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ROD Summary

ENVIRONEERING, INC.

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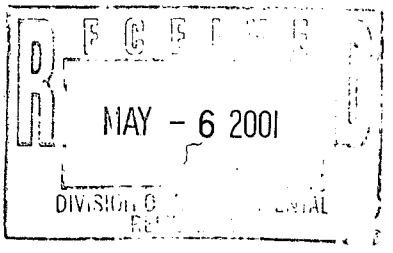


May 1, 2002

Chief, New York Remediation Branch
Attention: Mr. Michael A. Walters, Superfund Site Remedial Project Manager
Emergency and Remedial Response Division
U.S. Environmental Protection Agency, Region II
290 Broadway, 20th Floor
New York, New York 10007-1866

CERTIFIED MAIL –

Re: Alcas Cutlery Facility
Olean Well Field Superfund Site, Olean, New York
Post ROD Summary Report

Dear Mr. Walters:

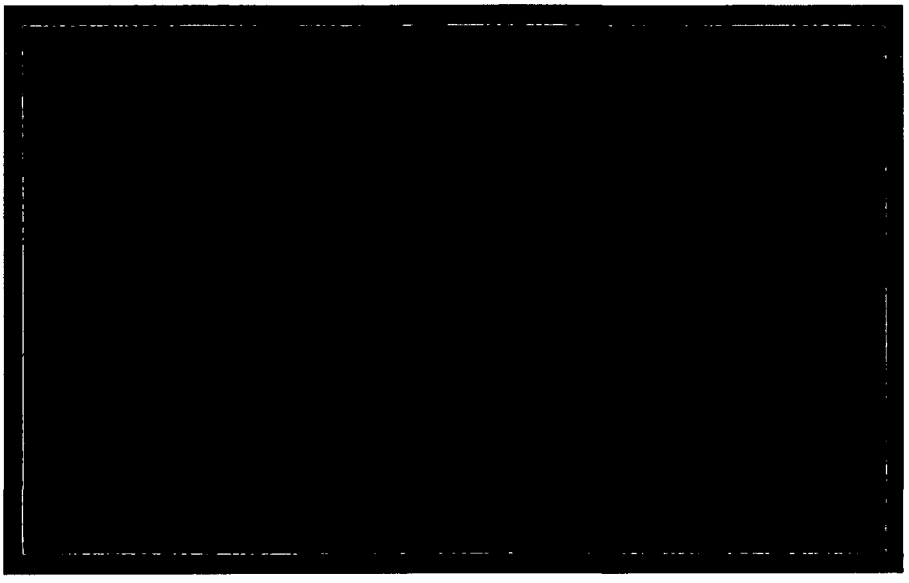
Per your request, ENVIRONEERING, on behalf of our client Alcoa, has prepared the above referenced report. The enclosed report summarizes the findings of the Phase I, II, III and IV investigations at the Alcas site. All data collected in those investigations were utilized in the preparation of this report, with the exception of geological cross-sectional data previously used in the Phase II report. These data have been superseded by data collected in the Phase III and IV investigations.

Should you have any questions or comments concerning this matter, please do not hesitate to contact Mr. Robert Prezbindowski with Alcoa at 865-977-3811 or me.

Sincerely,
ENVIRONEERING, Inc.

Timothy H. White, REM
Principal

cc: Robert Prezbindowski – Alcoa
Vivek Nattanmai - NYSDEC



ENVIRONEERING, INC.

POST ROD SUMMARY REPORT

ALCAS CUTLERY CORPORATION PROPERTY
OLEAN WELL FIELD SUPERFUND SITE
OLEAN, NEW YORK

May 1, 2002

Prepared for

Alcoa Remediation
Alcoa, Tennessee

Prepared by

ENVIRONEERING, INC
16350 Park Ten Place, Suite 140
Houston, Texas 77084
281-578-5800

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1.0 INTRODUCTION

1.1 Alcas Property Operations and Solvent Release History

The Alcas Cutlery Corporation facility (*hereinafter referred to as "Alcas"*) has manufactured cutlery and sporting knives at the Olean site since 1949. The plant used Trichloroethylene ("*TCE*") in vapor degreasers as part of the finishing operation. The quantity of TCE used annually has been estimated at 4,000 gallons to 6,500 gallons in the late 1970's and early 1980's. Beginning in the mid 1980's usage decreased to 4,000 to 5,000 gallons per year until 1989 when TCE usage stopped. The quantity of distillation residues disposed of from 1949 to 1980 was approximately one 55-gallon drum per month containing approximately 10 percent TCE.

New TCE was shipped and stored in 55-gallon drums in an area along the eastern portion of the main building. The plant operated five vapor degreasers in the main building. Reportedly, during normal manufacturing operations *de minimis* loses of TCE occurred to the floor of the building. In addition, more significant loses of TCE are believed to have occurred periodically from the vapor degreasers. One degreaser in particular, located in the southwest portion of the main building, was reported to leak. Historically, spilled TCE would normally be collected in floor drains, which discharged into the sanitary sewer system. The sanitary sewer lines generally drained southward to a trunk line that ran westward along the south perimeter of the main building. The sanitary line exits the site from a manhole located at the southwest corner of the main building through the southern edge of the property. Possible TCE release points beneath the main building exit throughout the floor drainage system, along the sanitary sewer line and through cracks and seams in the floor.

Exterior to the building, waste TCE was reportedly used as a weed killer along the fence on the northern side of the plant from 1975 to 1979. The quantity applied was estimated at 25 to 40 gallons per year. The leftover waste TCE used for weed killing was most likely disposed of at various points at or around the storage building. The number or specific location of these entry points is unknown.

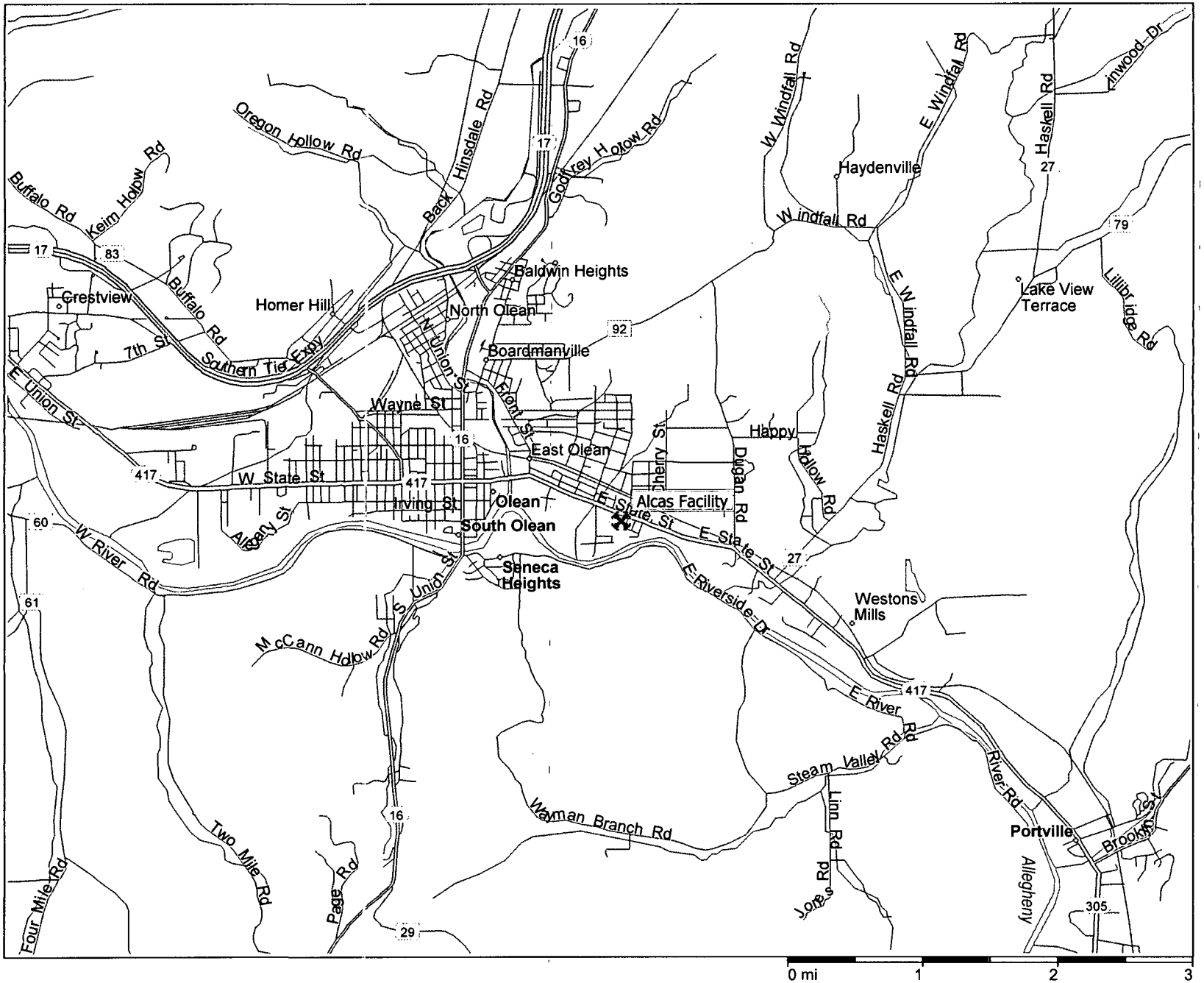
1.2 Site Background

The Olean Well Field Superfund Site (*hereinafter referred to as the "Site"*) is located in the eastern portion of the City of Olean and east and south of the City in the Towns of Olean and Portville in Cattaraugus County, New York as shown in Figure 1-1. The Olean Well Field Superfund Site incorporates three municipal wells, and spans approximately 800 acres of property principally occupied by industrial facilities. The Allegheny River flows through the southwest and southern portions of the Olean Well Field Superfund Site, and State Routes 16 and 417 provide access to the area.

Municipal wells 18M, 37M, and 38M began pumping in 1960, and continued in operation until 1979 when TCE was detected in water samples from these wells. The wells were shut down, and a former surface water treatment facility was reactivated to supply the City of Olean with water. These wells were shut in and not used again until 1990 when the water produced from these wells was treated using air strippers installed at the well locations.

Following an investigation of the Site, the U.S. Environmental Protection Agency ("*EPA*") added the Olean Well Field to the National Priorities List in September 1983. Between 1983 and 1985, the EPA conducted additional investigations of the Site and undertook some early removal actions and supplied carbon adsorption filters to owners of impacted private wells. The EPA additionally implemented a broad-scale remedial investigation and feasibility study ("*RI/FS*") and implemented initial remedial

Figure 1-1, Site Location Map, Olean, NY



measures, including regular monitoring of private wells and installation of carbon adsorption units as needed. It was determined that soils and groundwater were contaminated with TCE and other chlorinated constituents, with established pathways of migration to the Site's Upper Water Bearing Zone and Lower Aquifer (*hereinafter referred to as the "City Aquifer"*).

Potentially Responsible Parties ("*PRPs*") residing within the Site boundaries and found to be contributing to the groundwater problem include the Alcas Cutlery Corporation (*hereinafter referred to as "Alcas"*) formerly owned and operated by the Alcoa Inc., AVX Corporation, and McGraw-Edison, currently owned by Cooper Industries.

Based on the results of the early studies and interim actions, the EPA issued the Record of Decision for the First Operable Unit ("*OU1 ROD*") in September 1985. The OU1 ROD required six principle actions:

- Installation of air strippers at municipal wells 18M and 37M/38M;
- Extension of the City's public water supply;
- Inspection/repair of an industrial sewer at McGraw-Edison;
- Recommendation of institutional controls to restrict withdrawal of contaminated groundwater;
- Institution of a Site Monitoring Plan; and
- Initiation of a Supplemental RI/FS to evaluate source control measures at PRP facilities.

The EPA issued a unilateral administrative order in February 1986, requiring the PRPs to carry out the actions in the OU1 ROD. To implement the Supplemental RI/FS, the PRPs conducted investigation of their respective facilities and the EPA conducted studies of 10 additional properties. The Supplemental RI/FS identified four areas within the Site as apparent sources of VOC contamination to the groundwater: the Alcas property, AVX, McGraw-Edison, and Loohn's Dry Cleaners and Launderers.

Following implementation of the OU1 ROD, the EPA issued the Record of Decision for the Second Operation Unit (*"OU2 ROD")* in September 1996. The OU2 ROD set forth selected remedies for the four source areas identified. The remedies involved combinations of Vacuum Enhanced Recovery ("*VER*"), groundwater pump-and-treat, excavation technologies and implementation of groundwater use restrictions. The selected remedial action for Alcas was VER for the soils and Upper Water-Bearing Zone with no additional groundwater treatment necessary due to the groundwater capture of 18M in the City Aquifer.

After the issuance of the OU2 ROD, and for the purpose of obtaining better site definition, a pre-design investigation was performed at Alcas. This investigation was conducted in two phases. The Phase 1 investigation was performed in accordance with Section 4 and Appendix B of the Remedial Design/Remedial Action Work Plan for the Alcas Property (ICF Kaiser, March 1999). Soil samples were collected for Target Compound List (TCL) VOCs. Groundwater samples were collected from each boring for analysis of TCL VOCs, metals, and inorganics. The metals and inorganic compounds were analyzed because they would be indicative of potential equipment fouling. The results of the Phase 1 pre-design investigation were transmitted to the EPA on August 31, 1999.

Because the results of the Phase 1 investigation did not sufficiently enable characterization of source constituents and impacted media and suggested that geological conditions at the facility are inconsistent with the original site conceptual model inferred in the ROD, Alcoa submitted a work plan for a Phase 2 investigation of the site on September 19, 1999. Phase 2 investigation activities included a screening-level passive soil gas survey. Passive soil gas detectors were installed on approximate 100-foot center grid pattern throughout the area south of the main plant building. Additional borings were also drilled,

and several existing borings were extended to the top of the City Aquifer. Also, the new soil borings were located to coincide with selected passive soil gas sampling locations. Each soil boring was continually logged and selected samples were collected for TCL VOC and geotechnical analysis. The field investigation included the collection of groundwater samples from wells both on and off the facility, screened in both the Upper and City Aquifers, for VOC analysis. Five of the groundwater wells sampled were also monitored for parameters that would measure the presence of chlorinated compounds. Results of the Phase 2 pre-design investigation were transmitted to the EPA on December 7, 1999. Overall, the pre-design (Phase 1 & 2) investigation consisted of 19 soil borings, 98 soil samples, 43 passive soil gas sampling modules, and 13 groundwater wells samples, eight open bore hole water samples, and 19 geotechnical soil samples.

After review of the Phase 1 and Phase 2 data it was becoming obvious to Alcoa that the governing source of TCE in the Upper Water Bearing Zone and the City Aquifer was not from the shallow soils at the rear of the property as inferred in the OU2 ROD. Furthermore it became obvious that fundamental problems existed with the selected remedy for the Alcas site. Alcoa presented a request for a remedy update in January 2000. At the same time Alcoa also presented to the EPA a document entitled "*Site Evaluation and Conceptual Model Report*". This document presented an updated conceptual model of the Alcas site and presented the case that the governing source of the chlorinated compounds found in the Upper and City aquifers was from residual DNAPL located underneath the main building.

EPA requested that Alcoa present data to substantiate their claim that a "residual DNAPL"[1] was present underneath the main building at Alcas. A Phase III investigative workplan was developed and implemented. A total of 12 micro-wells were installed on and off-site to define the direction of groundwater flow in the Upper Water Bearing Zone, to verify that affected groundwater is migrating from under the main manufacturing building, and to delineate the down gradient extent of the Upper Water Bearing Zone affected groundwater.

The results of the Phase III investigation did not show the complete delineation of the Upper Water Bearing Zone plume in the southerly and northeasterly directions. In addition, the EPA raised a concern during a July 2001 meeting at their offices, regarding the extent of the plume in the westerly direction. To further delineate the extent of impact and further characterize the hydrogeologic conditions at the site a Phase IV investigation was proposed and implemented.

1.3 Objective

The purpose of this document is to provide a comprehensive technical report that summarizes all the Post-ROD data collection for the Alcas site.

[1] "*Residual DNAPL is a DNAPL held in soil pore spaces by capillary forces (negative pressure on DNAPL). Residual will remain trapped within the pores of the porous media unless the viscous forces (caused by the dynamic force of water against the DNAPL) are greater than the capillary forces holding the DNAPL in the pore.*" USEPA, "Estimating Potential for Occurrence of DNAPL at Superfund Sites". Publication 9355.407FS, January 1992. See Appendix H.

2.0 HYDROGEOLOGICAL DESCRIPTION

2.1 Regional Geology

The following discussion of regional geology is based on "*Olean Well Field Remedial Investigation and Feasibility Study, Town and City of Olean, New York*", prepared by Engineering-Science, May 1985.

The City of Olean is located in the Appalachian Highland Physiographic province, an upland of moderate relief underlain by sedimentary rocks dipping south at approximately 2 degrees. Several continental ice sheets covered most of this region during the Pleistocene Epoch (1,600,000 to 10,000 years before the present). The glaciers, however, never progressed south of the Allegheny River Valley in western New York. The nonglaciated area, called the Salamanca Re-entrant, is the northernmost area in the eastern United States to escape Pleistocene glaciation.

Geologic and geophysical analysis of borehole data reveal that the upper 100 feet of sediment can be divided into 5 lithologic units, distinguished primarily on the basis of color, texture, grain size, and mode of deposition. These units are identified as Units A through E, from oldest to youngest (deepest to shallowest) and discussed below.

With the exception of Unit E, the sediments described are probably associated with a late Wisconsinian glaciation. Unit A is primarily glacio-lacustrine clays directly above the bedrock. Unit B is likely a glacial outwash associated with the melting of large blocks of disintegrating (stagnant) ice. The unsorted sand, gravel, and silt portion of the unit may actually be a melt-out till. The sandier lenses, some of which measures, are stratified, reflect channelized deposition from braided streams.

The till unit (Unit C) is identified by its olive to olive-gray appearance and poorly sorted texture. Grain size curves, from wet sieve and hydrometer analysis, clearly distinguish Unit B as much coarser than Unit C with Unit C containing a large percentage (>50 percent) of silt and clay in addition to gravel and sands.

The sequence of sediments deposited above Unit C appears to be fluvial in origin although the sequence can be subdivided into 2 units. Unit D is a coarse sandy gravel directly overlying Unit C that has been classified as glacio-fluvial materials. Fine sands and silts and occasional clay or gravel deposits make up Unit E, and have been grouped as recent alluvium, implying deposition by modern river processes of the Allegheny River.

2.2 Regional Hydrology

Hydrogeologic units are units of consistent hydraulic properties. They may be composed of one lithologic unit, a group of lithologic units, or parts of a unit. Consequently, lithologic and hydrologic units may not coincide.

The five lithologic units identified in the area have been grouped into four hydrologic units: Upper Water-Bearing Zone, Lower Aquifer, Upper Aquitard, and Lower Aquitard. Unit D (glacial fluvial sands and gravel) and Unit E (recent fluvial deposits including fine sands and silts and some fill) comprise the Upper Water-Bearing Zone, although local clay lenses may act as discontinuous semi-confining layers. Unit B (glacial outwash) combined with sandy lenses in the upper part of Unit A, forms the City Aquifer.

Unit C (till, perhaps more specifically a lodgment till) comprises the Upper Aquitard, which separates the two water-bearing units. The layered glacio-lacustrine silts and clays of Unit A form a Lower Aquitard beneath the City Aquifer separating this aquifer from the underlying bedrock.

2.3 Site Geology

The Site geology generally follows the regional geology described in Section 2.1. At the Site, four of the five lithologic units have been identified. To illustrate the Site geology, three geological cross sections were constructed. The location of the cross sections is shown in Figure 2-1. The symbols representing the different stratigraphies used in the cross sections are shown in Figure 2-2. The lithologic units logged during this investigation are shown in Cross-Section A-A', B-B', and C-C' in Figures 2-3, 2-4, and 2-5, respectively.

The field logging compared very favorably to the lithologic descriptions derived from the geotechnical laboratory data. Of the 67 geotechnical samples collected, only 10 had a different lithological classification than was logged in the field. Generally, the field descriptions for these samples were in agreement with the percentages of sands and clays. Where a difference between the field and the laboratory description occurred, the laboratory description is the one used in this report. Most of the discrepancies were when the sample contained 45 to 50 percent sand, but was logged in the field as a clay, or vice versa.

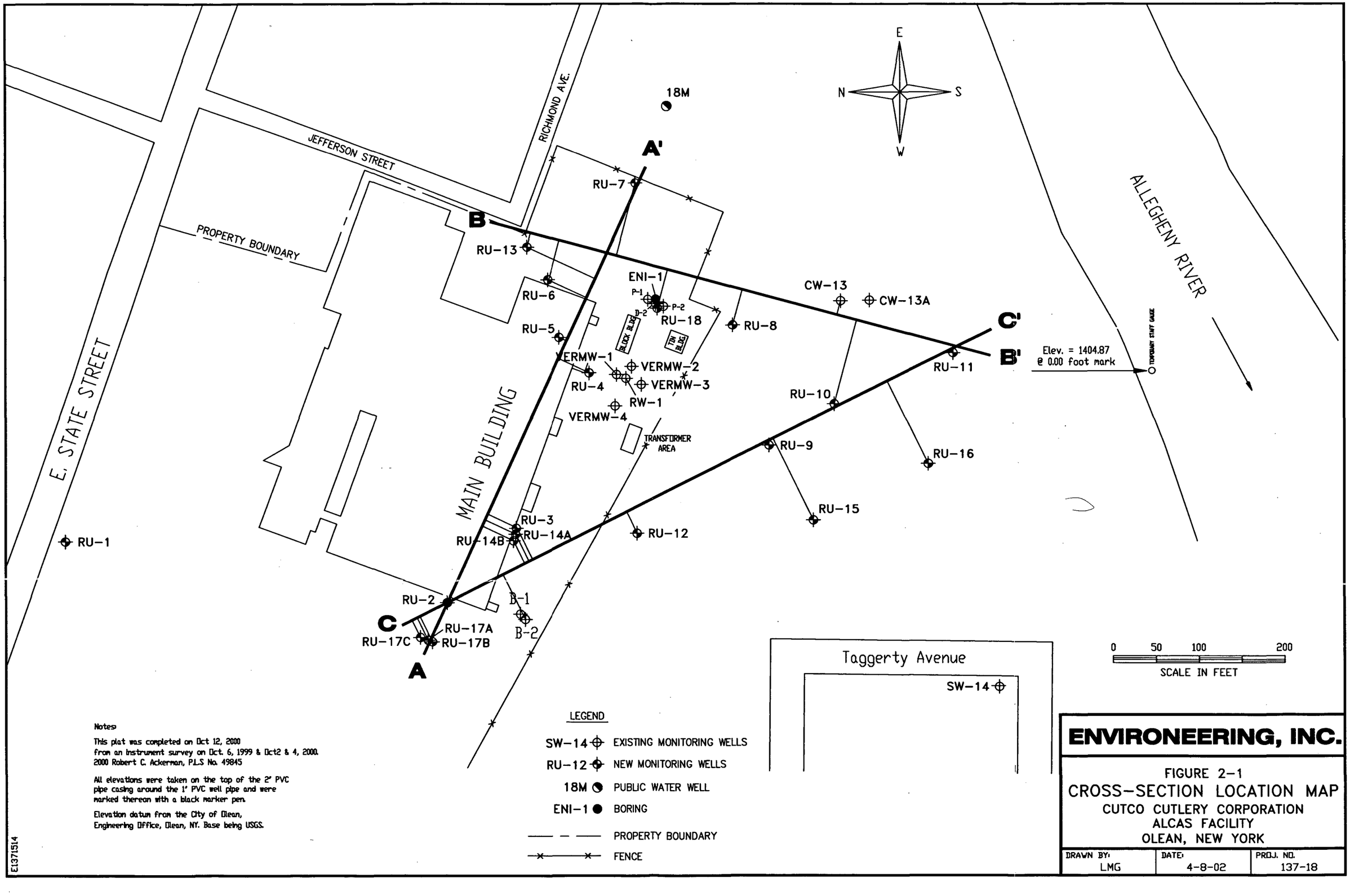
The lowest unit encountered during this investigation is the City Aquifer (Unit B), which is predominately gravel with sand and clay. Based on the sieve analyses, the percentage of sand in this unit ranged from 92 to 95 percent sand. This unit is very permeable, and yields significant quantities of water. The top of the City Aquifer is 25 to 30 feet deep (approximate elevation of 1400 feet) in the western portion of the Site dipping to the east and south. The top of the City Aquifer was not encountered at a depth of 40 feet (elevation of 1380 feet) in RU-11.

