEPTH	DESCRIPTION	OVA
	Gravel	N/A
	Black caly, some sand and gravel.	
1	Black slag and gravel, little clay, moist.	
2	Black clay and sand (fly ash?) grading from -3' to -3.5' to...	
3	Red-brown clay, some silt, trace gravel (native, lacustrine)	
4	Bottom of pit	
5		
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 4 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT H-3

DATE: 9-19-94 LOCATION: SITE 2, AREA H

DEPTH	DESCRIPTION	OVA
	Gravel	N/A
1	Gravel and grey-brown clay.	
2	Black slag and gravel, some black clay and silt, little fill (wood, old metal electrical conduit).	
3	Black clay and red-brown clay. grading to...	
4	Red-brown clay, some silt, trace gravel (native, lacustrine)	
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 4.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT H-4

DATE: 9-19-94 LOCATION: SITE 2, AREA H

DEPTH	DESCRIPTION	OVA
	Gravel.	N/A
1	Gravel and red-brown clay.	
2	Black sand and silt (fly ash?), little clay	
3	Black clay. grading to...	
4	Red-brown clat, some silt, trace gravel (native, lacustrine)	
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 4.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT H-5

DATE: 9-20-94 LOCATION: SITE 2, AREA H

DEPTH	DESCRIPTION	OVA
	Gravel and dark brown silt, some sand	N/A
1	Tan sand, little silt and gravel, slightly moist, uniform appearance	
2		
3		
4	Red-brown clay, little black clay. grading to...	
5	Red-brown clay, some silt, trace gravel (native, lacustrine)	
6		
7	Bottom of pit	
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 6.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT H-6

DATE: 9-20-94 LOCATION: SITE 2, AREA H

DEPTH	DESCRIPTION	OVA
	Gravel and brown-grey silt, some sand, some ceramic chips	N/A
1	Tan sand, little silt and gravel, slightly moist, uniform appearance	
2		
3		
4	Red-brown clay, little black clay grading to....	
5	Red-brown clay, some silt, trace gravel (native, lacustrine)	
6	Bottom of pit	
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 6 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT H-7

DATE: 9-20-94 LOCATION: SITE 2, AREA H

DEPTH	DESCRIPTION	OVA
1	Black silt and sand, some ceramic chips	N/A
	Black silt and sand, little gravel	
	Black slag and gravel, some silt and sand. Dry.	
2	Black clay, some silt. grading to...	
3	Red-brown clay, some silt, trace gravel (native, lacustrine)	
4		
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT H-8

DATE: 9-21-94 LOCATION: SITE 2, AREA H

DEPTH	DESCRIPTION	HNu
	Topsoil	
1	Black silt and clay (fly ash?)	0
2		
3	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
4	Bottom of pit	
5		
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 3.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT H-9

DATE: 9-21-94 LOCATION: SITE 2, AREA H

DEPTH	DESCRIPTION	HNu
	Topsoil	
1	Brown to red-brown silt and clay, little fill (brick rubble)	0
2	Black silt, little clay.	0
3	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
4	Bottom of pit	
5		
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 4 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

WOODWARD-CLYDE CONSULTANTS

LOG OF TEST PIT I-1

DATE: 9-21-94 LOCATION: SITE 2, AREA I

DEPTH	DESCRIPTION	HNu
	Topsoil	
	Brown silt and gravel, little brick rubble. Dry.	0
1		
	Black silt, some clay, some intermixed red-brown clay.	0
2		
3	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
4		
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT I-2

DATE: 9-21-94 LOCATION: SITE 2, AREA I

DEPTH	DESCRIPTION	HNu
	Topsoil	
1	Brown silt and gravel.	0
2	Black silt and clay, some intermixed red-brown clay.	0
3	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
4		
5		
6	Bottom of pit	
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

WOODWARD-CLYDE CONSULTANTS

LOG OF TEST PIT I-3

DATE: 9-21-94 LOCATION: SITE 2, AREA I

DEPTH	DESCRIPTION	HNu
0	Topsoil	
1	Black silt, little clay and gravel, little fill (concrete, brick)	0
2		
3	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
4		
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 4.5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT I-4

DATE: 9-21-94 LOCATION: SITE 2, AREA I

DEPTH	DESCRIPTION	HNu
	Topsoil	
1	Black-brown silt and gravel, some fill (metal bar, brick rubble, asphalt shingle)	0
2	Red-brown clay.	0
3	Black silt and clay	0
4	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

WOODWARD-CLYDE CONSULTANTS

LOG OF TEST PIT I-5

DATE: 9-21-94 LOCATION: SITE 2, AREA I

DEPTH	DESCRIPTION	HNu
0	Topsoil	
1	Brown silt and gravel, little cobbles	0
2	Black silt and clay	0
3		
4	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
5		
6	Bottom of pit	
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 6 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT I-6

DATE: 9-21-94 LOCATION: SITE 2, AREA I

DEPTH	DESCRIPTION	HNu
	Topsoil	
1	Brown silt and gravel, some fill (metal bars, wood, concrete), little coal and slag in east wall.	0
2		
3	Red-brown clay and black silt, some black clay.	0
	grading to...	
4	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT I-7

DATE: 9-21-94 LOCATION: SITE 2, AREA I

DEPTH	DESCRIPTION	HNu
	Topsoil	
1	Brown silt and gravel, some cement fill.	0
2	Black silt and sand, little clay, 2 small (1" to 2") seams of red-brown to yellow brown material in south end of pit, lying on top of cement pieces.	0
3		
4	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
5		
6	Bottom of pit	
7		
8	NOTE: Oxidizer field test conducted on red-brown to yellow sandy material found on top of cement. Results were negative. On closer examination this material was believed to be cement decomposition products.	
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 6 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT I-8

DATE: 9-21-94 LOCATION: SITE 2, AREA I

DEPTH	DESCRIPTION	HNu
	Topsoil	
1	Tan-brown silt and gravel, little fill (cement and metal).	0
2	Red-brown clay, intermixed with black silt and clay.	0
	grading to...	
3	Red-brown clay, some silt, trace gravel (native, lacustrine).	0
4		
5	Bottom of pit	
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 5 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

LOG OF TEST PIT I-9

DATE: 9-21-94 LOCATION: SITE 2, AREA I

DEPTH	DESCRIPTION	HNu
	Topsoil	
1	Black-brown silt, little gravel	0
2		
3	Red-brown clay, some silt, trace gravel (native, lacustrine)	0
4	Bottom of pit	
5		
6		
7		
8		
9		
10		
11		

SURFACE ELEVATION: COMPLETION DEPTH: 4 FEET WATER DEPTH:

PROJECT NAME: FMC CORPORATION TONAWANDA, N.Y. FACILITY PRELIMINARY SITE ASSESSMENT

PROJECT NUMBER: 93C2339-0003

Appendix B