The Upper Aquitard (Unit C) is silty clay with gravel, and was identified by its olive gray color and/or the gravel content. This unit contained 50 to 97 percent clay based on the sieve analyses. The thickness of this unit is highly variable across the Site.

As discussed in the Section 2.2 Site Geology, the Upper Water-Bearing Zone appears to be channelized stream deposits between the Section B-B' line on the east and a north-south line through RU-2. This channel ranges from 2 to 10 feet thick along the southern end of the Alcas Facility building as shown in Section A-A'. Of the eight borings within the channel, only two contained any clay in the Upper Water-Bearing Zone. This means that the hydraulic conductivity of this zone is increased significantly over the sediments outside the channel containing clay.

As shown in Section B-B', Upper Water-Bearing Zone is discontinuous, and is not at a consistent elevation within the Units D and E. In addition, five of the eight borings show that the Upper Water-Bearing Zone contains a significant portion of clay. This suggests that this section line is on the edge or outside of the channel.

Section C-C' clearly shows a thick (15 to 20 feet) of silty sand in the south of the Alcas Facility. Of the nine southern-most borings on this cross section, only three contain any clay in the Upper Water-Bearing Zone. This thicker and coarser sequence of sediments provides a preferential pathway for water and constituent migration.



Notes:

This plat was completed on Oct 12, 2000 from an instrument survey on Oct. 6, 1999 & Oct2 & 4, 2000. 2000 Robert C. Ackerman, P.L.S No. 49845

All elevations were taken on the top of the 2" PVC pipe casing around the 1" PVC well pipe and were marked thereon with a black marker pen.

Elevation datum from the City of Olean, Engineering Office, Olean, NY. Base being USGS.

LEGEND

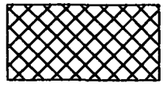
- SW-14 ⊕ EXISTING MONITORING WELLS
- RU-12 ⊕ NEW MONITORING WELLS
- 18M ◔ PUBLIC WATER WELL
- ENI-1 ● BORING
- PROPERTY BOUNDARY
- FENCE

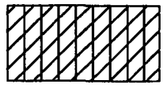
ENVIRONEERING, INC.

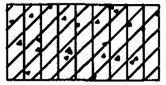
FIGURE 2-1
CROSS-SECTION LOCATION MAP
CUTCO CUTLERY CORPORATION
ALCAS FACILITY
OLEAN, NEW YORK

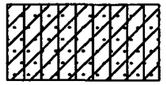
DRAWN BY:	DATE:	PROJ. NO.
LMG	4-8-02	137-18

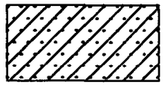
E1371514

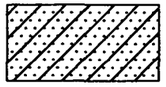
1. PAVEMENT 

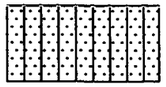
2. SILTY CLAY 

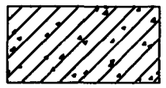
3. SILTY CLAY W/GRAVEL 

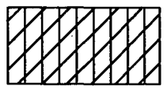
4. SILTY, SANDY CLAY 

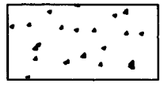
5. SANDY CLAY 

6. CLAYEY SAND 

7. SILTY SAND 

8. CLAY W/GRAVEL 

9. CLAYEY SILT 

10. GRAVEL 

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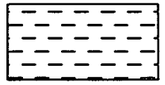
12. SHALE 

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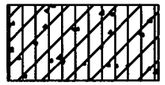
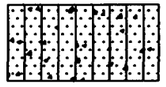
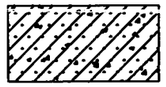
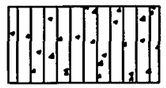
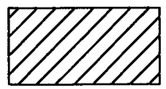
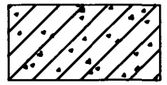
14. CLAYEY SILT W/ GRAVEL 

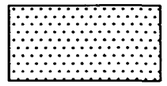
15. SAND W/GRAVEL & SILT 

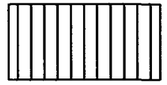
16. CLAY W/GRAVEL & SAND 

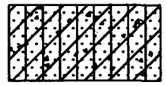
17. SILT W/GRAVEL 

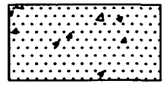
18. CLAY 

19. GRAVEL W/CLAY 

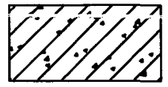
20. SAND 

21. SILT 

22. SILTY CLAYEY SAND W/GRAVEL 

23. SAND W/GRAVEL 

24. GRAVEL W/SAND 

25. CLAY & GRAVEL 

NOTE:
RED INDICATES PREDOMINANT LITHOLOGY.
BLUE INDICATES SECONDARY LITHOLOGY.

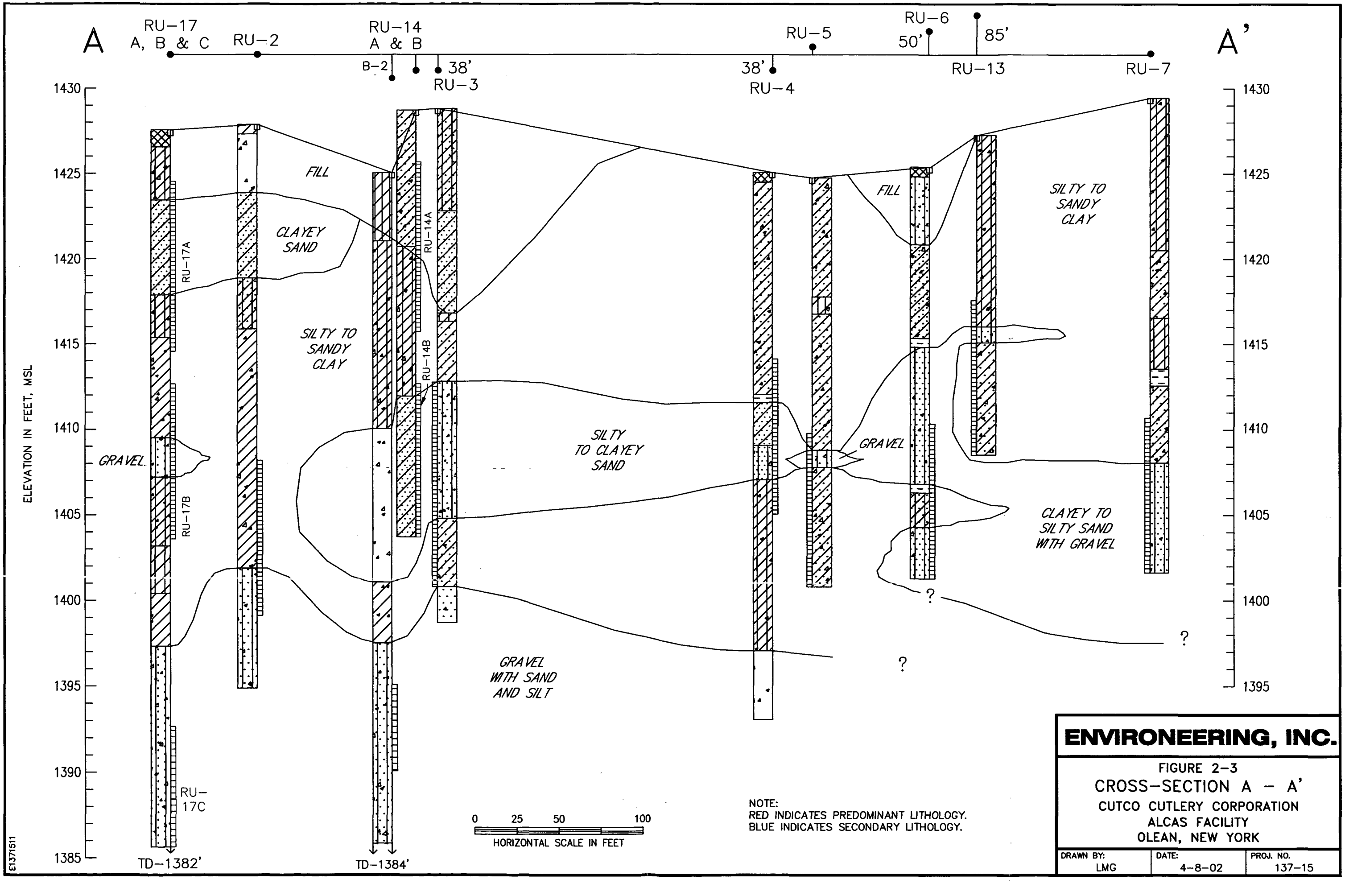
NOT TO SCALE

E1371801

ENVIRONEERING, INC.

FIGURE 2-2
STRATIGRAPHIC COLUMN DESCRIPTIONS
CUTCO CUTLERY CORPORATION
ALCAS FACILITY
OLEAN, NEW YORK

DRAWN BY:	DATE:	PROJ. NO.
LMG	4-8-02	137-18



ENVIRONEERING, INC.

FIGURE 2-3

CROSS-SECTION A - A'

CUTCO CUTLERY CORPORATION
ALCAS FACILITY
OLEAN, NEW YORK

DRAWN BY:	DATE:	PROJ. NO.
LMG	4-8-02	137-15

B

RU-13 28' 52' RU-6 | 70' RU-7 | 40' RU-18 | 45' RU-8 | 9' CW-13 | 100' RU-10 | RU-11

B'

ELEVATION IN FEET, MSL

1430
1425
1420
1415
1410
1405
1400
1395
1390
1385

FILL

SILTY TO SANDY CLAY

CLAYEY TO SILTY SAND WITH GRAVEL

GRAVEL WITH SAND AND SILT

?

0 25 50 100
HORIZONTAL SCALE IN FEET

TD-1380'

TD-1319.9'

TD-1380'

NOTE:
RED INDICATES PREDOMINANT LITHOLOGY.
BLUE INDICATES SECONDARY LITHOLOGY.

E1371512

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FIGURE 2-4
CROSS-SECTION B - B'
CUTCO CUTLERY CORPORATION
ALCAS FACILITY
OLEAN, NEW YORK

DRAWN BY:	DATE:	PROJ. NO.
LMG	4-8-02	137-15

C

C'

RU-17 A, B & C

RU-14 A & B

RU-3 38'

RU-2

B-2

RU-12

RU-9

RU-15

RU-10

RU-16

RU-11

ELEVATION IN FEET, MSL

1430

1425

1420

1415

1410

1405

1400

1395

1390

1385

RU-17A

RU-17B

RU-14A

RU-14B

RU-17C

FILL

CLAYEY SAND

SILTY TO SANDY CLAY

GRAVEL

CLAYEY TO SILTY SAND

CLAYEY TO SILTY SAND WITH GRAVEL

GRAVEL WITH SAND AND SILT

?

TD-1382'

TD-1384'

TD-1380'

0 25 50 100

HORIZONTAL SCALE IN FEET

NOTE:
RED INDICATES PREDOMINANT LITHOLOGY.
BLUE INDICATES SECONDARY LITHOLOGY.

E1371513

ENVIRONEERING, INC.

FIGURE 2-5

CROSS-SECTION C - C'

CUTCO CUTLERY CORPORATION
ALCAS FACILITY
OLEAN, NEW YORK

DRAWN BY:	DATE:	PROJ. NO.
LMG	4-8-02	137-15

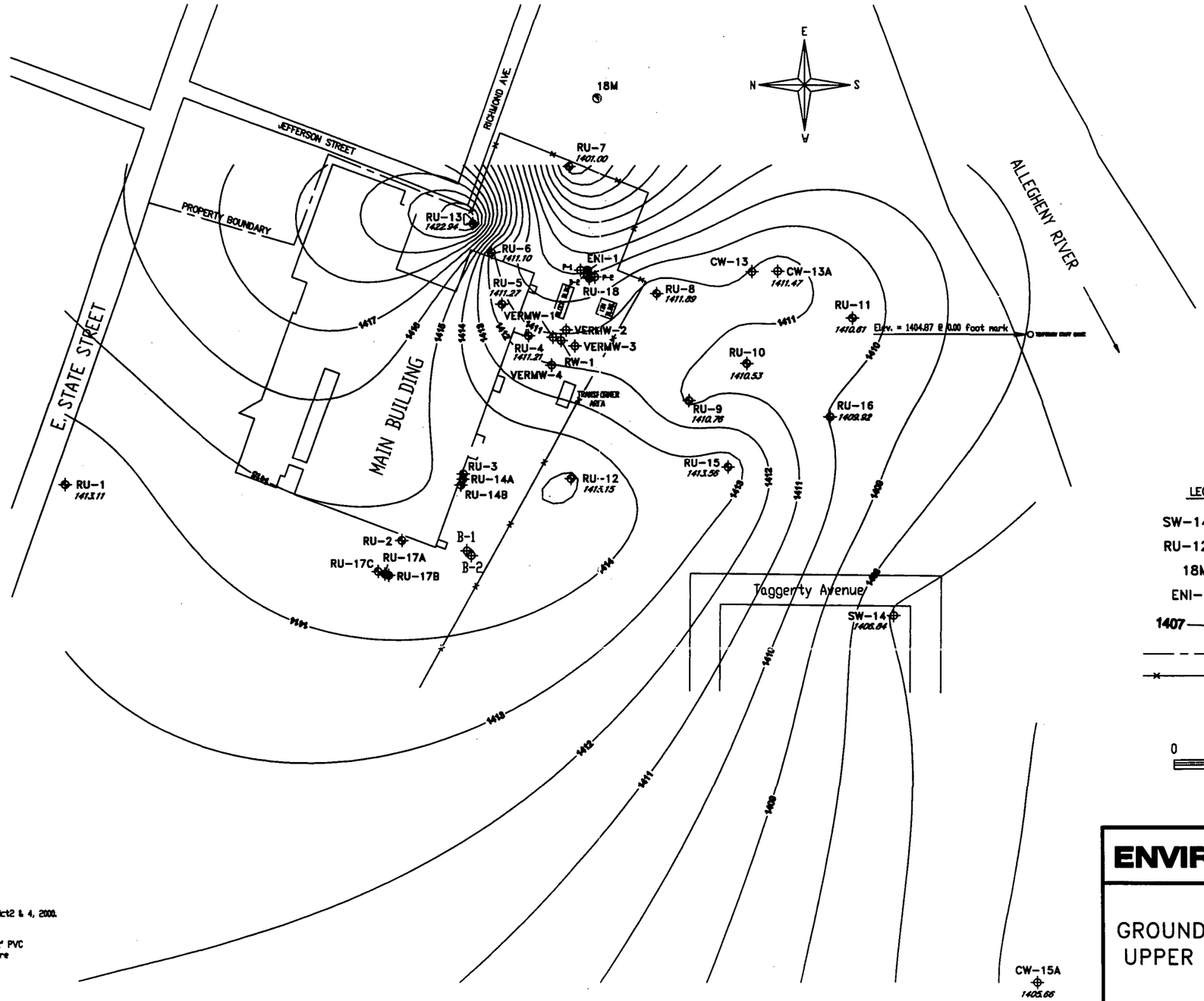
2.4 Site Hydrology

Groundwater flow in the Upper Water-Bearing Zone is depicted in the water table contour map in Figure 2-6. Based on this water table contour map, groundwater is flowing to the east near the Alcas Building and toward the south in the southern part of the study area. A groundwater divide exists along the line immediately from the southwest corner of the Alcas building to RU-15, between RU-10 and RU-16, to immediately north of RU-11. The shape of the water table contour map clearly indicates the pumping from 18M, 37M, and/or 38M.

Historically, Municipal wells 18M, 37M, and 38M began pumping in 1960, and continued in operation until 1979 when TCE was detected in water samples from these wells. These wells were shut in and not used again until 1990. The chlorinated solvents migrated through the unsaturated zone under the building, through the Upper Water Bearing Zone and into the City Aquifer. Pumping from 18M caused groundwater flow to reverse in the City Aquifer back toward 18M from under the main building at Alcas. In addition, a cone of depression was created in the Upper Water Bearing Zone that was a subdued replica of the cone of depression in the City Aquifer.

The capture zone for 18M in the Upper Water-Bearing Zone is north and east of the groundwater divide and it extends north or the Alcas building. The northern extent may extend as far north as East State Street.

An area of high water appears in the vicinity of RU-13. This mound of high water does not appear to be a natural occurrence, but rather caused by some man-made source. It appears the source of this mound is likely from a release from a nearby surface water line or storm/sewer line. Several city lines have been identified in the area, which line and how long it has been leaking is currently unknown.



LEGEND

SW-14 ⊕	EXISTING MONITORING WELLS
RU-12 ⊕	NEW MONITORING WELLS
18M ◔	PUBLIC WATER WELL
ENI-1 ●	BORING
1407 ——	GROUNDWATER CONTOUR IN FEET
—— - ——	PROPERTY BOUNDARY
—×—×—	FENCE

0 75 150 300

SCALE IN FEET

Notes:

This plat was completed on Oct 12, 2000 from an instrument survey on Oct. 6, 1999 & Oct2 & 4, 2000. 2000 Robert C. Ackerman, P.L.S No. 49845

All elevations were taken on the top of the 2" PVC pipe casing around the 1" PVC well pipe and were marked thereon with a black marker pen.

Elevation datum from the City of Olean, Engineering Office, Olean, NY. Base being USGS.

E1372001

ENVIRONEERING, INC.

FIGURE 2-6

GROUND WATER CONTOUR MAP
UPPER WATER-BEARING ZONE

ALCAS FACILITY
OLEAN, NEW YORK

DRAWN BY:	DATE:	PROJ. NO.
LMG	4-26-02	137-20

3.0 INVESTIGATIVE RESULTS

Investigative data collected from 1999 to date is summarized below. This data summary consists of soil, soil-gas and groundwater sampling results. Data summary tables and figures are provided in the referenced appendices. The data was presented in this manner to follow the sequence of the investigations and for ease of presentation and mutual understanding.

3.1 Soil Sampling Results

Geotechnical (*physical*) and analytical data are summarized as follows in the order of collection. Corresponding boring location maps are included for orientation purposes.

3.1.1 Geotechnical Data Summaries

Geotechnical data is provided in Appendix A in the following order.

- Phase II Investigation (*October, 1999*)
  - Data Summary Table (Table 3-1)
  - Laboratory Data Sheets
- Phase III Investigation (*September, 2000*)
  - Laboratory Results
- Phase IV Investigation (*September, 2001*)
  - Laboratory Results
- Composite Boring Location Map (Figure 3.1.1)

Geotechnical data was not collected during the Phase I Investigation.

3.1.2 Analytical Data Summaries

Analytical soil data summaries are provided in Appendix B in the following order.

- Phase I Investigation (*July, 1999*)
  - Analytical Summary Table (Table 3-2)
  - Analytical Soil Data Location Map (Figure 3.1.2)
- Phase II Investigation (*October, 1999*)
  - Analytical Summary Table (Table 3-3)

- Analytical Soil Data Location Maps (Figures 3.1.3 and 3.1.4)

- Phase IV Investigation (*September, 2001*)

  - Analytical Summary Table (Table 3-4)
  - Boring Location Map (See Figure 3.1.1)

Analytical soil data was not collected during the Phase III Investigation.

3.2 Groundwater Sampling Results

Groundwater analytical data are summarized as follows in the order of collection. Corresponding well location maps are included for orientation purposes.

3.2.1 Upper Zone Data

Groundwater sampling data for the Upper Zone is provided in Appendix C in the following order.

- Phase I Investigation (*July, 1999*)

  - Analytical Summary Table (Table 3-5)
  - Boring Locations & Data Plot (Figure 3.2.1)

- Phase II Investigation (*October, 1999*)
  - Field and Analytical Data Summary Table (Table 3-6)
  - Well/Boring Locations & Data Plot (Figure 3.2.2)

- Phase III Investigation (*October, 2000*)

  - Analytical Summary Table (Table 3-7)

- Phase IV Investigation (*September, 2001*)

  - Analytical Summary Table (Table 3-8)
  - Well Locations & Data Plot (*Composite of Phase III & IV Work*) (See Figure 3.2.3)

3.2.2 City Aquifer Data

Groundwater sampling data for the Lower Zone is provided in Appendix D in the following order.

- Phase II Investigation (*October, 1999*)

  - Field and Analytical Data Summary Table (Table 3-9)
  - Well/Boring Locations & Data Plot (See Figure 3.2.2)

- Phase III Investigation (*October, 2000*)
    - Analytical Summary Table (Table 3-10)
- Phase IV Investigation (*September, 2001*)
    - Analytical Summary Table (Table 3-11)
    - Well Locations & Data Plot (*Composite of Phase III & IV Work*) (See Figure 3.2.3)

Groundwater samples were not collected in the Lower Zone during the Phase I Investigation.

A composite of all well data for both the Upper and Lower Zones is provided in Table 3-12 at the end of Appendix D.

3.3 Soil-Gas Sampling Results

Soil gas sampling data collected during the Phase II investigation is summarized in Appendix E as follows.

- Tabulated Summaries of GORE-SORBER® Screening Survey Data (Tables 3-13 & 3-14)
- GORE-SORBER® Screening Survey Plots for PERC, TCE, and cis- & trans-1,2-DCE

4.0 DISCUSSION OF RESULTS

4.1 DNAPL Releases

When released into the environment, chlorinated organic solvents that are heavier than water are commonly referred to as dense nonaqueous phase liquids or DNAPLs. Because they are heavier than water, DNAPLs can readily migrate downward and through groundwater into the subsurface. DNAPL can exist in the subsurface as free and residual DNAPL. When released, DNAPL will move downward through the subsurface under the force of gravity or laterally along the surface of sloping fine-grained soil units.[2] The DNAPL must overcome the capillary forces to continue its movement. Point release types of equal mass, will typically travel much deeper than release types that are spread over greater surface areas. DNAPLs will distribute in the subsurface as both disconnected blobs and ganglia of liquid referred to as "residual", and in larger accumulations referred to as "pools". The portion of the subsurface where DNAPLs are located, either free or residual, is commonly referred to as the DNAPL zone. The DNAPL zone is that portion of the subsurface where the released immiscible liquids (via free-phase DNAPL migration and chemical diffusion) are present within the subsurface media.

Free DNAPL refers to the presence of DNAPL at saturation higher that residual DNAPL. Free DNAPL is distinctive from residual DNAPL in that free DNAPL is still potentially capable of traveling in the environment if it can overcome capillary forces.

The trailing end of a migrating DNAPL being trapped in pore spaces or fractures by capillary forces forms residual DNAPL. The amount of residual DNAPL contained in the subsurface is a function of the DNAPL density, viscosity, and interfacial tension and the geologic characteristics of the site such as, soil pore size, permeability, capillary pressure, root holes, small fractures, and slickensides found in silt, clay layers, etc. The subsurface DNAPL distribution is typically impossible to locate or delineate accurately. DNAPL migrates preferentially through selected pathways, and is affected by small-scale changes in the stratigraphy. Therefore, the ultimate path taken by DNAPL can be very difficult to characterize and predict.

Both free and residual DNAPL give rise to contaminant vapors in the unsaturated zone and can cause a dissolved phase plume in the saturated zone (below the water table). Ground water flowing past the DNAPL slowly dissolves soluble components of the DNAPL, forming a dissolved or aqueous phase plume zone downgradient of the DNAPL zone. Contributing to evaporation and aqueous dissolution, with time some chemical diffusion of the DNAPL can occur into the surrounding soil matrix. These DNAPL depleting mechanisms typically operate very slowly under natural conditions; thus, subsurface DNAPL tends to persist as a long-term source of dissolved phase derivatives into groundwater. Complete dissolution of DNAPL in the saturated zone can take decades or centuries due to the limits on chemical solubility, groundwater velocity, and vertical dispersion.

The aqueous plume zone is that portion of the groundwater surrounding and downgradient of the DNAPL zone where DNAPLs are not present. The plume zone originates from and extends beyond the DNAPL zone as it progressively migrates with ground water flow for as long as the DNAPL zones persist. From a mass perspective, typically the mass of free or residual DNAPL significantly exceeds that which is sorbed to soils, dissolved in the groundwater or present as vapors in the vadose zone. Depending on the volume of the release and site-specific subsurface characteristics, the plume zone may extend over a large distance

[2] USEPA, "Estimating Potential for Occurrence of DNAPL at Superfund Sites". Publication 9355.407FS, January 1992.

from the entry zone and the underlying DNAPL zone. The migration of constituents in these plumes is subject to advection, dispersion, sorption, and degradation.

The plume zone will often include a light vapor phase just above the water table. The volatilization of the residual DNAPL and from the dissolved plume will form a sinking, density driven vapor plume that can condense on the surface of the water table. The time for volatilization of DNAPL to occur is highly variable and will fluctuate with changing site conditions (e.g., dry/wet soils, discontinuous channels, voids, and coarse/fine-grained soils).

The DNAPL zone is typically the source area of dissolved and vapor phase transport of chlorinated compounds, which affect soils within the plume zones to the extent the plume migrates. While it represents a fraction of contaminant mass and vehicle for continuing transport of dissolved phase compounds, the plume-affected media is not the governing source component at chlorinated sites in terms of generation and persistence, except where all residual liquids in the origin DNAPL zone have dissipated.

4.2 Soil Data

The soil data is extensive both horizontally and vertically south of the building footprint, in the "backyard" area of the Alcas site (See Figure 3.1.4). The data reflects soils affected in this area, from near surface to a depth of approximately 46 feet below grade. However, based on the latest methods to determine the presence of DNAPL in soils, the detected soil concentrations do not indicate the presence of residual DNAPL in this portion of the site. The latest methods to determine the presence of residual DNAPL in soil is included in EPA Pub 9355.4-07FS, attached as Appendix H.

Instead, the concentrations suggest the soils are within a plume zone, impacted by the transport of dissolved phase derivatives migrating from residual DNAPL, upgradient of the area. According to Cohen and Mercer, the erratic nature of the concentrations found in soils, which corresponds to groundwater data in the same area, and vicinity soil gas data, indicate that a DNAPL zone is nearby[3]. While it is possible that some of the "backyard" soils may be affected by trace amounts of source residual from minor, episodic surface releases in the area, the data does not reflect such occurrences.

The current method of assessing the presence of residual DNAPL using concentrations in soil samples, is based on soil/water partitioning relationships. The partitioning calculation tests the assumption that all organics in the subsurface are either dissolved in groundwater or adsorbed to soil. If the calculation results in dissolved phase concentrations that are greater than the effective solubility or pure phase solubility, then DNAPL presence is likely in the area of the sample[4]. An example of the calculation, per EPA guidance in Attachment 1, can be shown as follows.

Partitioning Equation – $C_w = (C_t \times \rho b) \div (Kd \times \rho b + \theta_w)$; where,

C_w = theoretical pore water concentration assuming no DNAPL (mg/l)
C_t = measured concentration of organic compound in soil (mg/kg)
ρb = dry bulk density of the soil (typical range from 1.8 to 2.1 kg/l)
Kd = partition coefficient between pore water and soil = $K_{oc} \times f_{oc}$

[3] R.M. Cohen and J.W. Mercer, DNAPL Site Evaluation, R.S. Kerr Environmental Research Laboratory, U.S. EPA, Ada, OK, John Matthews-EPA Project Officer, C.K. Smoley, Boca Raton, Florida, 1993. (*Section 7, Table 7-4*).

[4] R.M. Cohen and J.W. Mercer, DNAPL Site Evaluation, R.S. Kerr Environmental Research Laboratory, U.S. EPA, Ada, OK, John Matthews-EPA Project Officer, C.K. Smoley, Boca Raton, Florida, 1993. (*Section 7, pages 7-1 through 7-11*

K_{oc} = organic carbon-water partition coefficient
f_{oc} = fraction of organic carbon in soil (mg/mg)
θ_w = water-filled porosity of soil

C_w is then compared to the pure phase solubility (S_i) of TCE, to assess the likelihood of DNAPL presence in the area of the sample. (The S_i of TCE is 1,100 mg/l.)

For the most conservative analysis using site-specific data, or in other words the hypothetical worst case scenario, the variables are developed as follows.

C_t = 120 mg/kg = the maximum concentration detected in the soil samples (This value is anomalous and well above representative concentrations found in site soils. The soil data averages well below 2.5 mg/kg.)

ρb = 1.8 kg/l = the lowest bulk density value in the typical range (Typical range is from 1.8 to 2.1 kg/l.)

K_{oc} = 125.9 for TCE (from the literature)

f_{oc} = 0.005 = the lowest organic content detected in the soil samples

Kd = 125.9 x 0.005 = 0.63

θ_w = 0.184 = minimum porosity value determined from the soil samples

Therefore, the worst case, theoretical pore water concentration is determined:

C_w = (120 x 1.8) + (0.63 x 1.8) + 0.184 = 163.9 mg/l

163.9 << S_i for TCE (1,100); therefore suggesting the absence of DNAPL in the area of the soil samples.

The calculation represents an overly conservative, worst-case scenario, primarily because the concentrations detected in site soil samples average below 2.5 mg/kg that is well below the maximum value of 120 mg/kg used in the calculation. If a representative soil concentration was used, say 2.5 mg/kg, the calculation would result in a C_w value of 3.4 mg/l. In any case, the soil concentrations found at the site, clearly and uniformly suggest the absence of DNAPL in the area of the soil samples.

Therefore, in summary, the soil data supports that the DNAPL zone and governing (if not sole) source of dissolved and vapor phase derivatives lies under the building and not in the area of the soil samples.

4.3 Soil-Gas Data

Many DNAPLs, including most halogenated solvents, have high vapor pressures and will volatilize in the vadose zone to form a vapor plume around a DNAPL source. Volatile organic compounds (VOCs) dissolved in groundwater can also volatilize at the capillary fringe into soil gas.[5]

[5] USEPA, DNAPL Site Characterization. Publication 9355.4-16FS, EPA/540/F-94/049, PB94-963317. September 1994.

The Phase II soil gas investigation indicated the presence of vapor phase mass of several chlorinated compounds (PCE, TCE, and DCE) at the site. The data clearly illustrates an area of concentration in the "backyard" in the form of a continuous "band", extending from the southeastern corner area of the building, south-southeasterly through the corner of the property (See figures presented in Appendix E). The data also illustrates another possible, yet smaller "band" area to the west-side of the "backyard". These vapor masses represent vapor phase derivatives from dissolved phase transport in groundwater and/or unsaturated source areas.

The two "band" areas of soil gas extend or sequence in north-south configurations south of the building and are comparable to the Upper Zone groundwater flow direction. These two bands also appear to align with the areas most likely to have leaks or solvent release points at the facility property, namely the degreasers and the sewer lines under the building. The areas also could be indicative of potential episodic, surface release points outside of the building.

When evaluating the more concentrated "band" area to the east, the TCE vapor data which stems from the parent compound at the site, is clearly a continuous formation in terms of vapor mass. The DCE data, which is the next order product of TCE, coincides with the parent TCE and is continuous to a lesser degree. As expected, the PCE vapor, likely derived from a commercial grade fraction of the TCE solvent used at the facility, is not detected in the same continuous formation. These data patterns present two key observations related to site characterization:

1. Because the parent compound and its first order product reflect continuous mass that coincides with the core of the Upper Zone groundwater plume migrating from beneath the building, and preferential transmissive areas apparent within the fluvial zone; this data likely reflects vapor phase mass associated with dissolved phase transport from an upgradient source area; and

2. Because the PCE source is likely a small, commercial grade fraction of the parent compound used at the facility (TCE), PCE vapor mass would be expected to be small, isolated and short-lived. PCE would not be expected to be found in a continuous, sustained formation in association with (overlying) dissolved phase transport in groundwater. Therefore, the PCE vapor mass likely represents detection of small, isolated, and episodic surface releases (i.e., spills, weed-killing spray, etc.) in the "backyard" area.

The soil-gas data is consistent with other Post ROD data collected at the Alcas site, and adds definition to site characterization. The data supports the evidence of a governing DNAPL zone under the main plant building, and adds possible explanation and definition for potential minor releases that could have occurred episodically and surficially in the "backyard" area.

4.4 Groundwater Data

When 1 percent of the aqueous solubility of a DNAPL compound is detected in the groundwater, it is highly suggestive that DNAPL is present in the aquifer. The 1 percent aqueous solubility limit is considered to be the strongest indicator of DNAPL presence in the saturated zone in accordance with the current state of practice, EPA guidance[6], and the latest research by Dr. John A. Cherry at the Waterloo Center for Groundwater Research. As shown in the data tables provided in Section 3, groundwater concentrations in the Upper and City Aquifers exceed 1 percent of the aqueous solubility for TCE. This

[6] USEPA, "Estimating Potential for Occurrence of DNAPL at Superfund Sites". Publication 9355.407FS, January 1992.

data, when combined with groundwater flow direction, indicates a DNAPL source zone beneath the main building.

4.4.1 Upper Water Bearing Zone Groundwater

The Phase III and IV groundwater sampling results show several key components of the contaminant distribution at the Alcas facility. The wells around the southeast corner of the building (RU-4, RU-5, and RU-6, see Figure 3.2.3) have TCE concentrations that exceed 1 percent of the solubility of TCE in water. This indicates that at or up gradient of this location is a DNAPL source. This places this source of DNAPL under the building.

The dissolved-phase plume is shown to be off site having migrated generally to the south with the direction of groundwater flow. The extent of affected ground water is not completely delineated as the TCE concentration in RU-10 and RU-12 exceeds the MCL. Detectable concentrations of chlorinated compounds are also present in RU-15 and RU-16.

To understand the present day distribution of contaminants in the Upper Water Bearing Zone the entire TCE usage and groundwater pumping history must be taken into consideration. As previously stated, Municipal wells 18M, 37M, and 38M began pumping in 1960, and continued in operation until 1979 when TCE was detected in water samples from these wells. These wells were shut in and not used again until 1990 when the water produced from these wells was treated using air strippers installed at the well locations. Alcas bean using TCE as a cleaning solvent in 1949. The plant stopped using TCE in 1989. Most likely, leakage under the main building through sewers and cracks in the cement floor began in the early 1950s. The chlorinated solvents migrated through the unsaturated zone under the building, through the Upper Water Bearing Zone and into the City Aquifer. Pumping from 18M caused groundwater flow to reverse in the City Aquifer back toward 18M from under the main building at Alcas. In addition, a cone of depression was created in the Upper Water Bearing Zone that was a subdued replica of the cone of depression in the City Aquifer.

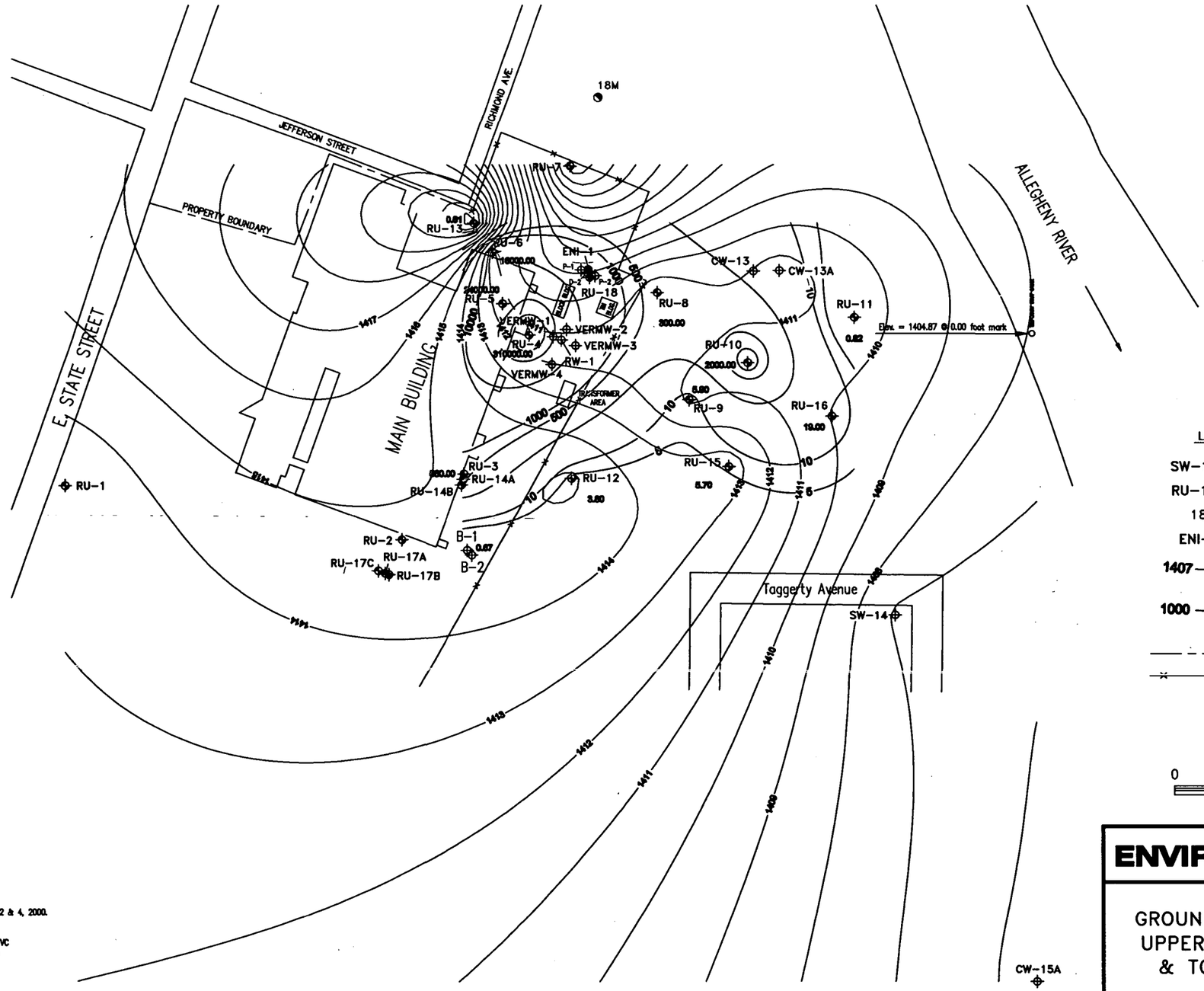
Beginning in 1979 with 18M shut in, the cone of depression began to recover and flow returned to natural conditions. The Upper Water Bearing Zone plume migrated south of the plant, most likely toward the river to the south. In 1990, the three Municipal wells were brought back on-line. A portion of the Upper Water Bearing Zone plume was pulled backed toward 18M with the majority of the "escaped" dissolved phase mass quite possibly controlled within the cone of depression for Wells 37M and 38M. Figure 4-1 shows a TCE Isopleth with the groundwater contours.

4.4.2 City Aquifer Groundwater

Data from monitor wells in the City Aquifer (D2, B2, CW-13, CW-1, RU-17C, and RU-18) show a wide array of results ranging from below detection levels up to 17 mg/L of TCE (Tables 3-9, 3-10, 3-11 and Figure 3.2.3). Concentration ranges of TCE from the Lower Zone data down gradient from the building can be summarized as follows, relative to 1 percent aqueous solubility levels.

Dissolved Phase Derivative	Concentration Range Down Gradient of the Source Area (mg/L)	1 % OF AQUEOUS SOLUBILITY (mg/L)
TCE	3.4 – 17 (MW-18 and D2)	11

As illustrated above City Aquifer groundwater concentrations reflect the presence of a DNAPL zone from an area below the main plant building, common with that reflected by the Upper Zone data. When combining all data, the composite suggests DNAPL has reached the City Aquifer.



Notes:

This plat was completed on Oct 12, 2000 from an instrument survey on Oct. 6, 1999 & Oct2 & 4, 2000. 2000 Robert C. Ackerman, P.L.S No. 49845

All elevations were taken on the top of the 2" PVC pipe casing around the 1" PVC well pipe and were marked thereon with a black marker pen.

Elevation datum from the City of Olean, Engineering Office, Olean, NY. Base being USGS.

E1372004

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FIGURE 4-1
GROUND WATER CONTOUR MAP
UPPER WATER-BEARING ZONE
& TCE ISOCONCENTRATION
ALCAS FACILITY
OLEAN, NEW YORK

DRAWN BY:	DATE:	PROJ. NO.
LMG	4-30-02	137-20

5.0 REMEDY SELECTION

The selected remedial action for Alcas was VER for the soils and Upper Water-Bearing Zone with no additional groundwater treatment necessary due to the groundwater capture of 18M in the City Aquifer. The remedy decision was selected based on the premise that the source area for the Alcas site was limited to surface releases of spent solvent at the rear of the property.

The OU2 ROD states in a response to comment in Appendix V, page V-9, "***Comment #19:*** *How much time it will take to implement the remedies at the source area properties.* ***EPA's Response:*** *After the design work is completed, EPA expects that is will take approximately one construction season to excavate all of the soil at AVX, and approximately five years to complete the soil treatment at Alcas and Loohn's. EPA expects that it will take approximately four additional years for the groundwater underlying these properties to be below drinking water standards. The four-year period represents the amount of time for three volumes of groundwater to travel or flush from the properties to the municipal wells.*"

The OU2 ROD also states on page 40 that "*A pilot test conducted in November 1994 confirmed that vacuum enhanced recovery (VER) could effectively desorb VOCs from the contaminated subsurface. Effective mass removal of VOCs was observed during the test for both the vapor and the dissolved phases.*"

A recent review of the pilot test results was conducted by EnSafe Inc. of Memphis, Tennessee. A copy of that review is attached. The review found that the conclusion of the 1994 pilot test was inconsistent with the results of the test. Several critical parameters are estimated during a pilot test. These include the radius of influence, intrinsic soil gas permeability, maximum attainable drawdown, and soil heterogeneity. The pilot test did not evaluate these parameters effectively. Furthermore, estimates of these critical parameters were either improper or exaggerated. As a result, the recommendation for the use of this technology in full-scale remediation does not appear to be valid.

APPENDIX A

Geotechnical Data Summaries

- **Phase II Investigation (*October, 1999*)**
  - Data Summary Table (Table 3-1)
  - Laboratory Data Sheets
- **Phase III Investigation (*September, 2000*)**
  - Laboratory Results
- **Phase IV Investigation (*September, 2001*)**
  - Laboratory Results
- **Composite Boring Location Map (Figure 3.1.1)**

TABLE 3-1
Geotechnical Data Summary
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Location	B-10A			B-11A		B-13A	
Sample Depth	6.0-7.0	14.0-15.0	24.0-25.0	15.0-16.0	19.0-20.0	29.0-30.0	37.0-38.0
Parameter (units)							
Hydraulic Conductivity (cm/sec)	2.2E-05	8.0E-08	2.7E-08				
Initial Water Content (%)	14.4	9.7	12.3				
Final Water Content (%)	14.3	8.4	11.9				
Initial Dry Density (g/cm^3)	1.784	2.193	2.045				
Final Dry Density (g/cm^3)	1.814	2.243	2.006				
Final Degree Saturation (%)	81	100	91				
Total Back Pressure (psi)	55	45	45				
Maximum Effective Stress (psi)	5	5	5				
Hydraulic Gradient	12	20	19				
Intrinsic Permeability[(a)]	2.2E-10	8.2E-13	2.8E-13				
Volume Water Content (cm^3/cm^3)	0.258	0.214	0.253				
Porosity	0.334	0.184	0.248				
Organic Content	0.012	0.008	0.013	0.013	0.010	0.012	0.005
Specific Gravity	2.686	2.693	2.727	2.748	2.729	2.752	2.735
Moisture Content (%)				11	12	12	9
Grain Size Distribution (% passing No	14	45	90	52	78	67	3
Density, Moisture Content (%)				148.5	143.9	146.0	155.0
Density, Unit Wet Weight (pcf)				11.4	12.3	12.5	7.1
Atterberg Limit, Liquid Limit	Not Plastic	Not Enough Sample	25	24	24	25	
Atterberg Limit, Plastic Limit			15	15	14	17	
Description	Silty Sand, brown	Silty Clay, olive gray w/gravel	Sandy Clay, brown w/gravel	Silty Clay, brown & olive gray w/gravel	Silty Clay, olive gray w/gravel & silt seams	Silty Clay, olive gray w/gravel & silt seams	Gravel, olive gray

Note: Blank cells indicate parameter was not analyzed.

[(a)] Property of the media only. Together with the physical propoerty of the fluid, permits the calculation of permeability to any permeant (water, air, etc.)

TABLE 3-1
Geotechnical Data Summary
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Location	B-14A				B-15A	B-19	
Sample Depth	7.0-8.0	9.5-10.3	14.5-15.4	21.2-22.0	15.0-16.0	6.5-7.3	30.0-31.0
Parameter (units)							
Hydraulic Conductivity (cm/sec)		2.0E-08		2.9E-08	1.6E-08		
Initial Water Content (%)		12.4		12.6	10.3		
Final Water Content (%)		11.7		11.4	11.1		
Initial Dry Density (g/cm^3)		2.068		2.110	2.385		
Final Dry Density (g/cm^3)		2.063		2.087	2.382		
Final Degree Saturation (%)		100		100	100		
Total Back Pressure (psi)		45		45	65		
Maximum Effective Stress (psi)		5		5	5		
Hydraulic Gradient		20		20	26		
Intrinsic Permeability[(a)]		2.1E-13		3.0E-13	1.6E-13		
Volume Water Content (cm^3/cm^3)		0.257		0.266	0.224		
Porosity		0.236		0.227	0.209		
Organic Content	0.012	0.018	0.012	0.014	0.015	0.009	0.010
Specific Gravity	2.703	2.714	2.728	2.738	2.739	2.718	2.738
Moisture Content (%)	12		10			13	12
Grain Size Distribution (% passing No	15	53	24	49	60	60	35
Density, Moisture Content (%)	154.8		143.7			138.2	142.9
Density, Unit Wet Weight (pcf)	9.6		9.0			14.6	11.2
Atterberg Limit, Liquid Limit		22	23	25	27		23
Atterberg Limit, Plastic Limit		16	16	16	17		16
Description	Gravel, red w/feroous stains	Sandy Clay, olive gray w/gravel	Silty Clay, olive gray w/gravel	Silty Clay, brown w/gravel	Sandy Clay, brown w/gravel	Sandy Silt, brown	Silty Clay, olive gray w/gravel

Note: Blank cells indicate parameter was not analyzed.

[(a)] Property of the media only. Together with the physical propoerty of the fluid, permits the calculation of permeability to any permeant (water, air, etc.)

TABLE 3-1
Geotechnical Data Summary
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Location	B-20	B-24	B-27		
Sample Depth	15.0-15.7	19.0-20.0	4.6-4.9	7.4-8.0	25.4-26.3
Parameter (units)					
Hydraulic Conductivity (cm/sec)		3.4E-08			
Initial Water Content (%)		13.5			
Final Water Content (%)		13.0			
Initial Dry Density (g/cm^3)		1.984			
Final Dry Density (g/cm^3)		2.004			
Final Degree Saturation (%)		100			
Total Back Pressure (psi)		45			
Maximum Effective Stress (psi)		5			
Hydraulic Gradient		17			
Intrinsic Permeability[(a)]		3.5E-13			
Volume Water Content (cm^3/cm^3)		0.271			
Porosity		0.268			
Organic Content	0.011	0.010	0.033	0.015	0.009
Specific Gravity	2.736	2.716	2.654	2.745	2.708
Moisture Content (%)	9		24	12	11
Grain Size Distribution (% passing Nc	10	62	72	51	35
Density, Moisture Content (%)					143.2
Density, Unit Wet Weight (pcf)					8.7
Atterberg Limit, Liquid Limit		26			26
Atterberg Limit, Plastic Limit		17			16
Description	Gravel, olive gray	Silty Clay, olive gray & brown w/gravel	Clayey Silt, olive gray	Silty Clay, brown & olive gray w/gravel	Silty Clay, brown & olive gray w/gravel

Note: Blank cells indicate parameter was not analyzed.

[(a)] Property of the media only. Together with the physical propoerty of the fluid, permits the calculation of permeability to any permeant (water, air, etc.)

TEST REPORT

.eport No.:	0401-1314	November 23,1999
Material:	Soil Samples	Page 1 of 7
Client:	IT Corporation	
Project:	Project Name-Alcoa, Alcas	
Sampled By:	Client	
Attention:	Robert Halden	

HYDRAULIC CONDUCTIVITY
ASTM D 5084

Sample Identification	B-10A 6.0'-7.0'	B-10A 14.0'-15.0'	B-10A 24.0'-25.0'	B-14A 9.5'-10.3'
Hydraulic Conductivity (cm/sec)	2.2 E-05	8.0E-08	2.7 E-08	2.0 E-08
Initial Water Content (%)	14.4	9.7	12.3	12.4
Final Water Content (%)	14.3	8.4	11.9	11.7
Initial Dry Density (g/cm^3)	1.784	2.193	2.045	2.068
Final Dry Density (g/cm^3)	1.814	2.243	2.006	2.063
Final Degree Saturation (%)	81	100	91	100
Total Back Pressure (psi)	55	45	45	45
Maximum Effective Stress (psi)	5	5	5	5
Hydraulic Gradiant	12	20	19	20
Intrinsic Permeability	2.2E-10	8.2 E-13	2.8 E-13	2.1 E-13
Volumetric Water Content (cm^3/cm^3)	0.258	0.214	0.253	0.257
Porosity	0.334	0.184	0.248	0.236
Organic Content	0.012	0.008	0.013	0.018
Specific Gravity	2.686	2.693	2.727	2.714

TEST REPORT

Report No.:	**0401-1314**	**November 23,1999**
Material:	**Soil Samples**	**Page 2 of 7**
Client:	**IT Corporation**	
Project:	**Project Name-Alcoa, Alcas**	
Sampled By:	**Client**	
Attention:	**Robert Halden**	

HYDRAULIC CONDUCTIVITY
ASTM D 5084

Sample Identification	B-14A 21.2'-22.0'	B-15A 15.0'-16.0'	B-24 19.0'-20.0'
Hydraulic Conductivity (cm/sec)	2.9 E-08	1.6 E-08	3.4 E-08
Initial Water Content (%)	12.6	10.3	13.5
Final Water Content (%)	11.4	11.1	13.0
Initial Dry Density (g/cm^3)	2.110	2.385	1.984
Final Dry Density (g/cm^3)	2.087	2.382	2.004
Final Degree Saturation (%)	100	100	100
Total Back Pressure (psi)	45	65	45
Maximum Effective Stress (psi)	5	5	5
Hydraulic Gradiant	20	26	17
Intrinsic Permeability	3.0 E-13	1.6 E-13	3.5 E-13
Volumetric Water Content (cm^3/cm^3)	0.266	0.224	0.271
Porosity	0.227	0.209	0.268
Organic Content	0.014	0.015	0.010
Specific Gravity	2.738	2.739	2.716

TEST REPORT

Report No.: 0401-1314 **November 23, 1999**
Material: Soil Samples
Client: IT Corporation
Project: Project Name-Alcoa, Alcas
Sampled By: Client
Attention: Robert Halden

MOISTURE CONTENT
ASTM D 2216/2488

Sample Identification	Depth	Sample Description	Moisture Content(%)
B-11A	15.0'-16.0'	Sandy lean clay (CL) Clay, brown and olive gray w/gravel	11
B-11A	19.0'-20.0'	Sandy lean clay with sand (CL) Clay, olive gray w/gravel and silt seams	12
B-13A	29.0'-30.0'	Sandy lean clay (CL) , olive gray w/gravel and silt seams	12
B-13A	37.0'-38.0'	well-graded gravel w/ sand (CW), olive gray	9
B-14A	7.0'-8.0'	silty sand w/ gravel (SM), red w/ferrous stains	12
B-14A	14.5'-15.4'	Silty sand w/ gravel (SM) Clay, olive gray w/gravel	10
B-19	6.5'-7.3'	Sandy Silt,(ML) brown	13
B-19	30.0'-31.0'	clayey sand w/ gravel (SC) Clay, olive gray w/gravel	12
B-20	15.0'-15.7'	well graded sand with silt and gravel (SW-SM), olive gray	9
B-27	4.6'-4.9'	Clayey Silt, olive gray	24
B-27	7.4'-8.0'	Silty Clay, brown and olive gray w/gravel	12
B-27	25.4'-26.3'	clayey sand w/ gravel (SC), brown and olive gray	11

SPECIFIC GRAVITY
ASTM D 854

Sample Identification	Depth	
B-11A	15.0'-16.0'	2.748
B-11A	19.0'-20.0'	2.729
B-13A	29.0'-30.0'	2.752

TEST REPORT

Report No.: 0401-1314
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Client: IT Corporation
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Sampled By: Client
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SPECIFIC GRAVITY
ASTM D 854

Sample Identification	Depth	
B-13A	37.0'-38.0'	2.735
B-14A	7.0'-8.0'	2.703
B-14A	14.5'-15.4'	2.728
B-19	6.5'-7.3'	2.718
B-19	30.0'-31.0'	2.738
B-20	15.0'-15.7'	2.736
B-27	4.6'-4.9'	2.654
B-27	7.4'-8.0'	2.745
B-27	25.4'-26.3	2.708

ORGANIC CONTENT
ASTM D 2974

Sample Identification	Depth	
B-11A	15.0'-16.0'	0.013
B-11A	19.0'-20.0'	0.010
B-13A	29.0'-30.0'	0.012
B-13A	37.0'-38.0'	0.005
B-14A	7.0'-8.0'	0.012
B-14A	14.5'-15.4'	0.012
B-19	6.5'-7.3'	0.009
B-19	30.0'-31.0'	0.010
B-20	15.0'-15.7'	0.011
B-27	4.6'-4.9'	0.033
B-27	7.4'-8.0'	0.015
B-27	25.4'-26.3'	0.009

GRAIN-SIZE
ASTM D 422

Sample Identification	Depth	Passing No. 200 (%)	Clay Fraction 0.002 mm (%)
B-10A	6.0'-7.0	14	-
B-10A	14.0'-15.0'	45	3
B-10A	24.0'-25.0'	90	5
B-11A	15.0'-16.0'	52	11

TEST REPORT

Report No.: 0401-1314 **November 23,1999**
Material: Soil Samples
Client: IT Corporation
Project: Project Name-Alcoa, Alcas
Sampled By: Client
Attention: Robert Halden

GRAIN-SIZE
ASTM D 422

Sample Identification	Depth	Passing No. 200 (%)	Clay fraction 0.02mm (%)
B-11A	19.0'-20.0'	78	10
B-13A	29.0'-30.0'	67	10
B-13A	37.0'-38.0'	3	-
B-14A	7.0'-8.0'	15	-
B-14A	9.5'-10.3'	53	11
B-14A	14.5'-15.4'	24	4
B-14A	21.2'-22.0'	49	11
B-15A	15.0'-16.0'	60	19
B-19	6.5'-7.3'	60	4
B-19	30.0'-31.0'	35	7
B-20	15.0'-15.7'	10	-
B-24	19.0'-20.0'	62	13
B-27	4.6'-4.9'	72	12
B-27	7.4'-8.0'	51	12
B-27	25.4'-26.3'	35	8

Please see attached plate(s) for grain size curves

ATTERBERG LIMIT
ASTM D 4318

Sample Identification	Sample Description	Depth	Liquid Limit	Plastic Limit
B-10A	Silty Sand w/ gravel (SM) Brown	6.0'-7.0'	Non-Plastic	
B-10A	sandy lean clay w/ gravel (CL) olive gray w/gravel	14.0'-15.0'	Not Enough Sample	
B-10A	Silty lean clay w/ gravel (CL) brown w/gravel	24.0'-25.0'	25	15
B-11A	Sandy lean Clay (CL) w/gravel brown & olive gray w/gravel	15.0'-16.0'	24	15
B-11A	Silty lean clay brown & olive gray w/gravel & silt seams	19.0'-20.0'	24	14
B-13A	Sandy lean Clay (CL) olive gray w/ gravel silt seams	29.0'-30.0'	25	17

TEST REPORT

Report No.: 0401-1314 **November 23,1999**
Material: Soil Samples
Client: IT Corporation
Project: Project Name-Alcoa, Alcas
Sampled By: Client
Attention: Robert Halden

ATTERBERG LIMIT
ASTM D 4318

Sample Identification	Sample Description	Depth	Liquid Limit	Plastic Limit
B-13A	Gravel olive gray	37.0'-38.0'	Non-Plastic	
B-14A	Silty Sand brown	7.0'-8.0'	Non-Plastic	
B-14A	lean Clay w/ sand (CL) olive gray w/gravel	9.5'-10.3'	22	16
B-14A	Silty sand w/ gravel SM) olive gray w/gravel	14.5'-15.4'	23	16
B-14A	Clay sand (SC) brown w/gravel	21.2'-22.0'	25	16
B-15A	Sandy lean Clay (CL) brown w/gravel	15.0'-16.0'	27	17
B-19	Sandy Silt brown w/gravel	6.5'-7.3'	Non-Plastic	
B-19	Clayey sand w/ gravel (CL) olive gray w/grave	30.0'-31.0'	23	16
B-20	well graded sand w/ silt and gravel (SW-SM) w/gravel	15.0'-15.7'	Non-Plastic	
B-24	lean clay w/ sand (CL) olive gray & brown w/gravel	19.0'-20.0'	26	17
B-27	Clayey Silt olive gray	4.6'-4.9'	Not Enough Sample	
B-27	Silty Clay brown & olive gray	7.4'-8.0'	Not Enough Sample	
B-27	Clayey sand with gravel (SC) brown & olive gray w/gravel	25.4'-26.3'	26	16

TEST REPORT

Report No.: 0401-1314
Material: Soil Samples
Client: IT Corporation
Project: Project Name-Alcoa, Alcas
Sampled By: Client
Attention: Robert Halden

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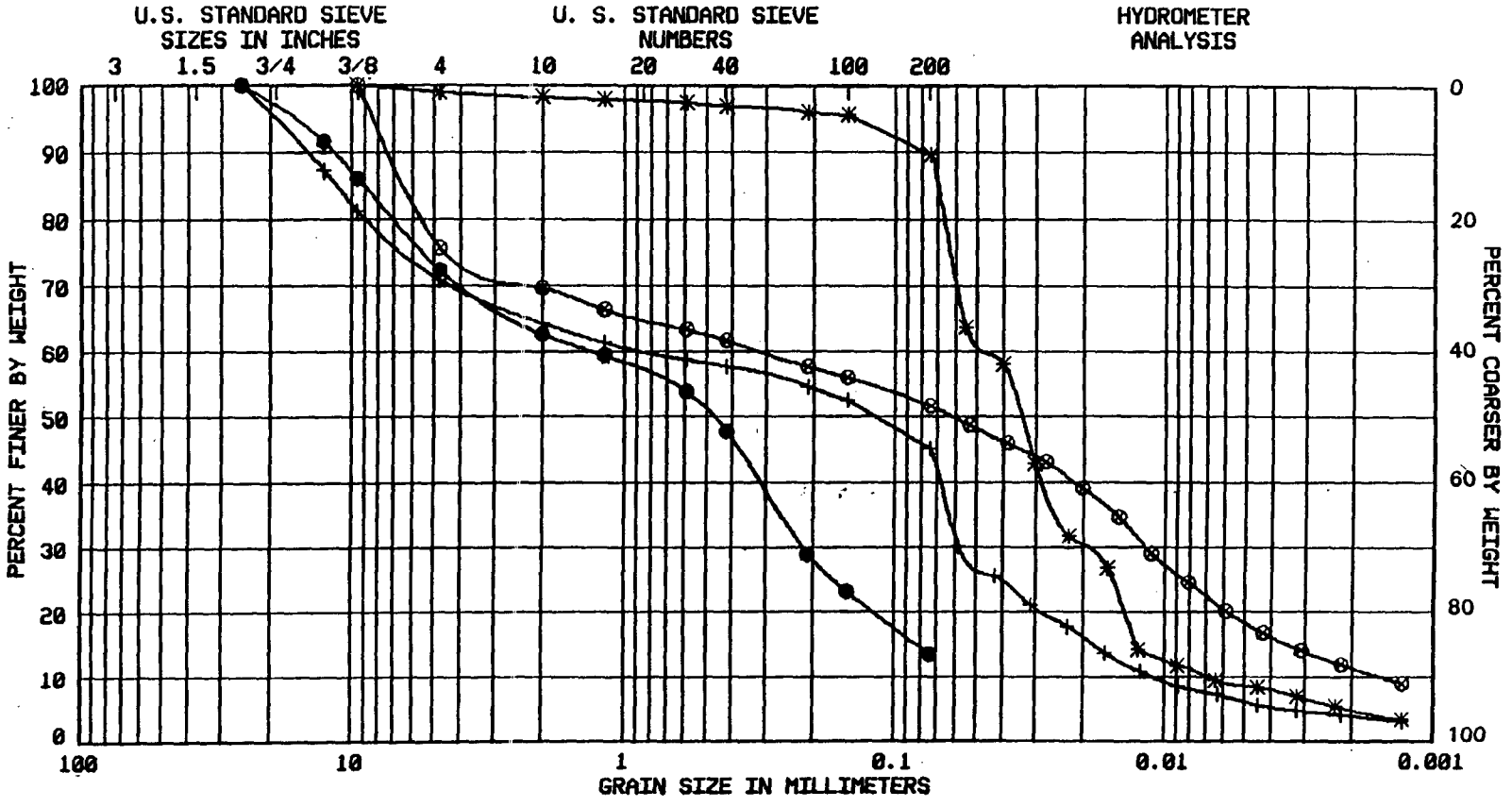
DENSITY
ASTM D 2166

Sample Identification	Depth	Unit Wet Weight (pcf)	Moisture Content (%)
B-11A	15.0'-16.0'	148.5	11.4
B-11A	19.0'-20.0'	143.9	12.3
B-13A	29.0'-30.0'	146.0	12.5
B-13A	37.0'-38.0'	155.0	7.1
B-14A	7.0'-8.0	154.8	9.6
B-14A	14.5'-15.4'	143.7	9.0
B-19	6.5'-7.3'	138.2	14.6
B-19	30.0'-31.0'	142.9	11.2
B-27	25.4'-26.3'	143.2	8.7

Fugro South, Inc.

Bill DeGroff
Geotechnical Laboratory Manager



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT.	CLASSIFICATION
●	B-10A	6.0	Silty Sand, brown w/gravel (SM)
+	B-10A	14.0	Sandy Lean Clay, tan w/gravel (CL)
✳	B-10A	24.0	Silty Lean Clay, brown (CL)
⊗	B-11A	15.0	Sandy Lean Clay, brown & olive gray w/gravel (CL)

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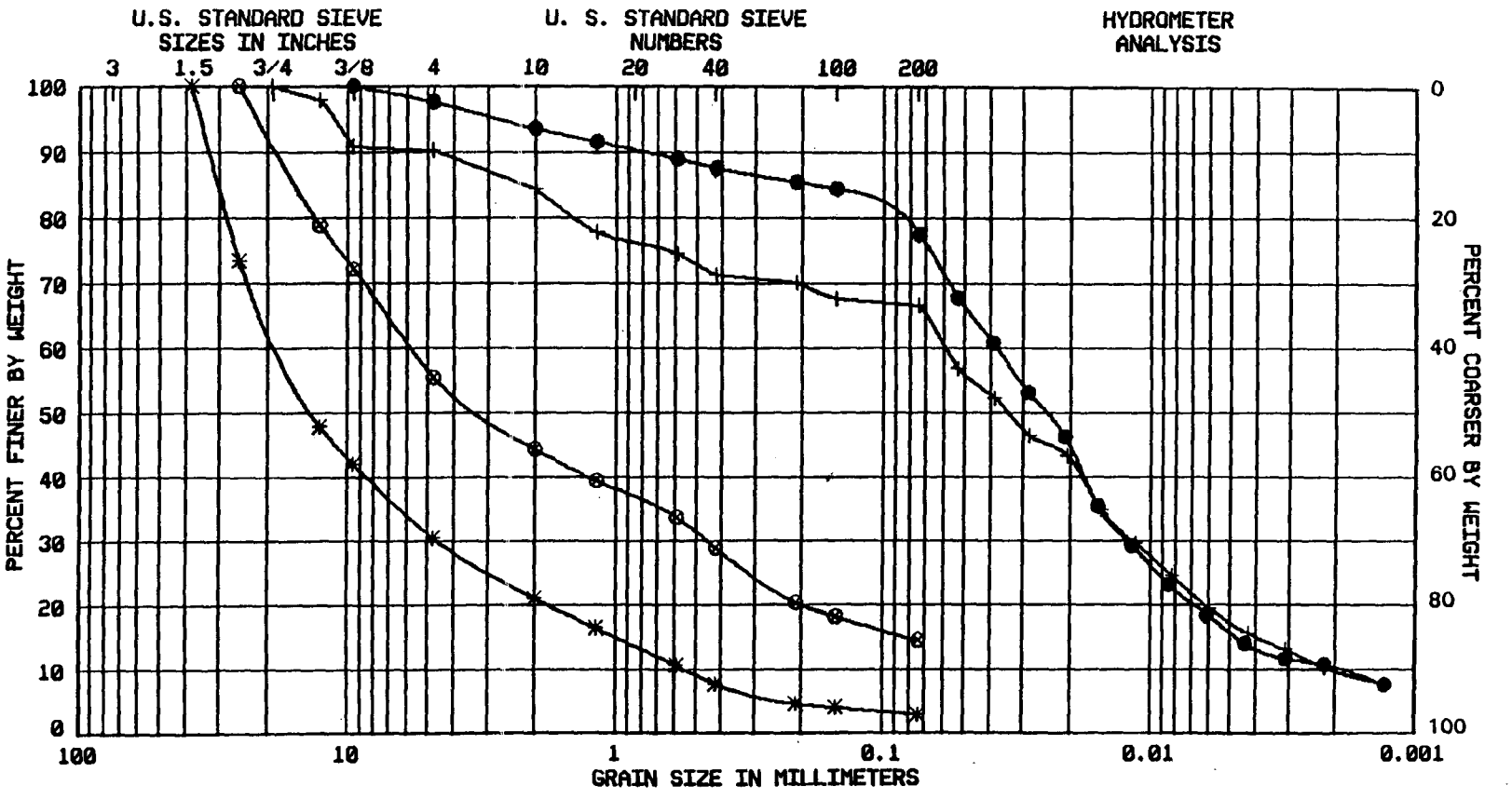
PLATE 1

GRAIN SIZE CURVES



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT.	CLASSIFICATION
●	B-11A	19.0	Silty Lean Clay, olive gray (CL)
+	B-13A	29.0	Sandy Lean Clay, olive gray (CL)
✳	B-13A	37.0	Well-Graded Gravel, olive gray w/sand (CW)
⊗	B-14A	7.0	Silty Sand red w/gravel & ferrous stains (SM)

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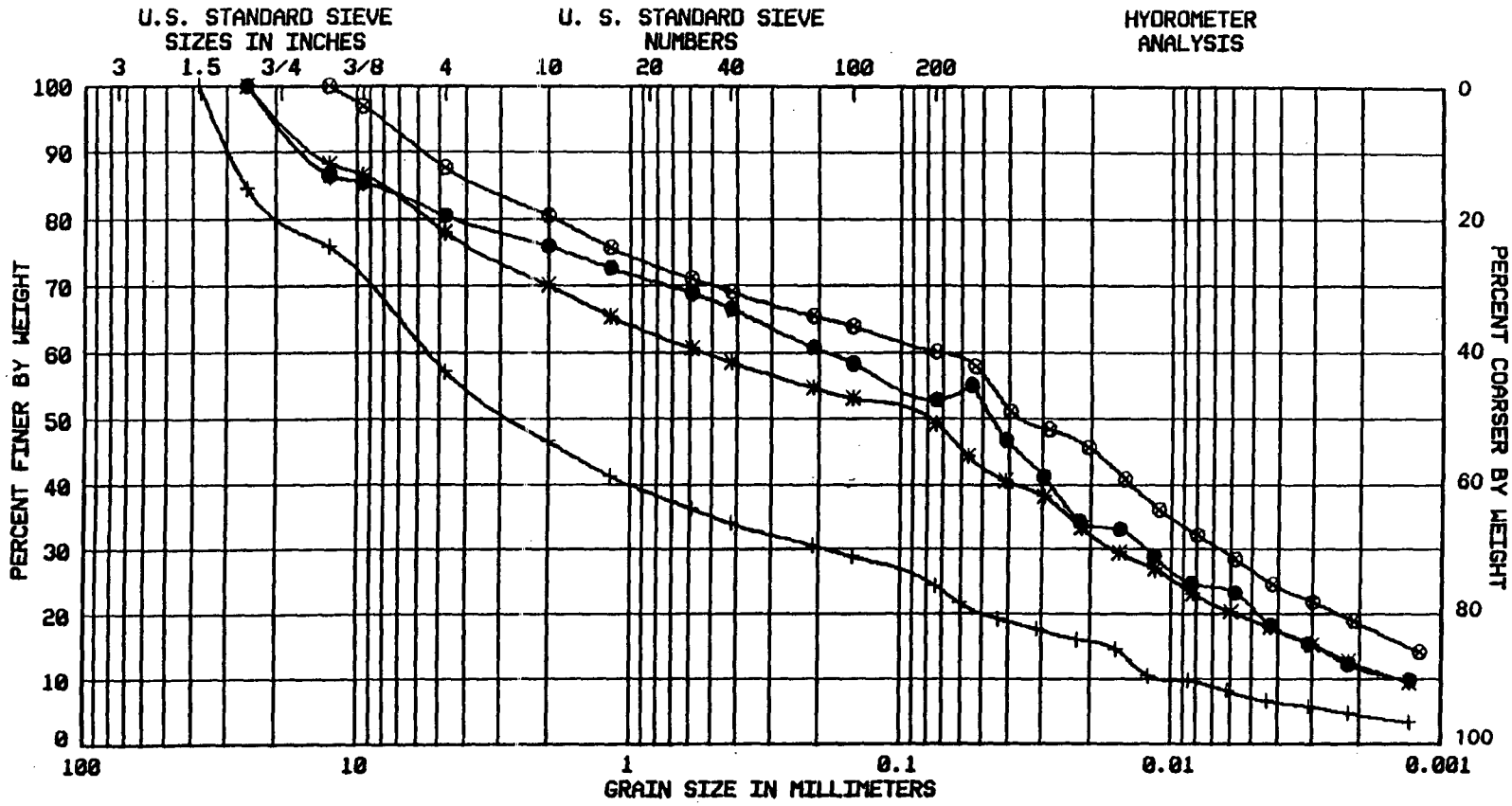
PLATE 2

GRAIN SIZE CURVES

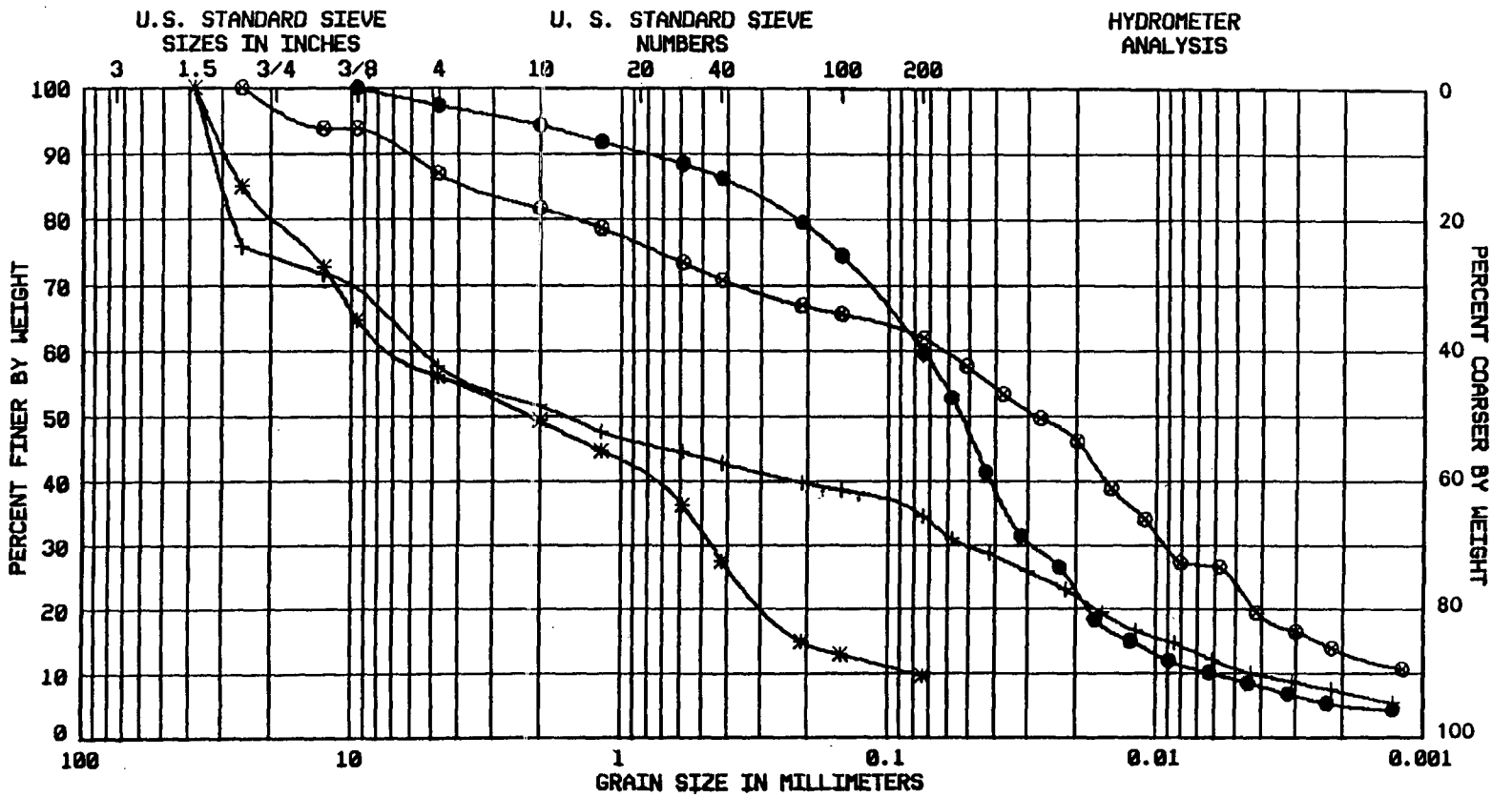


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT.	CLASSIFICATION
●	B-14A	9.5	Sandy Lean Clay, olive gray w/sand (CL)
+	B-14A	14.5	Silty Sand, olive gray w/gravel (SM)
✳	B-14A	21.2	Clayey Sand, olive gray (SC)
⊗	B-15A	15.0	Sandy Lean Clay, olive gray (CL)

PLATE 3

GRAIN SIZE CURVES

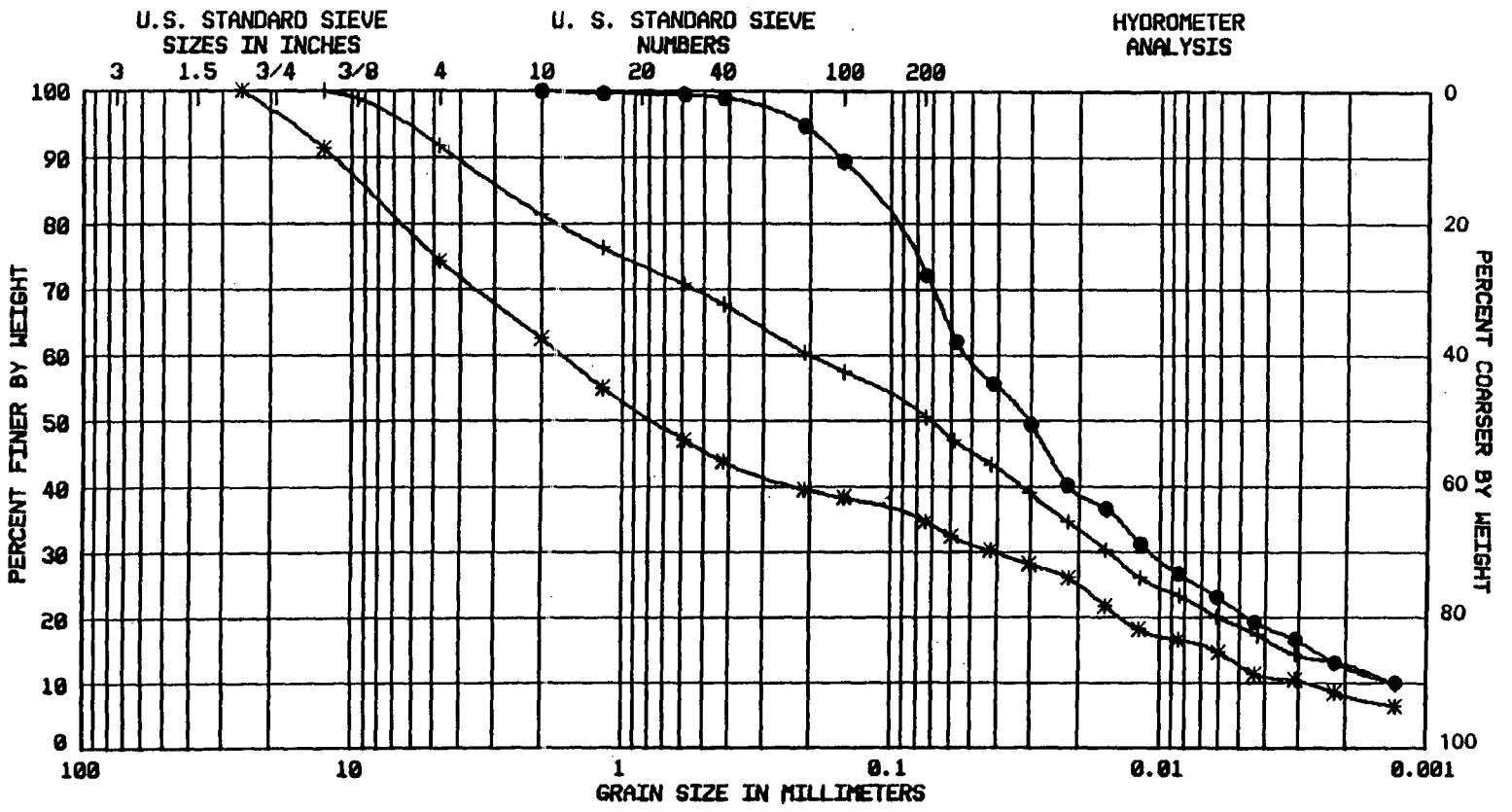


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT.	CLASSIFICATION
●	B-19	6.5	Sandy Silt, brown
+	B-19	30.0	Clayey Sand, olive gray w/gravel (SC)
✳	B-20	15.0	Well-Graded Sand, olive gray w/silt & gravel (SW & SM)
⊗	B-24	19.0	Lean Clay, olive gray w/sand (CL)

PLATE 4

GRAIN SIZE CURVES



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT.	CLASSIFICATION
●	B-27	4.6	Clayey Silt, olive gray
+	B-27	7.4	Silty Clay, brown & olive gray w/gravel
✳	B-27	25.4	Clayey Sand, brown w/gravel (SC)

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PLATE 5

GRAIN SIZE CURVES

Sample Identification	INDEX OR PHYSICAL PROPERTY TEST							USCS Group Symbol
	Liquid Limit, LL	Plasticity Index, PI	Passing No. 4 Sieve (%)	Passing No. 10 Sieve (%)	Passing No. 40 Sieve (%)	Passing No. 200 Sieve (%)	Finer 0.002 mm (%)	
RV1-SL-0102	36	12	88	82	72	50	9	CL
RV1-SL-0405	29	11	81	78	72	52	12	CL
RV1-SL-0910	23	6	70	52	23	8	7	SW-SC
RV1-SL-1213	20	5	81	75	64	46	10	SC-SM
RV1-SL-2122	Non - Plastic		31	26	18	12	–	GC-GM
RV1-SL-2526	26	9	73	68	58	48	12	SC-SM
RV1-SL-3132	26	9	77	71	61	50	13	CL
RV2-SL-0102	Non - Plastic		34	28	21	9	–	GP-GC
RV2-SL-0506	32	14	56	31	21	7	7	SP-SC
RV2-SL-0910	24	7	100	98	85	77	8	CL-ML
RV2-SL-1314	26	9	85	78	66	54	12	CL-ML
RV2-SL-2526	25	10	82	74	64	52	14	CL-ML
RV2-SL-3233	Non - Plastic		46	33	18	8		GP-GC

Sample Identification	Sample Description	Grain Size
RV1-SL-0102	Sandy lean clay, olive gray w/ gravel	Plate 8
RV1-SL-0405	Sandy lean clay, brown and olive gray w/ gravel and ferrous nodules	Plate 8
RV1-SL-0910	Well graded sand, olive gray w/ clay pockets and gravel	Plate 8
RV1-SL-1213	Silty, clayey sand, olive gray w/ gravel	Plate 8
RV1-SL-2122	Silty, clayey gravel, olive gray w/ sand	Plate 8
RV1-SL-2526	Clayey sand, olive gray w/ gravel	Plate 8
RV1-SL-3132	Sandy lean clay, olive gray w/ gravel	Plate 8
RV2-SL-0102	Poorly graded gravel, brown w/ silty clay and sand	Plate 9
RV2-SL-0506	Poorly graded sand, olive gray w/ clay and gravel	Plate 9
RV2-SL-0910	Sandy silty clay, olive gray	Plate 9
RV2-SL-1314	Sandy lean clay, olive gray w/ gravel	Plate 9
RV2-SL-2526	Sandy lean clay, olive gray w/ gravel	Plate 9
RV2-SL-3233	Poorly graded gravel, olive gray w/ silty clay and sand	Plate 9

SUMMARY OF SELECTED INDEX AND PHYSICAL PROPERTIES

PLATE 1

Sample Identification	INDEX OR PHYSICAL PROPERTY TEST							USCS Group Symbol
	Liquid Limit, LL	Plasticity Index, PI	Passing No. 4 Sieve (%)	Passing No. 10 Sieve (%)	Passing No. 40 Sieve (%)	Passing No. 200 Sieve (%)	Finer 0.002 mm (%)	
RV3-SL-0203	Non - Plastic		94	90	81	58	10	CL-ML
RV3-SL-0506	Non - Plastic		85	79	68	51	7	CL-ML
RV3-SL-0809	27	12	68	53	35	26	7	SC
RV3-SL-1314	24	9	81	75	65	51	13	CL-ML
RV3-SL-1920	Non - Plastic		48	37	22	14	–	GM
RV3-SL-2425	27	10	81	74	64	55	14	CL-ML
RV3-SL-2627	27	9	87	81	66	57	13	CL-ML
RV4-SL-0102	24	8	94	89	80	54	12	CL
RV4-SL-0506	29	9	88	83	72	55	13	CL
RV4-SL-1415	Non - Plastic		64	59	53	35	6	SC
RV4-SL-1617	Non - Plastic		68	62	52	43	11	SC-SM
RV4-SL-1819	26	6	89	79	66	56	6	CL
RV4-SL-2829	Non - Plastic		42	30	14	5	–	GW-GM

Sample Identification	Sample Description	Grain Size
RV3-SL-0203	Sandy silty clay, olive gray w/ gravel	Plate 10
RV3-SL-0506	Sandy silty clay, olive gray w/ gravel	Plate 10
RV3-SL-0809	Clayey sand, olive gray w/ gravel	Plate 10
RV3-SL-1314	Sandy lean clay, olive gray w/ gravel	Plate 10
RV3-SL-1920	Silty gravel, brown w/ sand	Plate 10
RV3-SL-2425	Sandy lean clay, olive gray w/ gravel	Plate 10
RV3-SL-2627	Sandy lean clay, olive gray w/ gravel	Plate 10
RV4-SL-0102	Sandy lean clay, brown	Plate 11
RV4-SL-0506	Sandy lean clay, brown	Plate 11
RV4-SL-1415	Clayey sand, brown w/ gravel	Plate 11
RV4-SL-1617	Silty, clayey sand, olive gray w/ gravel	Plate 11
RV4-SL-1819	Gravelly lean clay, brown w/ sand	Plate 11
RV4-SL-2829	Well graded gravel, brown w/ clay and sand	Plate 11

SUMMARY OF SELECTED INDEX AND PHYSICAL PROPERTIES

PLATE 2

Sample Identification	INDEX OR PHYSICAL PROPERTY TEST							USCS Group Symbol
	Liquid Limit, LL	Plasticity Index, PI	Passing No. 4 Sieve (%)	Passing No. 10 Sieve (%)	Passing No. 40 Sieve (%)	Passing No. 200 Sieve (%)	Finer 0.002 mm (%)	
RV5-SL-0203	26	7	90	88	83	49	10	CL-ML
RV5-SL-0809	28	12	85	78	68	56	15	CL
RV5-SL-1617	Non - Plastic		38	24	10	6	–	GW-GC
RV5-SL-1718	25	9	88	73	62	54	14	CL
RV6-SL-0102	Non - Plastic		46	36	21	11	–	GW-GM
RV6-SL-0506	Non - Plastic		92	91	88	71	4	CL-ML
RV6-SL-1112	23	8	87	80	68	51	11	CL
RV6-SL-1213	22	7	81	74	64	48	10	SC-SM
RV6-SL-2021	Non - Plastic		100	99	98	76	5	CL-ML
RV6-SL-2122	27	9	73	64	53	45	10	SC

Sample Identification	Sample Description	Grain Size
RV5-SL-0203	Sandy silty clay, red	Plate 12
RV5-SL-0809	Sandy lean clay, gray	Plate 12
RV5-SL-1617	Well graded gravel, olive gray w/ clay and sand	Plate 12
RV5-SL-1718	Sandy lean clay, gray	Plate 12
RV6-SL-0102	Well graded gravel, brown w/ silt and sand	Plate 13
RV6-SL-0506	Sandy silty clay, brown	Plate 13
RV6-SL-1112	Sandy lean clay, gray	Plate 13
RV6-SL-1213	Silty, clayey sand, gray w/ gravel	Plate 13
RV6-SL-2021	Sandy silty clay, brown	Plate 13
RV6-SL-2122	Clayey sand w/ gravel, olive gray	Plate 13

SUMMARY OF SELECTED INDEX AND PHYSICAL PROPERTIES

PLATE 3

Sample Identification	INDEX OR PHYSICAL PROPERTY TEST							USCS Group Symbol
	Liquid Limit, LL	Plasticity Index, PI	Passing No. 4 Sieve (%)	Passing No. 10 Sieve (%)	Passing No. 40 Sieve (%)	Passing No. 200 Sieve (%)	Finer 0.002 mm (%)	
RV7-SL-0102	33	15	100	100	100	99	18	CL
RV7-SL-0910	Non - Plastic		97	96	94	61	4	CL
RV7-SL-1314	23	7	83	74	63	48	10	SC-SM
RV7-SL-1718	25	11	85	79	70	55	14	CL
RV7-SL-2425	25	8	58	45	30	23	4	SC-SM
RV8-SL-0203	29	8	96	92	85	52	9	CL
RV8-SL-0910	Non - Plastic		81	76	66	42	3	SM
RV8-SL-1213	Non - Plastic		82	71	57	40	5	SC-SM
RV8-SL-1617	Non - Plastic		64	52	40	28	3	SC
RV8-SL-1819	26	10	100	100	100	96	21..2	CL

Sample Identification	Sample Description	Grain Size
RV7-SL-0102	Silty lean clay, red	Plate 14
RV7-SL-0910	Sandy lean clay, red	Plate 14
RV7-SL-1314	Silty, clayey sand, gray w/ gravel	Plate 14
RV7-SL-1718	Sandy lean clay, brown w/ gravel	Plate 14
RV7-SL-2425	Clayey sand, olive gray w/ gravel	Plate 14
RV8-SL-0203	Sandy lean clay, red	Plate 15
RV8-SL-0910	Silty sand, red w/ gravel	Plate 15
RV8-SL-1213	Silty, clayey sand, brown w/ gravel	Plate 15
RV8-SL-1617	Clayey sand, gray w/ gravel	Plate 15
RV8-SL-1819	Sandy lean clay, olive gray	Plate 15

SUMMARY OF SELECTED INDEX AND PHYSICAL PROPERTIES

PLATE 4

Sample Identification	INDEX OR PHYSICAL PROPERTY TEST							USCS Group Symbol
	Liquid Limit, LL	Plasticity Index, PI	Passing No. 4 Sieve (%)	Passing No. 10 Sieve (%)	Passing No. 40 Sieve (%)	Passing No. 200 Sieve (%)	Finer 0.002 mm (%)	
RV9-SL-0203	28	8	100	100	99	68	12	CL
RV9-SL-0607	Non - Plastic		96	96	94	21	4	SC-SM
RV9-SL-1213	Non - Plastic		70	56	38	22	3	SC-SM
RV9-SL-1516	32	12	100	100	99	97	30	CL
RV10-SL-0102	32	10	100	99	94	59	13	CL
RV10-SL-0708	Non - Plastic		100	99	88	13	2	SC-SM
RV10-SL-1617	21	3	97	94	91	62	8	CL

Sample Identification	Sample Description	Grain Size
RV9-SL-0203	Sandy lean clay, brown	Plate 16
RV9-SL-0607	Silty, clayey sand, red	Plate 16
RV9-SL-1213	Silty, clayey sand, red w/ gravel	Plate 16
RV9-SL-1516	Sandy lean clay, red	Plate 16
RV10-SL-0102	Sandy lean clay, red	Plate 17
RV10-SL-0708	Silty, clayey sand, red	Plate 17
RV10-SL-1617	Sandy lean clay, red	Plate 17

SUMMARY OF SELECTED INDEX AND PHYSICAL PROPERTIES

PLATE 5

Sample Identification	INDEX OR PHYSICAL PROPERTY TEST							USCS Group Symbol
	Liquid Limit, LL	Plasticity Index, PI	Passing No. 4 Sieve (%)	Passing No. 10 Sieve (%)	Passing No. 40 Sieve (%)	Passing No. 200 Sieve (%)	Finer 0.002 mm (%)	
RV11-SL-0203	25	7	100	99	87	61	16	CL
RV11-SL-0405	24	6	94	90	82	41	10	SC-SM
RV11-SL-1011	Non - Plastic		99	98	98	92	7	CL
RV11-SL-1617	Non - Plastic		66	56	45	32	7	SC
RV11-SL-2223	23	8	87	81	70	54	11	CL
RV12-SL-0203	32	13	100	99	97	73	19	CL
RV12-SL-0506	Non - Plastic		97	95	93	50	6	CL
RV12-SL-0910	26	9	88	71	51	40	11	SC

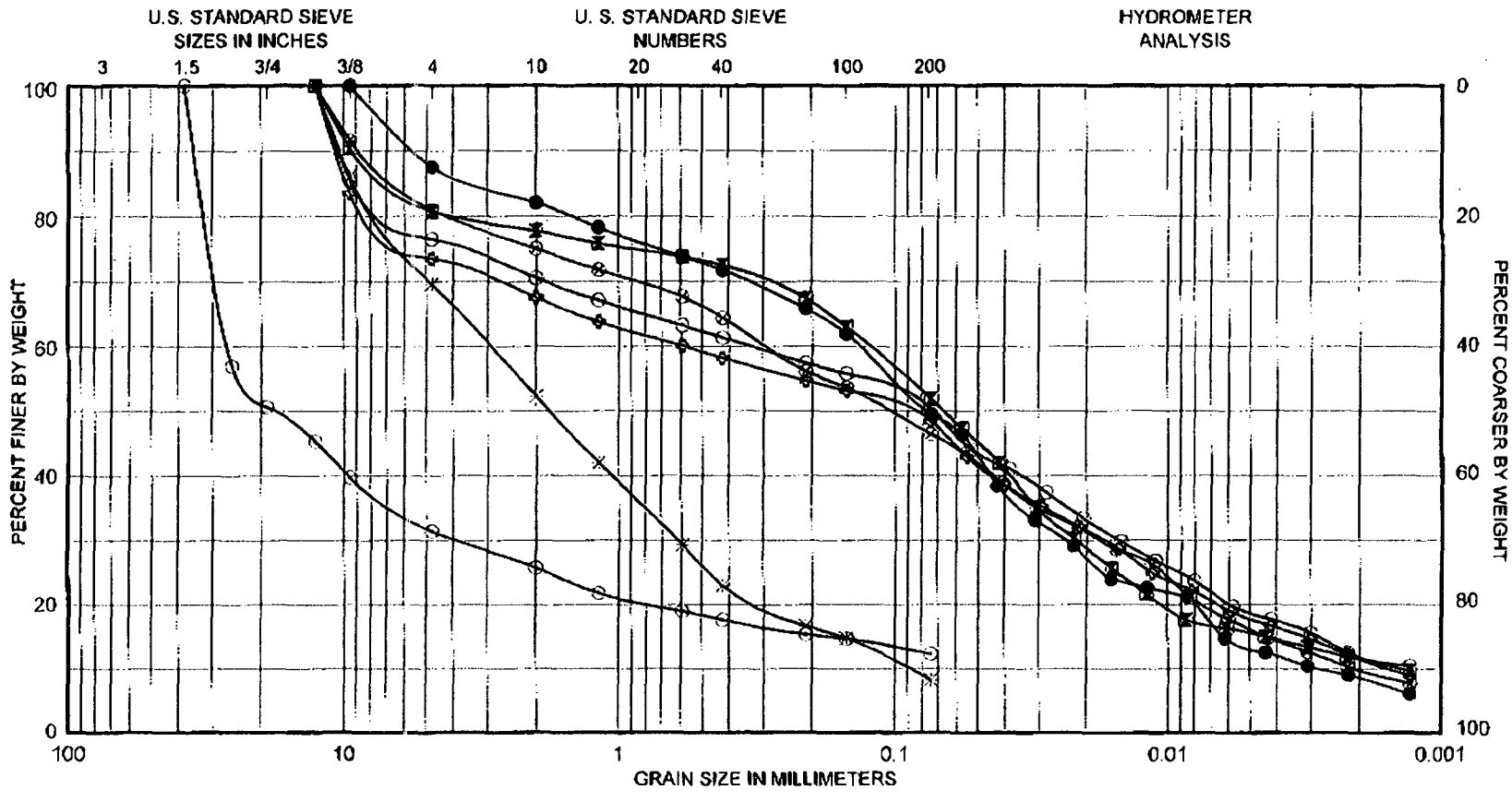
Sample Identification	Sample Description	Grain Size
RV11-SL-0203	Sandy lean clay, brown	Plate 18
RV11-SL-0405	Silty, clayey sand, red	Plate 18
RV11-SL-1011	Sandy lean clay, brown	Plate 18
RV11-SL-1617	Clayey sand, olive gray w/ gravel	Plate 18
RV11-SL-2223	Sandy lean clay, olive gray	Plate 18
RV12-SL-0203	Sandy lean clay, olive gray w/ organics	Plate 19
RV12-SL-0506	Sandy lean clay, brown	Plate 19
RV12-SL-0910	Clayey sand, gray	Plate 19

SUMMARY OF SELECTED INDEX AND PHYSICAL PROPERTIES

Sample Identification	INDEX OR PHYSICAL PROPERTY TEST							USCS Group Symbol
	Liquid Limit, LL	Plasticity Index, PI	Passing No. 4 Sieve (%)	Passing No. 10 Sieve (%)	Passing No. 40 Sieve (%)	Passing No. 200 Sieve (%)	Finer 0.002 mm (%)	
ENI1-SL-0102	26	8	100	99	96	71	15	CL
ENI1-SL-0809	23	8	83	76	64	50	13	CL
ENI1-SL-1920	23	8	85	80	69	52	12	CL
ENI1-SL-2425	25	7	89	80	61	49	10	SC-SM
ENI1-SL-2526	Non - Plastic		57	52	40	17	–	SC-SM
ENI1-SL-3031	24	7	83	75	62	50	10	CL

Sample Identification	Sample Description	Grain Size
ENI1-SL-0102	Sandy lean clay, red w/ ferrous stains	Plate 20
ENI1-SL-0809	Sandy lean clay, gray w/ gravel	Plate 20
ENI1-SL-1920	Sandy lean clay, gray w/ gravel	Plate 20
ENI1-SL-2425	Silty, clayey sand, brown	Plate 20
ENI1-SL-2526	Silty, clayey sand, brown w/ gravel	Plate 20
ENI1-SL-3031	Sandy lean clay, gray w/ gravel	Plate 20

SUMMARY OF SELECTED INDEX AND PHYSICAL PROPERTIES

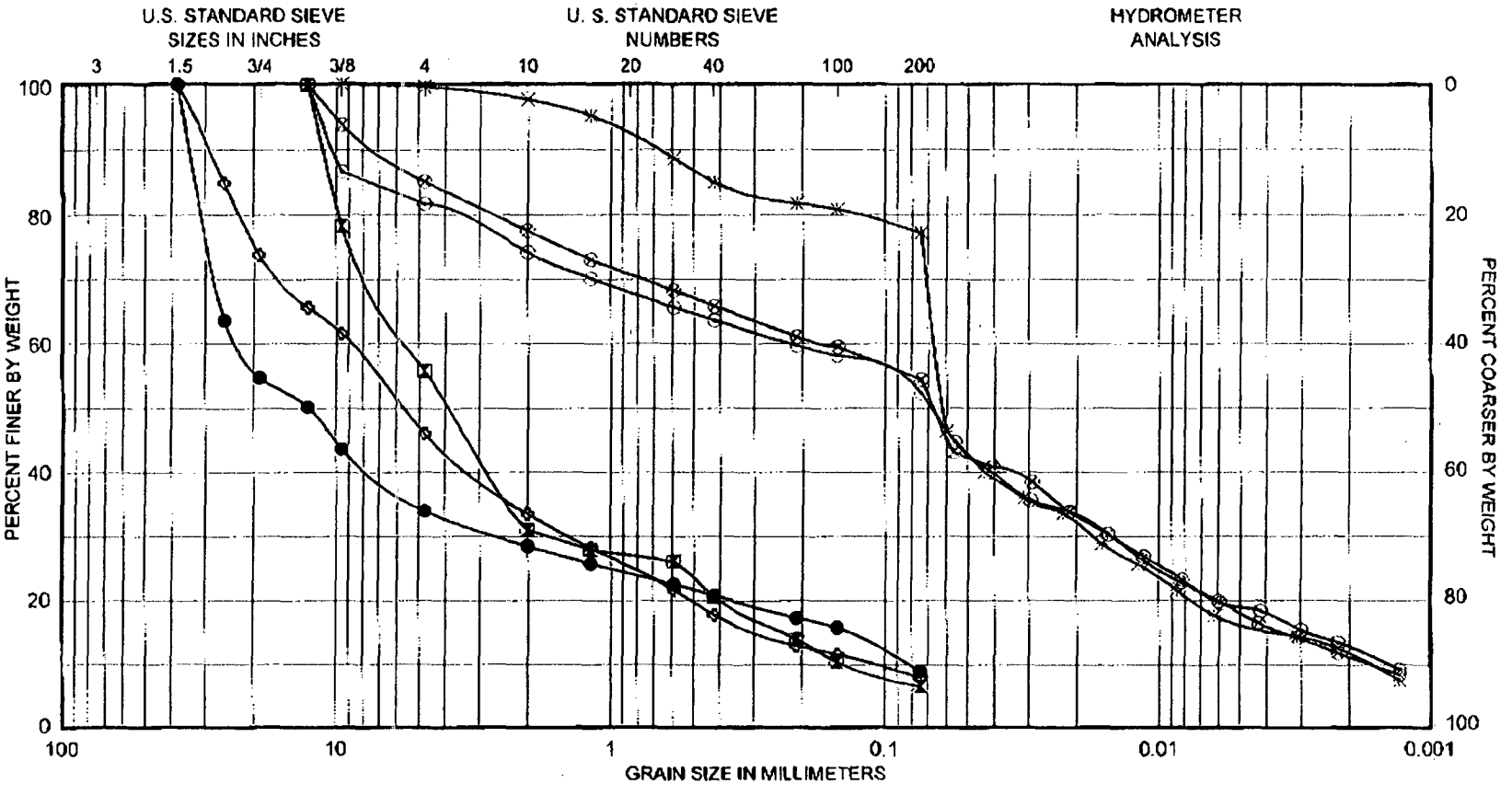


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT.	CLASSIFICATION
●	RV1-SL	102.0	Please See Plate 1 for Classification
⊠	RV1-SL	405.0	Please See Plate 1 for Classification
✳	RV1-SL	910.0	Please See Plate 1 for Classification
⊗	RV1-SL	1213.0	Please See Plate 1 for Classification
⊙	RV1-SL	2122.0	Please See Plate 1 for Classification
◇	RV1-SL	2526.0	Please See Plate 1 for Classification
○	RV1-SL	3132.0	Please See Plate 1 for Classification

GRAIN SIZE CURVES

PLATE 8

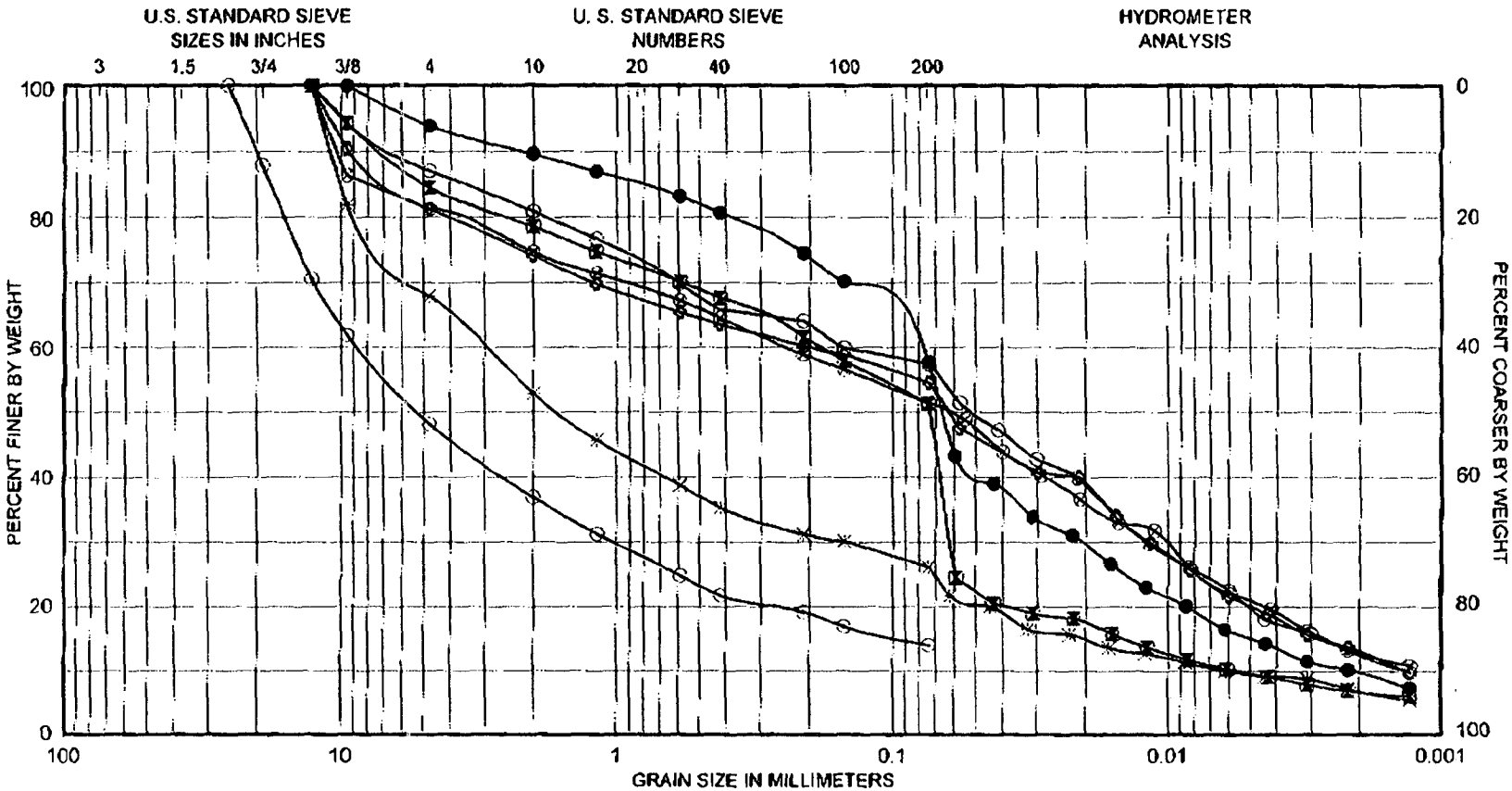


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT.	CLASSIFICATION
●	RV2-SL	102.0	Please See Plate 1 for Classification
⊠	RV2-SL	506.0	Please See Plate 1 for Classification
✳	RV2-SL	910.0	Please See Plate 1 for Classification
⊗	RV2-SL	1314.0	Please See Plate 1 for Classification
⊙	RV2-SL	2526.0	Please See Plate 1 for Classification
◇	RV2-SL	3233.0	Please See Plate 1 for Classification

GRAIN SIZE CURVES

PLATE 9

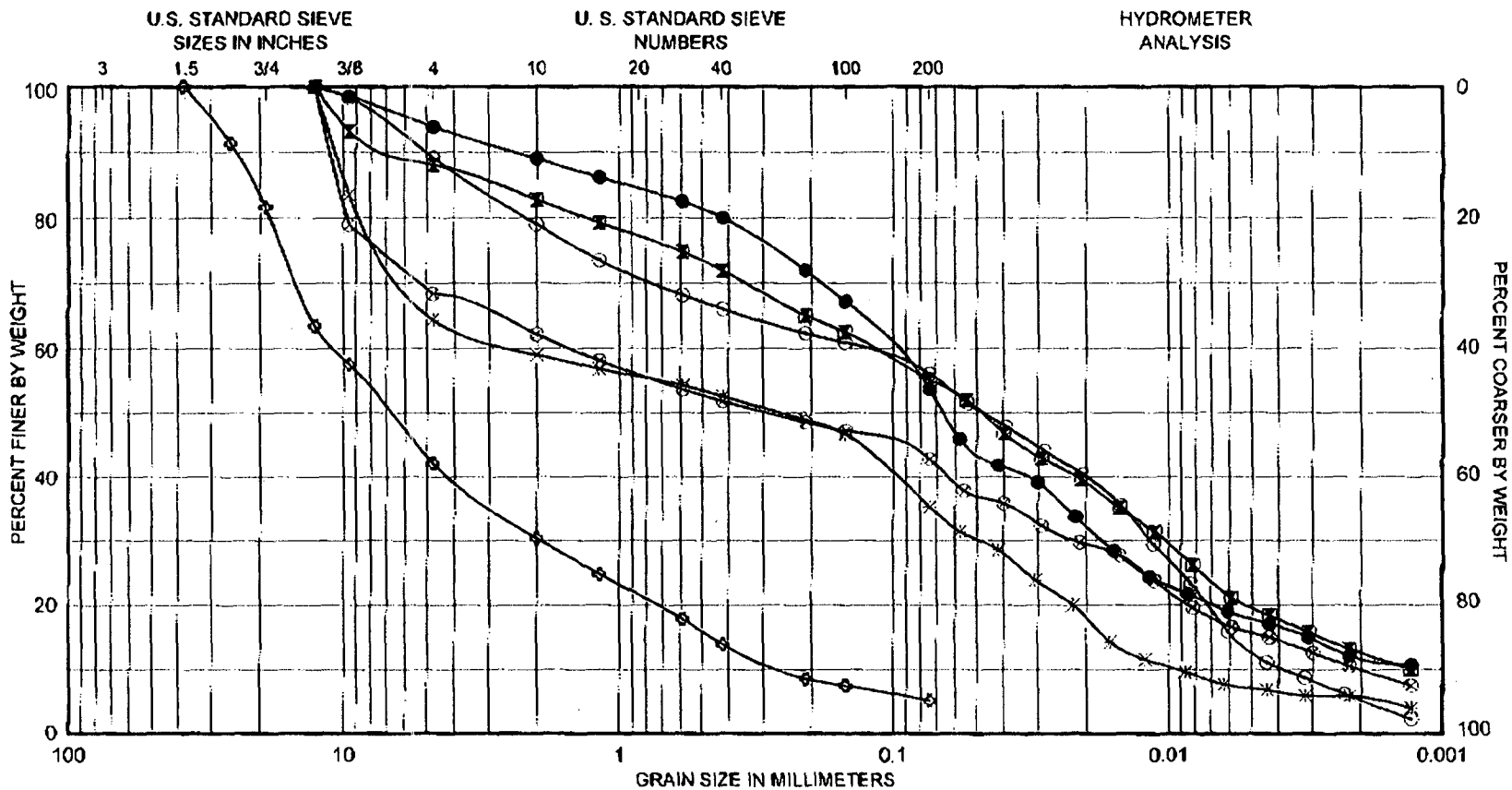


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT.	CLASSIFICATION
●	RV3-SL	203.0	Please See Plate 2 for Classification
⊠	RV3-SL	506.0	Please See Plate 2 for Classification
✳	RV3-SL	809.0	Please See Plate 2 for Classification
⊗	RV3-SL	1314.0	Please See Plate 2 for Classification
⊙	RV3-SL	1920.0	Please See Plate 2 for Classification
○	RV3-SL	2425.0	Please See Plate 2 for Classification
○	RV3-SL	2627.0	Please See Plate 2 for Classification

GRAIN SIZE CURVES

PLATE 10

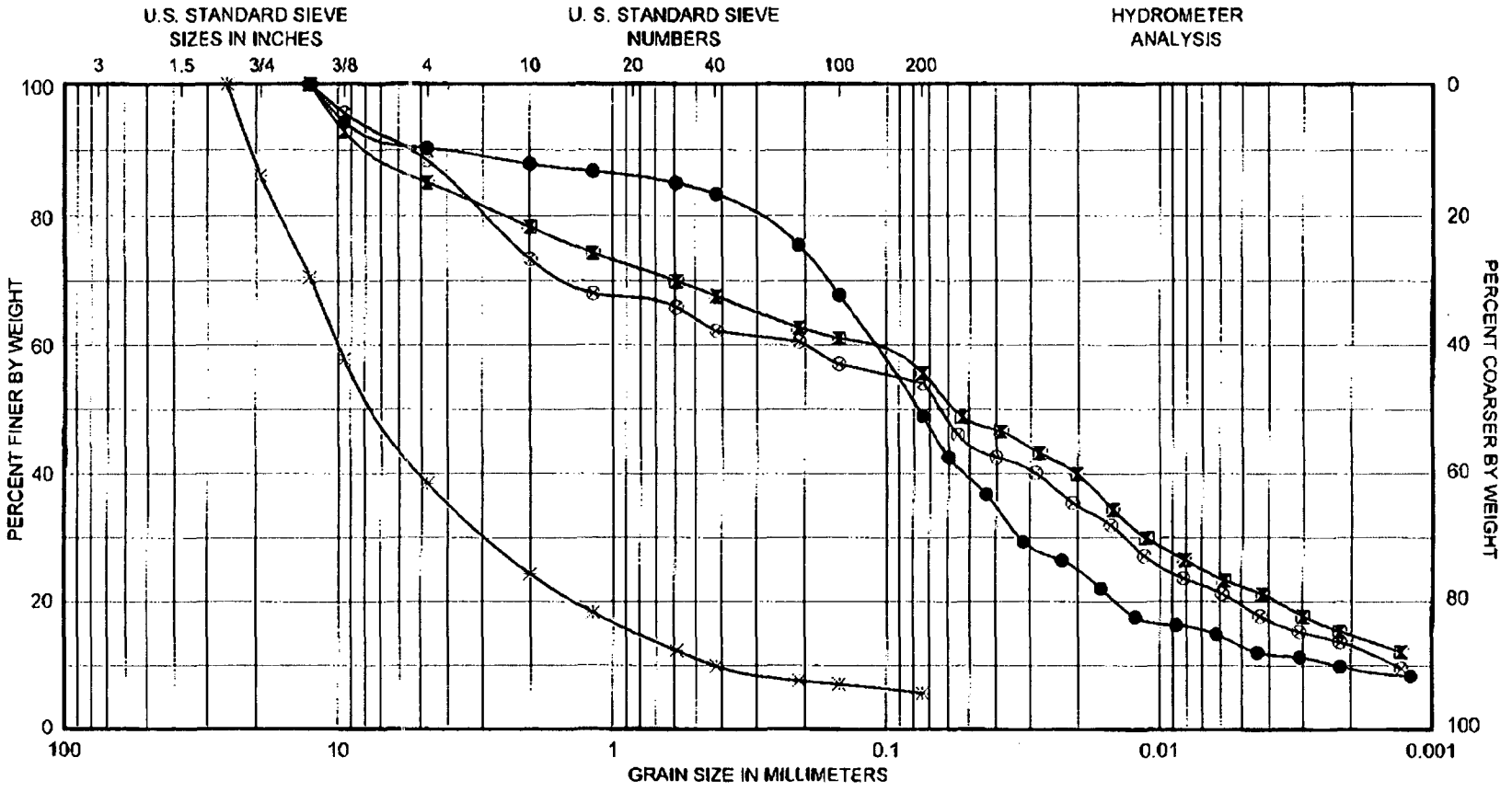


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT.	CLASSIFICATION
●	RV4-SL	102.0	Please See Plate 2 for Classification
⊠	RV4-SL	506.0	Please See Plate 2 for Classification
✳	RV4-SL	1415.0	Please See Plate 2 for Classification
⊗	RV4-SL	1617.0	Please See Plate 2 for Classification
⊙	RV4-SL	1819.0	Please See Plate 2 for Classification
✿	RV4-SL	2829.0	Please See Plate 2 for Classification

GRAIN SIZE CURVES

PLATE 11

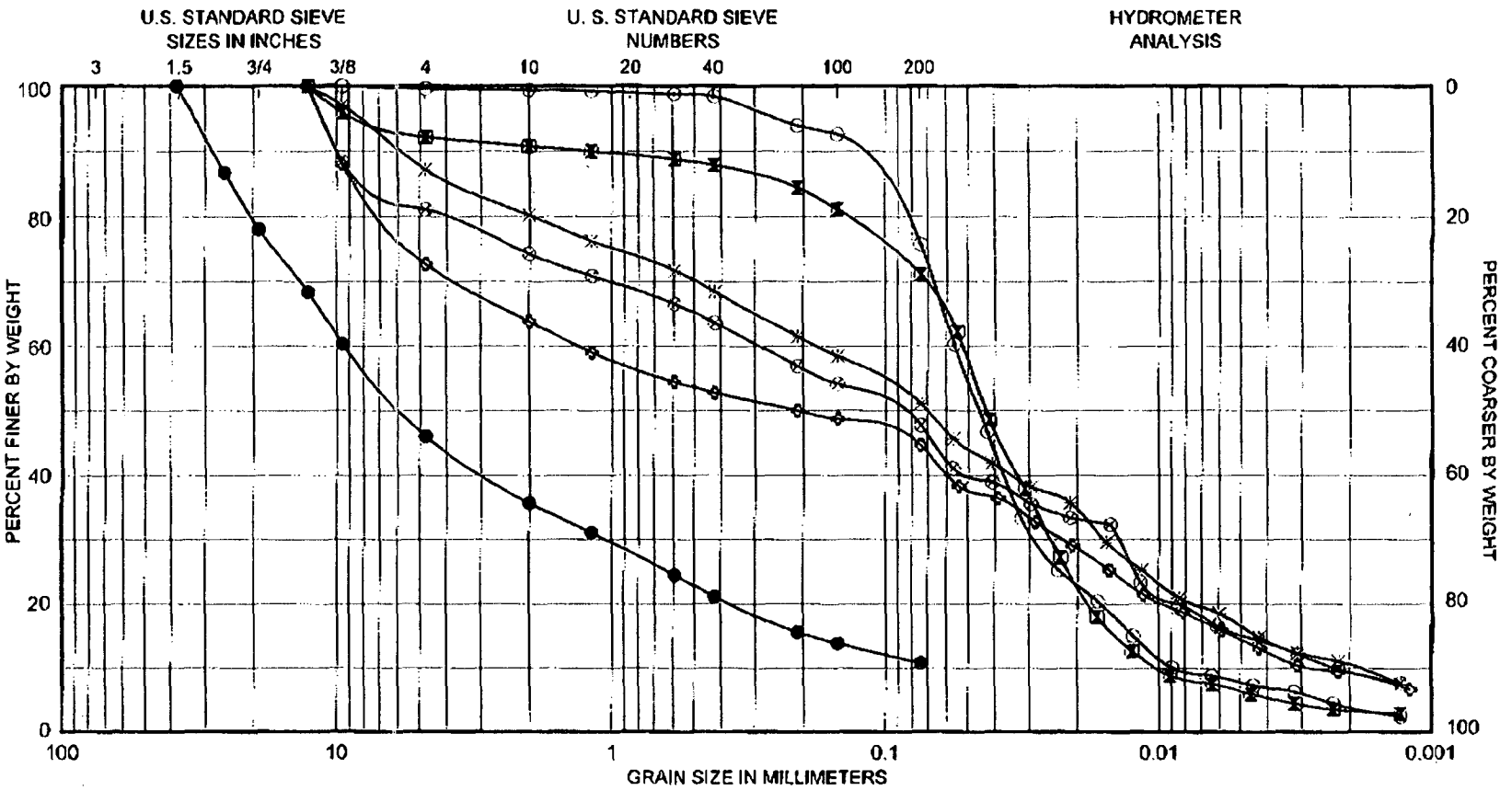


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT.	CLASSIFICATION
●	RV5-SL	203.0	Please See Plate 3 for Classification
⊠	RV5-SL	809.0	Please See Plate 3 for Classification
✳	RV5-SL	1617.0	Please See Plate 3 for Classification
⊗	RV5-SL	1718.0	Please See Plate 3 for Classification

PLATE 12

GRAIN SIZE CURVES

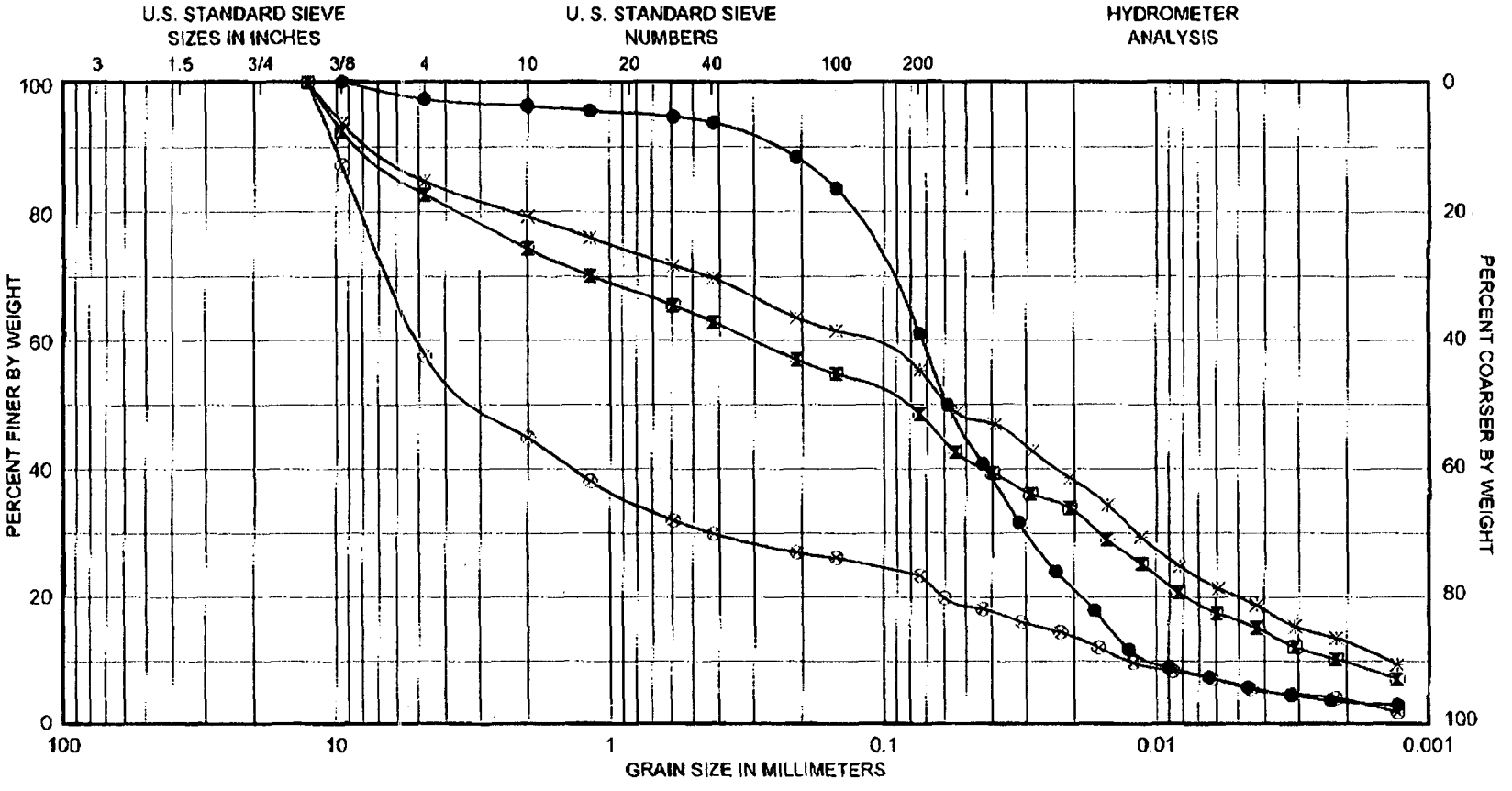


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT.	CLASSIFICATION
●	RV6-SL	102.0	Please See Plate 3 for Classification
⊠	RV6-SL	506.0	Please See Plate 3 for Classification
✳	RV6-SL	1112.0	Please See Plate 3 for Classification
⊗	RV6-SL	1213.0	Please See Plate 3 for Classification
⊙	RV6-SL	2021.0	Please See Plate 3 for Classification
✪	RV6-SL	2122.0	Please See Plate 3 for Classification

GRAIN SIZE CURVES

PLATE 13

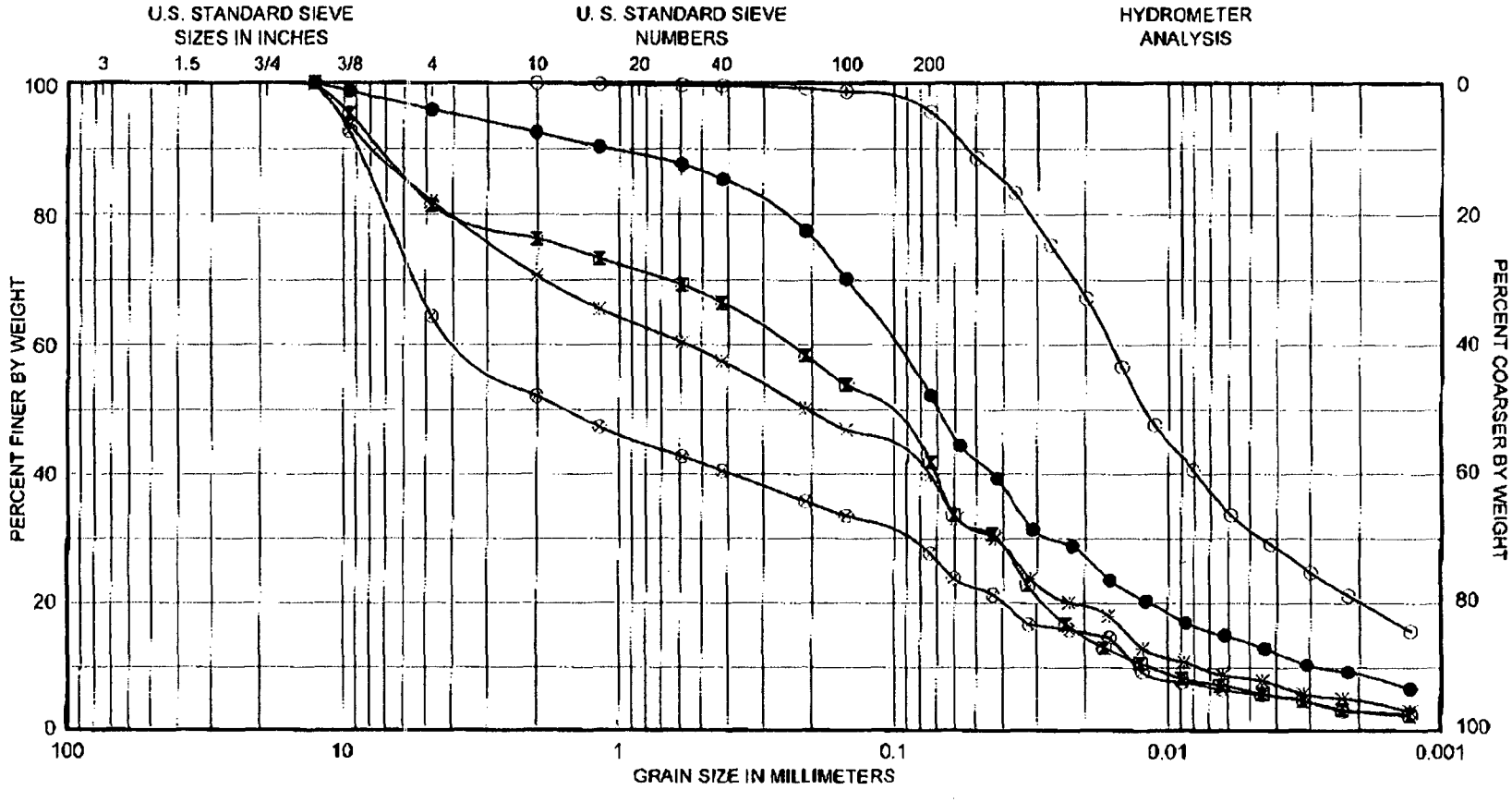


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT.	CLASSIFICATION
●	RV7-SL	910.0	Please See Plate 4 for Classification
⧗	RV7-SL	1314.0	Please See Plate 4 for Classification
✳	RV7-SL	1718.0	Please See Plate 4 for Classification
⊗	RV7-SL	2425.0	Please See Plate 4 for Classification

PLATE 14

GRAIN SIZE CURVES

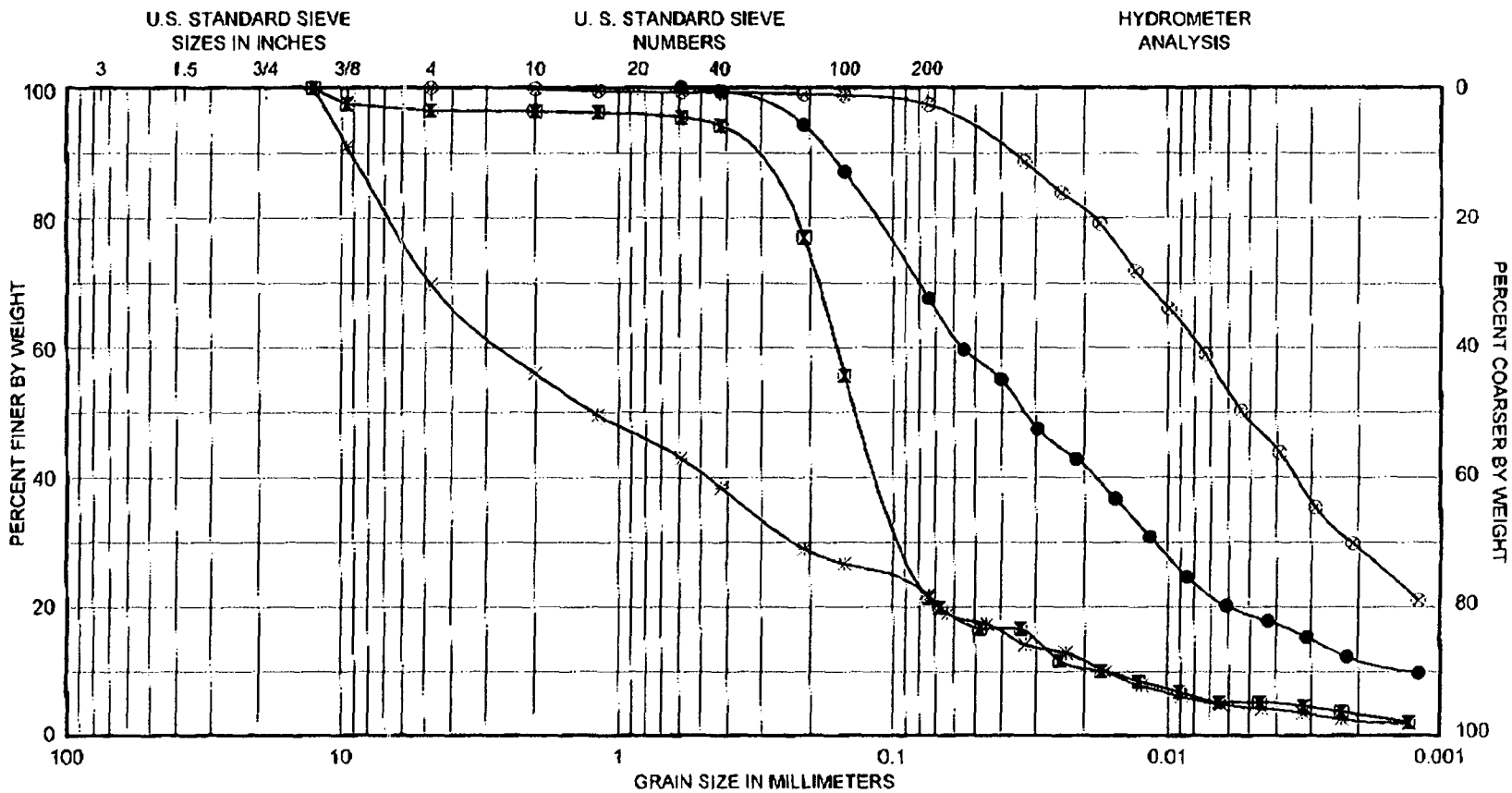


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT.	CLASSIFICATION
●	RV8-SL	203.0	Please See Plate 4 for Classification
⊠	RV8-SL	910.0	Please See Plate 4 for Classification
✳	RV8-SL	1213.0	Please See Plate 4 for Classification
⊗	RV8-SL	1617.0	Please See Plate 4 for Classification
⊙	RV8-SL	1819.0	Please See Plate 4 for Classification

PLATE 15

GRAIN SIZE CURVES

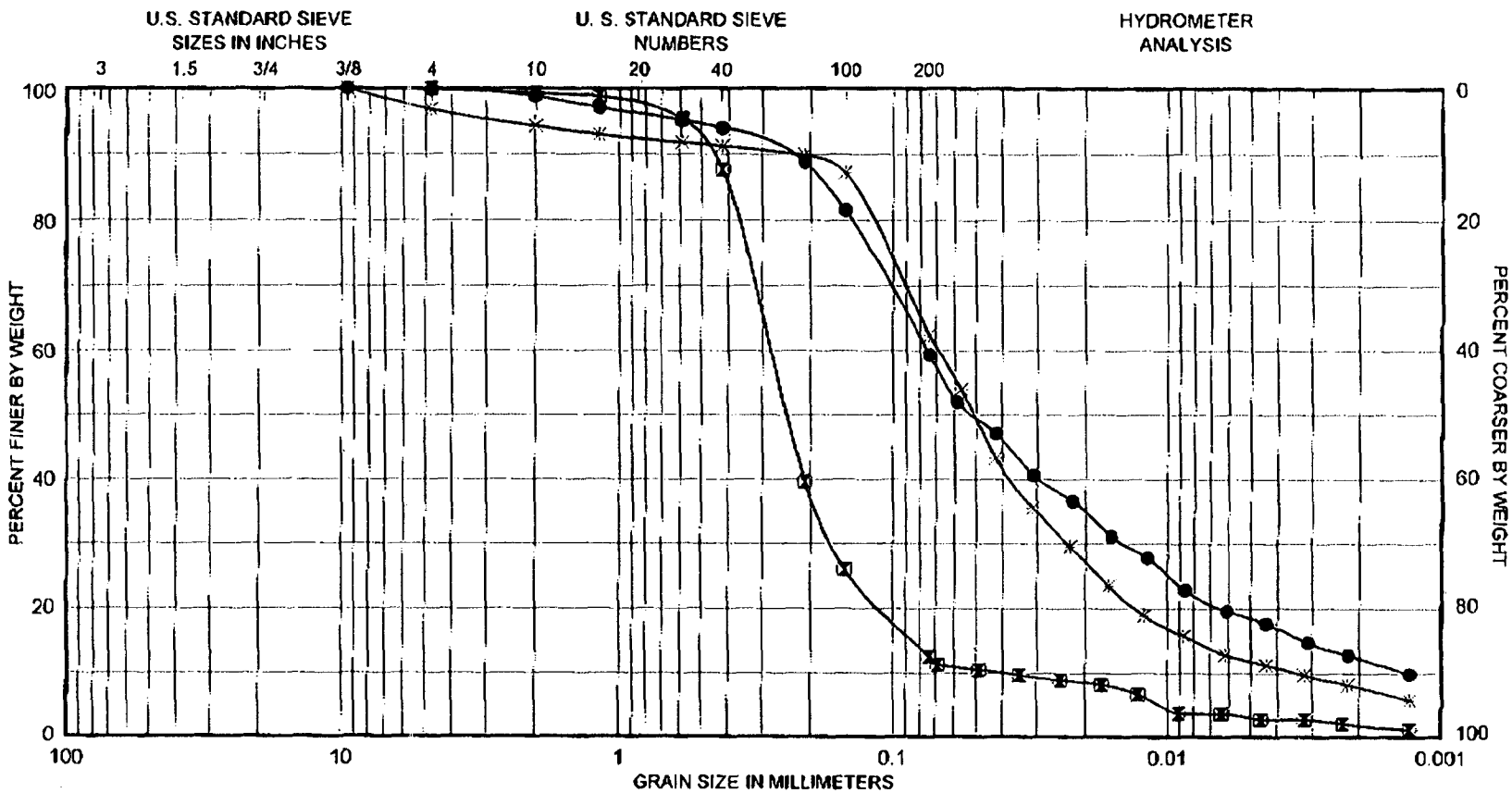


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT.	CLASSIFICATION
●	RV9-SL	203.0	Please See Plate 5 for Classification
⊠	RV9-SL	607.0	Please See Plate 5 for Classification
✳	RV9-SL	1213.0	Please See Plate 5 for Classification
※	RV9-SL	1516.0	Please See Plate 5 for Classification

PLATE 16

GRAIN SIZE CURVES

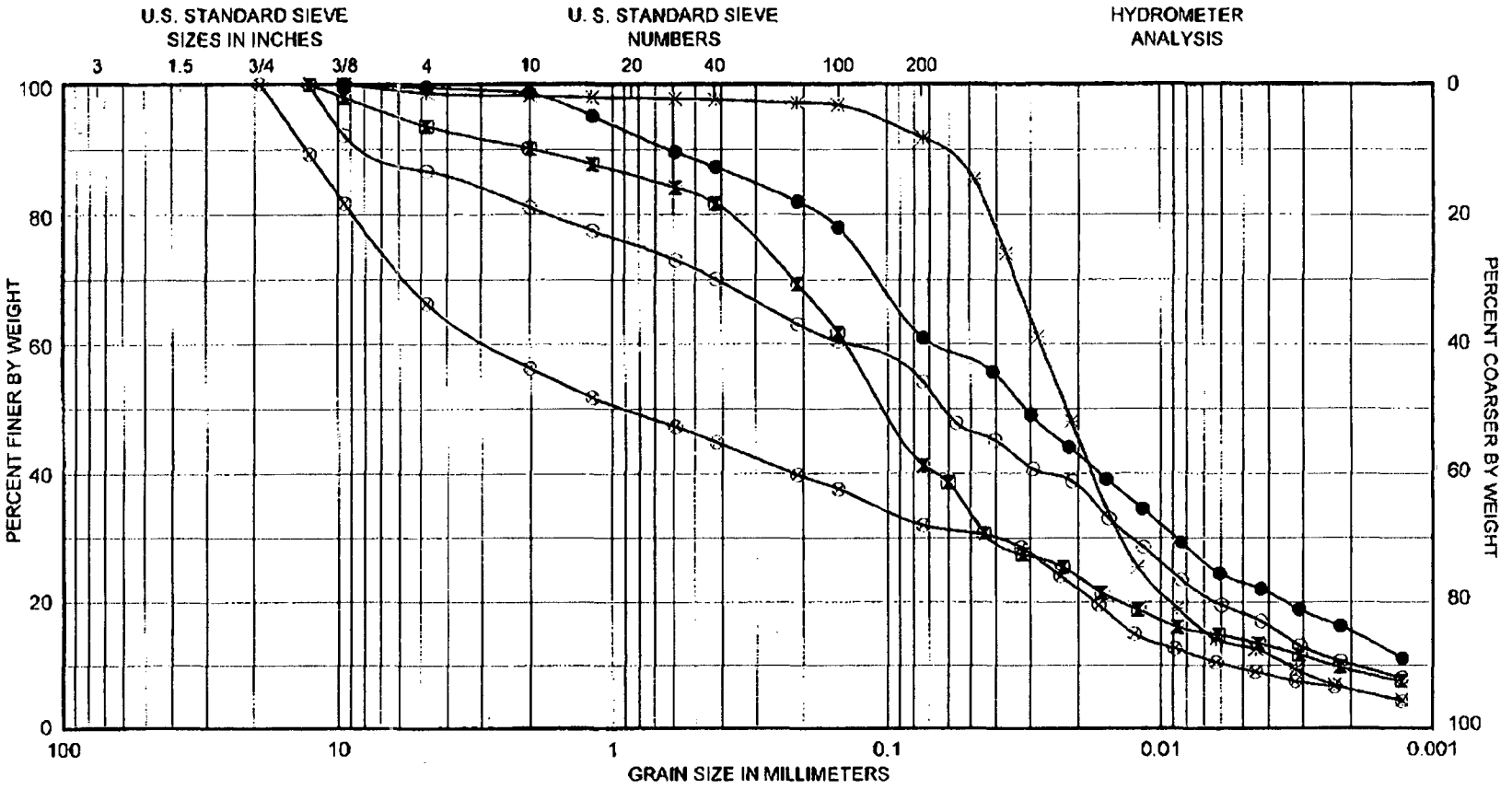


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT.	CLASSIFICATION
●	RV10-SL	102.0	Please See Plate 5 for Classification
⊠	RV10-SL	708.0	Please See Plate 5 for Classification
✳	RV10-SL	1617.0	Please See Plate 5 for Classification

PLATE 17

GRAIN SIZE CURVES

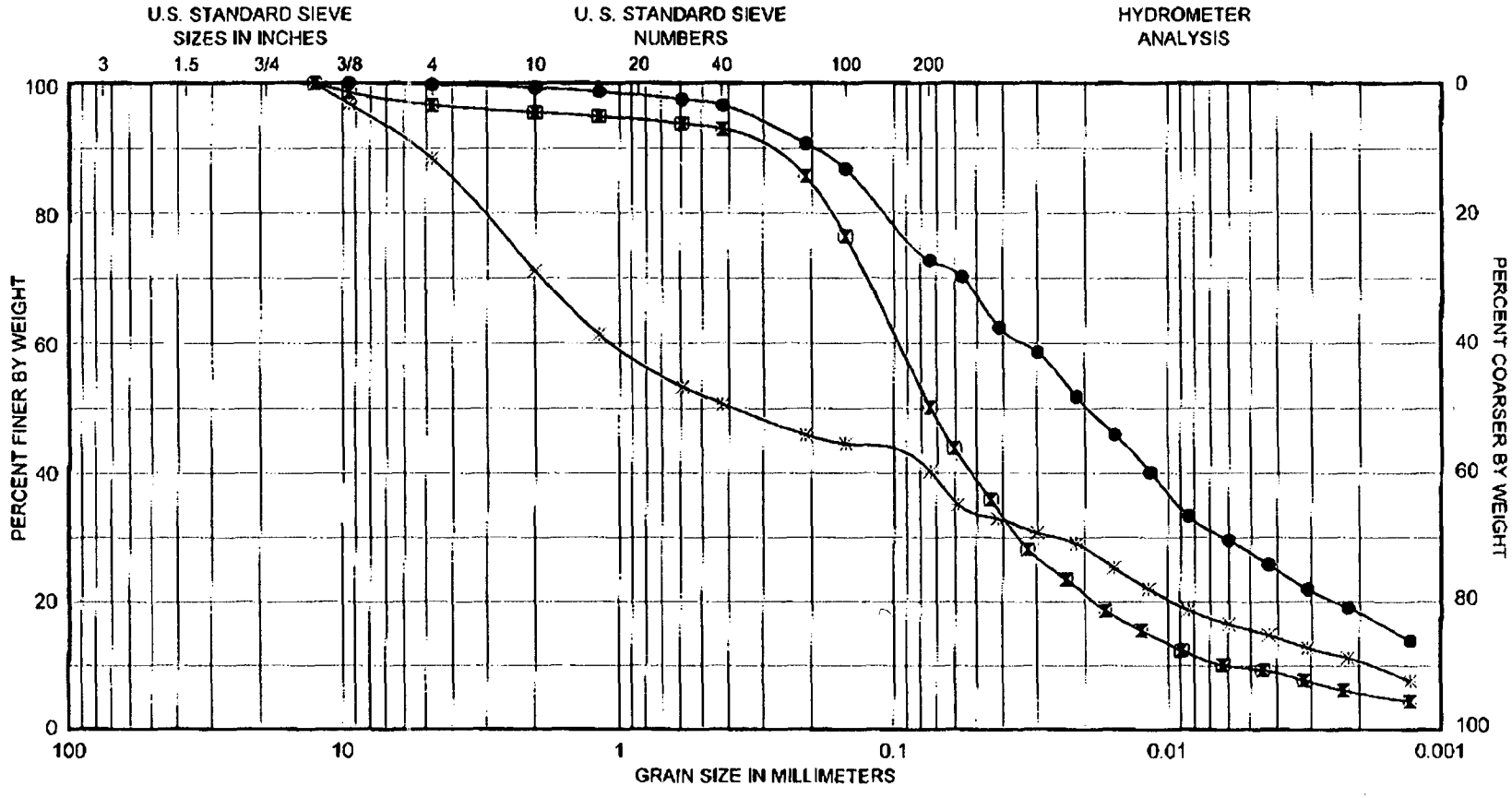


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT.	CLASSIFICATION
●	RV11-SL	203.0	Please See Plate 6 for Classification
⊠	RV11-SL	405.0	Please See Plate 6 for Classification
×	RV11-SL	1011.0	Please See Plate 6 for Classification
⊗	RV11-SL	1617.0	Please See Plate 6 for Classification
⊙	RV11-SL	2223.0	Please See Plate 6 for Classification

PLATE 18

GRAIN SIZE CURVES

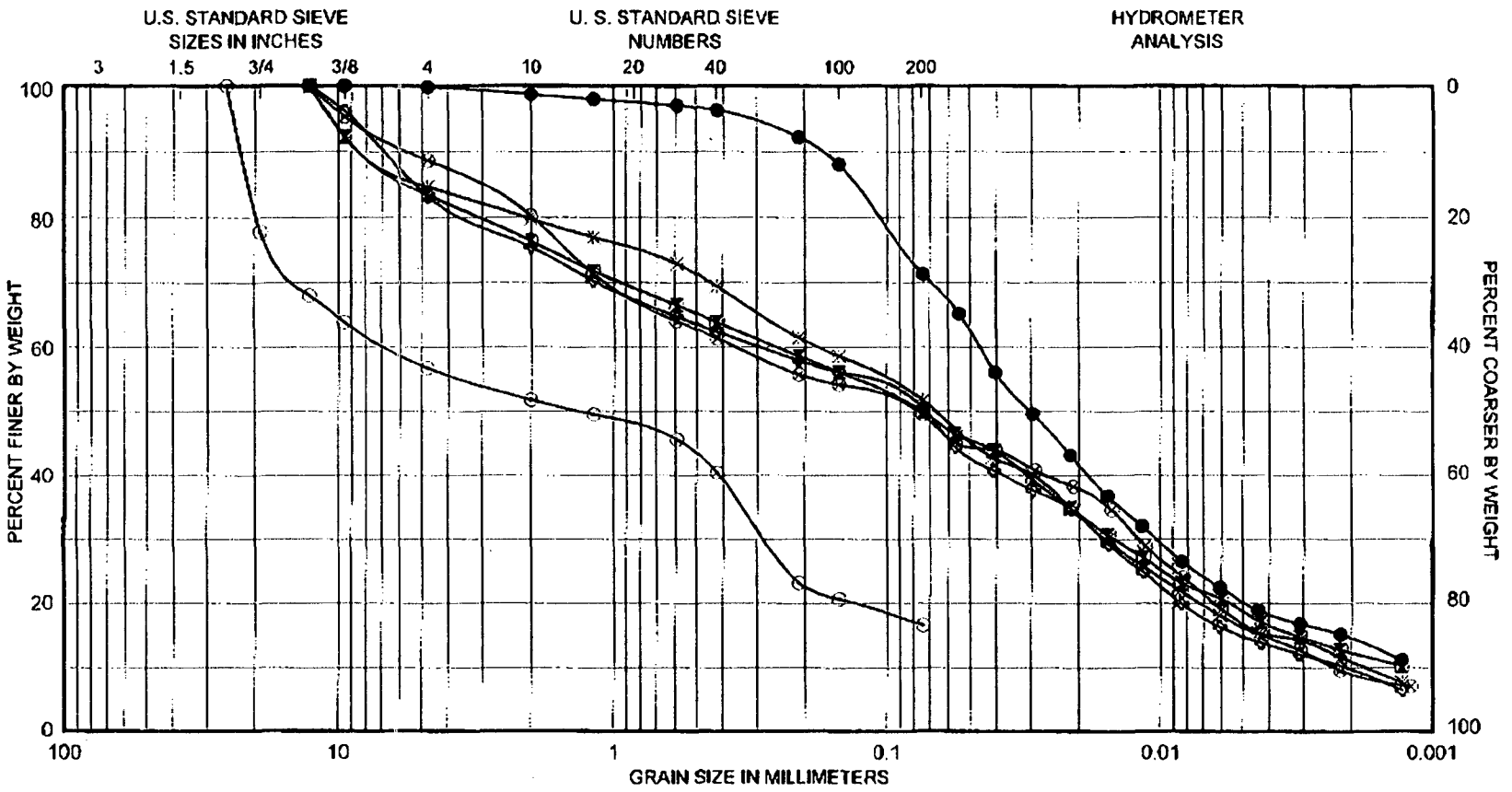


GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT.	CLASSIFICATION
●	RV12-SL	203.0	Please See Plate 6 for Classification
⊠	RV12-SL	506.0	Please See Plate 6 for Classification
※	RV12-SL	910.0	Please See Plate 6 for Classification

PLATE 19

GRAIN SIZE CURVES



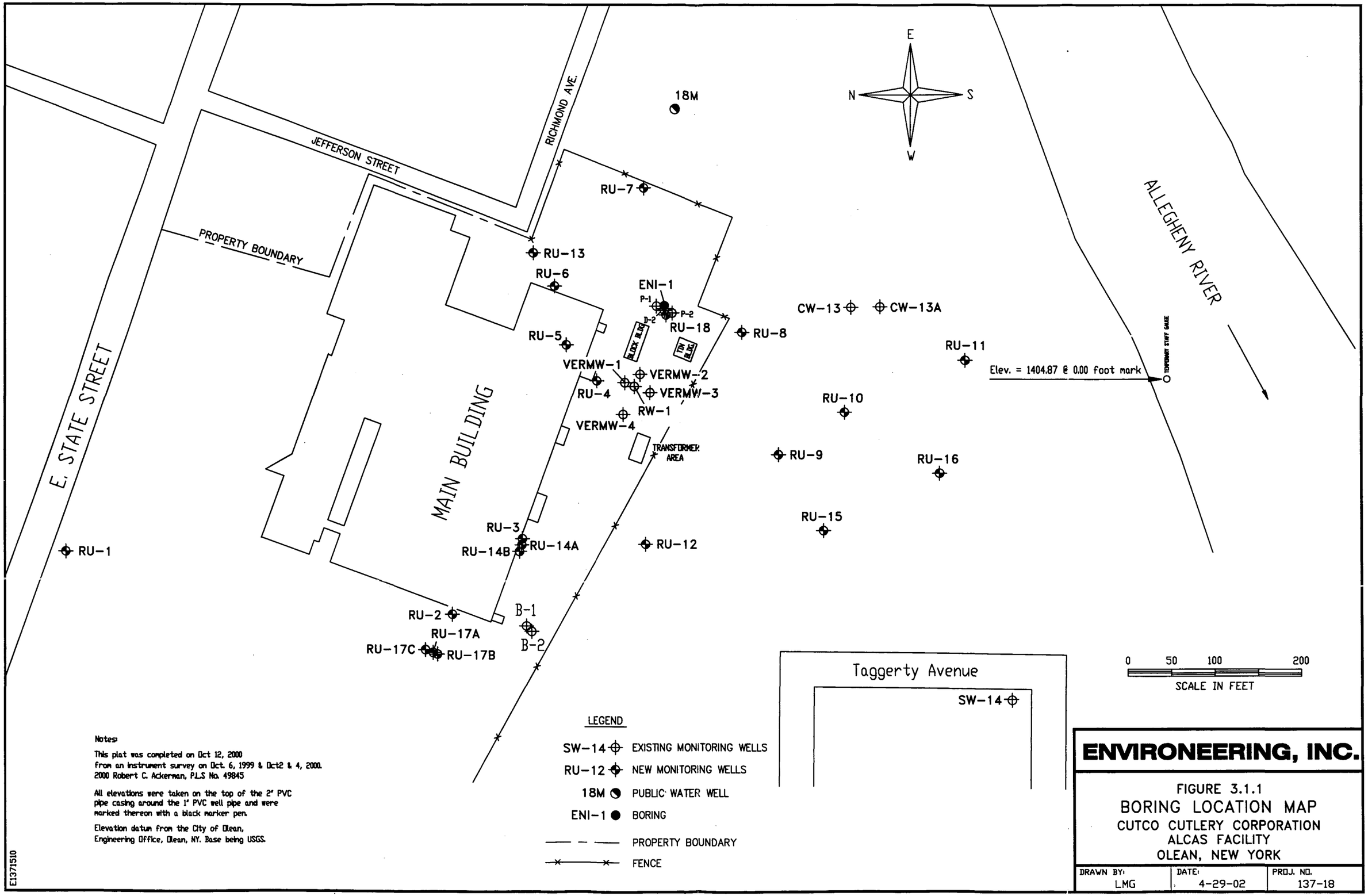
GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT.	CLASSIFICATION
●	ENI1-SL	102.0	Please See Plate 7 for Classification
▣	ENI1-SL	809.0	Please See Plate 7 for Classification
✳	ENI1-SL	1920.0	Please See Plate 7 for Classification
⊗	ENI1-SL	2425.0	Please See Plate 7 for Classification
⊙	ENI1-SL	2526.0	Please See Plate 7 for Classification
✿	ENI1-SL	3031.0	Please See Plate 7 for Classification

GRAIN SIZE CURVES

PLATE 20

TOTAL P.21



LEGEND

- SW-14 ⊕ EXISTING MONITORING WELLS
- RU-12 ⊕ NEW MONITORING WELLS
- 18M ◔ PUBLIC WATER WELL
- ENI-1 ● BORING
- PROPERTY BOUNDARY
- FENCE

Notes:

This plat was completed on Oct 12, 2000
from an instrument survey on Oct. 6, 1999 & Oct2 & 4, 2000.
2000 Robert C. Ackerman, P.L.S No. 49845

All elevations were taken on the top of the 2" PVC pipe casing around the 1" PVC well pipe and were marked thereon with a black marker pen.

Elevation datum from the City of Olean, Engineering Office, Olean, NY. Base being USGS.

E1371510

ENVIRONEERING, INC.

FIGURE 3.1.1
BORING LOCATION MAP
CUTCO CUTLERY CORPORATION
ALCAS FACILITY
OLEAN, NEW YORK

DRAWN BY:	DATE:	PROJ. NO.
LMG	4-29-02	137-18

APPENDIX B

Analytical Soil Data Summaries

- **Phase I Investigation (*July, 1999*)**
    - Analytical Summary Table (Table 3-2)
    - Analytical Soil Data Location Map (Figure 3.1.2)
- **Phase II Investigation (*October, 1999*)**
    - Analytical Summary Table (Table 3-3)
    - Analytical Soil Data Location Maps (Figures 3.1.3 and 3.1.4)
- **Phase IV Investigation (*September, 2001*)**
    - Analytical Summary Table (Table 3-4)

TABLE 3-2
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number	B10-SL-0001	B10-SL-0708	B10-SL-1718	B11-SL-0001	B11-SL-0405	B11-SL-1112	B12-SL-0001
Field Duplicate Identification							
Laboratory Dilution Number	14569A-20DL	14569A-19-DL				14629-4-DL	
Laboratory Number	14569A-20	14569A-19	14569B-1	14629-8	14629-9	14629-4	14629-6
Vinyl Chloride (µg/kg)		4.8 J[1]				15	
Methylene Chloride (µg/kg)							
Acetone (µg/kg)				100	59 J		72
Carbon Disulfide (µg/kg)							
1,1-Dichloroethene (µg/kg)							
Cis/Trans-1,2-Dichloroethene (µg/kg)		6.4				170	48
2-Butanone (MEK) (µg/kg)							
1,1,1-Trichloroethane (µg/kg)		11					
Trichloroethene (µg/kg)	120000	200 J	1200	85	110	ND	180
1,1,2-Trichloroethane (µg/kg)							
Benzene (µg/kg)							
Tetrachloroethene (µg/kg)		85					
Toluene (µg/kg)		4.0 J					3.0 J
Styrene (µg/kg)							
Ethylbenzene (µg/kg)							
Xylene (Total) (µg/kg)							
Total VOCs	120000	311.2	1200	185	169	185	303

(1) "J" designation denotes an estimated value
(2) "E" designation denotes a serial dilution of the sample
(3) "B" designation denotes a detection in laboratory blanks.
Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives.
ND Non Detect

Soil Clean-up Oblective; Table 1, OU2 ROD
USEPA Region II, September, 1996[4]

Borehole Description:
B10 - Borehole Location
SL - Soil Sample
0001 - Sample Interval in feet

Compound	Soil Clean-up Objective[3]
Vinyl Chloride (µg/kg)	200
Cis/Trans-1,2-Dichloroethene (µg/kg)	300
2-Butanone (MEK) (µg/kg)	300
1,1,1-Trichloroethane (µg/kg)	800
Trichloroethene (µg/kg)	700
Benzene (µg/kg)	60
Tetrachloroethene (µg/kg)	1400
Toluene (µg/kg)	1500
Ethylbenzene (µg/kg)	5500
Xylene (Total) (µg/kg)	1200

TABLE 3-2
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number	B12-SL-0607	B12-SL-1415	B13-SL-0001	B13-SL-0708	B13-SL-1618	B14-SL-0001	B14-SL-0508
Field Duplicate Identification							
Laboratory Dilution Number			14569A-1-DL		14569A-3-DL	14569A-4-DL	14569A-5-DL
Laboratory Number	14629-7	14629-5	14569A-1	14569A-2	14569A-3	14569A-4	14569A-5
Vinyl Chloride (µg/kg)		80		32	95		
Methylene Chloride (µg/kg)							
Acetone (µg/kg)			160	81	22 J	350	63
Carbon Disulfide (µg/kg)							
1,1-Dichloroethene (µg/kg)					3.5 J		
Cis/Trans-1,2-Dichloroethene (µg/kg)	2.2 J	180	97	130	670 E[2]	7.6	14
2-Butanone (MEK) (µg/kg)						32	
1,1,1-Trichloroethane (µg/kg)							
Trichloroethene (µg/kg)	4.4 J	79	3600	250 E	120 J	840	
1,1,2-Trichloroethane (µg/kg)							
Benzene (µg/kg)							
Tetrachloroethene (µg/kg)			46			4.9 J	11
Toluene (µg/kg)							
Styrene (µg/kg)							
Ethylbenzene (µg/kg)	2.2 J						
Xylene (Total) (µg/kg)							
Total VOCs	8.8	339	3903	493	910.5	1234.5	88

(1) "J" designation denotes an estimated value
(2) "E" designation denotes a serial dilution of the sample
(3) "B" designation denotes a detection in laboratory blanks.
Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives.
ND Non Detect

Soil Clean-up Oblective; Table 1, OU2 ROD
USEPA Region II, September, 1996

Borehole Description:
B10 - Borehole Location
SL - Soil Sample
0001 - Sample Interval in feet

Compound	Soil Clean-up Objective[3]
Vinyl Chloride (µg/kg)	200
Cis/Trans-1,2-Dichloroethene (µg/kg)	300
2-Butanone (MEK) (µg/kg)	300
1,1,1-Trichloroethane (µg/kg)	800
Trichloroethene (µg/kg)	700
Benzene (µg/kg)	60
Tetrachloroethene (µg/kg)	1400
Toluene (µg/kg)	1500
Ethylbenzene (µg/kg)	5500
Xylene (Total) (µg/kg)	1200

TABLE 3-2
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number		B14-SL-1820	B15-SL-0001	B15-SL-0607	B15-SL-1314	B16-SL-0001	B16-SL-0607
Field Duplicate Identification	B14D-SL-0508						
Laboratory Dilution Number	14569A-6-DL	14569A-7-DL		14569A-9-DL	14569A-10-DL		14569A-12-DL
Laboratory Number	14569A-6	14569A-7	14569A-8	14569A-9	14569A-10	14569A-11	14569A-12
Vinyl Chloride (µg/kg)		15	56	270 E	160		77
Methylene Chloride (µg/kg)		2.8 J[2]					
Acetone (µg/kg)	36 J	56	130	34 J	62	84	
Carbon Disulfide (µg/kg)		4.2 J					
1,1-Dichloroethene (µg/kg)		12		2.4 J	3.3 J		
Cis/Trans-1,2-Dichloroethene (µg/kg)	10	640 E[2]		420 E	250		180
2-Butanone (MEK) (µg/kg)							
1,1,1-Trichloroethane (µg/kg)							
Trichloroethene (µg/kg)	170 J	13000	30 B[3]	440 E	4900	7.0	580 BE
1,1,2-Trichloroethane (µg/kg)							
Benzene (µg/kg)		6			4.2 J		
Tetrachloroethene (µg/kg)	9.4	2.8 J		12	17		
Toluene (µg/kg)		81			3.7 J		
Styrene (µg/kg)			7.9	2.9 J	4.0 J		
Ethylbenzene (µg/kg)							
Xylene (Total) (µg/kg)		3.3 J					
Total VOCs	225.4	13823.1	223.9	1181.3	5404.2	91	837

(1) "J" designation denotes an estimated value
(2) "E" designation denotes a serial dilution of the sample
(3) "B" designation denotes a detection in laboratory blanks.
Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives.
ND Non Detect

Soil Clean-up Oblective; Table 1, OU2 ROD
USEPA Region II, September, 1996

Borehole Description:
B10 - Borehole Location
SL - Soil Sample
0001 - Sample Interval in feet

Compound	Soil Clean-up Objective*
Vinyl Chloride (µg/kg)	200
Cis/Trans-1,2-Dichloroethene (µg/kg)	300
2-Butanone (MEK) (µg/kg)	300
1,1,1-Trichloroethane (µg/kg)	800
Trichloroethene (µg/kg)	700
Benzene (µg/kg)	60
Tetrachloroethene (µg/kg)	1400
Toluene (µg/kg)	1500
Ethylbenzene (µg/kg)	5500
Xylene (Total) (µg/kg)	1200

TABLE 3-2
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number	B16SL-0910	B16-SL-1819	B17-SL-0001	B17-SL-0607	B17-SL-1112	B17-SL-1718	B18-SL-0001
Field Duplicate Identification							
Laboratory Dilution Number	14569A-13-DL				14569-A-17-DL	14569A-18-DL	
Laboratory Number	14569A-13	14569A-14	14569A-15	14569A-16	14569A-17	14569A-18	14629-1
Vinyl Chloride (µg/kg)	130	2.8 J		62	130	5.3 J[1]	11
Methylene Chloride (µg/kg)							
Acetone (µg/kg)			50 J	33 J			24 J
Carbon Disulfide (µg/kg)							16
1,1-Dichloroethene (µg/kg)	2.8 J				3.8 J		
Cis/Trans-1,2-Dichloroethene (µg/kg)	700 E[2]	4.3 J		280 E	350 E	15	38
2-Butanone (MEK) (µg/kg)			27 J			3.7 J	
1,1,1-Trichloroethane (µg/kg)							
Trichloroethene (µg/kg)	890	25	17 B	140 B	1900	420	24
1,1,2-Trichloroethane (µg/kg)	3.8 J						
Benzene (µg/kg)			7.6		5.4		
Tetrachloroethene (µg/kg)	8						
Toluene (µg/kg)					3.4 J		
Styrene (µg/kg)							
Ethylbenzene (µg/kg)							
Xylene (Total) (µg/kg)							
Total VOCs	1734.6	32.1	101.6	515	2392.6	444	113

(1) "J" designation denotes an estimated value
(2) "E" designation denotes a serial dilution of the sample
(3) "B" designation denotes a detection in laboratory blanks.
Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives.
ND Non Detect

Soil Clean-up Oblective; Table 1, OU2 ROD
USEPA Region II, September, 1996

Borehole Description:
B10 - Borehole Location
SL - Soil Sample
0001 - Sample Interval in feet

Compound	Soil Clean-up Objective[4]
Vinyl Chloride (µg/kg)	200
Cis/Trans-1,2-Dichloroethene (µg/kg)	300
2-Butanone (MEK) (µg/kg)	300
1,1,1-Trichloroethane (µg/kg)	800
Trichloroethene (µg/kg)	700
Benzene (µg/kg)	60
Tetrachloroethene (µg/kg)	1400
Toluene (µg/kg)	1500
Ethylbenzene (µg/kg)	5500
Xylene (Total) (µg/kg)	1200

TABLE 3-2
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number	B18-SL-0607	B18-SL-1415
Field Duplicate Identification		
Laboratory Dilution Number		
Laboratory Number	14629-2	14629-3
Vinyl Chloride (µg/kg)	66	
Methylene Chloride (µg/kg)		
Acetone (µg/kg)		
Carbon Disulfide (µg/kg)		
1,1-Dichloroethene (µg/kg)		
Cis/Trans-1,2-Dichloroethene (µg/kg)	87	
2-Butanone (MEK) (µg/kg)		
1,1,1-Trichloroethane (µg/kg)		
Trichloroethene (µg/kg)	41	
1,1,2-Trichloroethane (µg/kg)		
Benzene (µg/kg)		2.1 J
Tetrachloroethene (µg/kg)		
Toluene (µg/kg)		
Styrene (µg/kg)		
Ethylbenzene (µg/kg)		
Xylene (Total) (µg/kg)		
Total VOCs	194	2.1

(1) "J" designation denotes an estimated value
(2) "E" designation denotes a serial dilution of the sample
(3) "B" designation denotes a detection in laboratory blanks.
Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives.
ND Non Detect

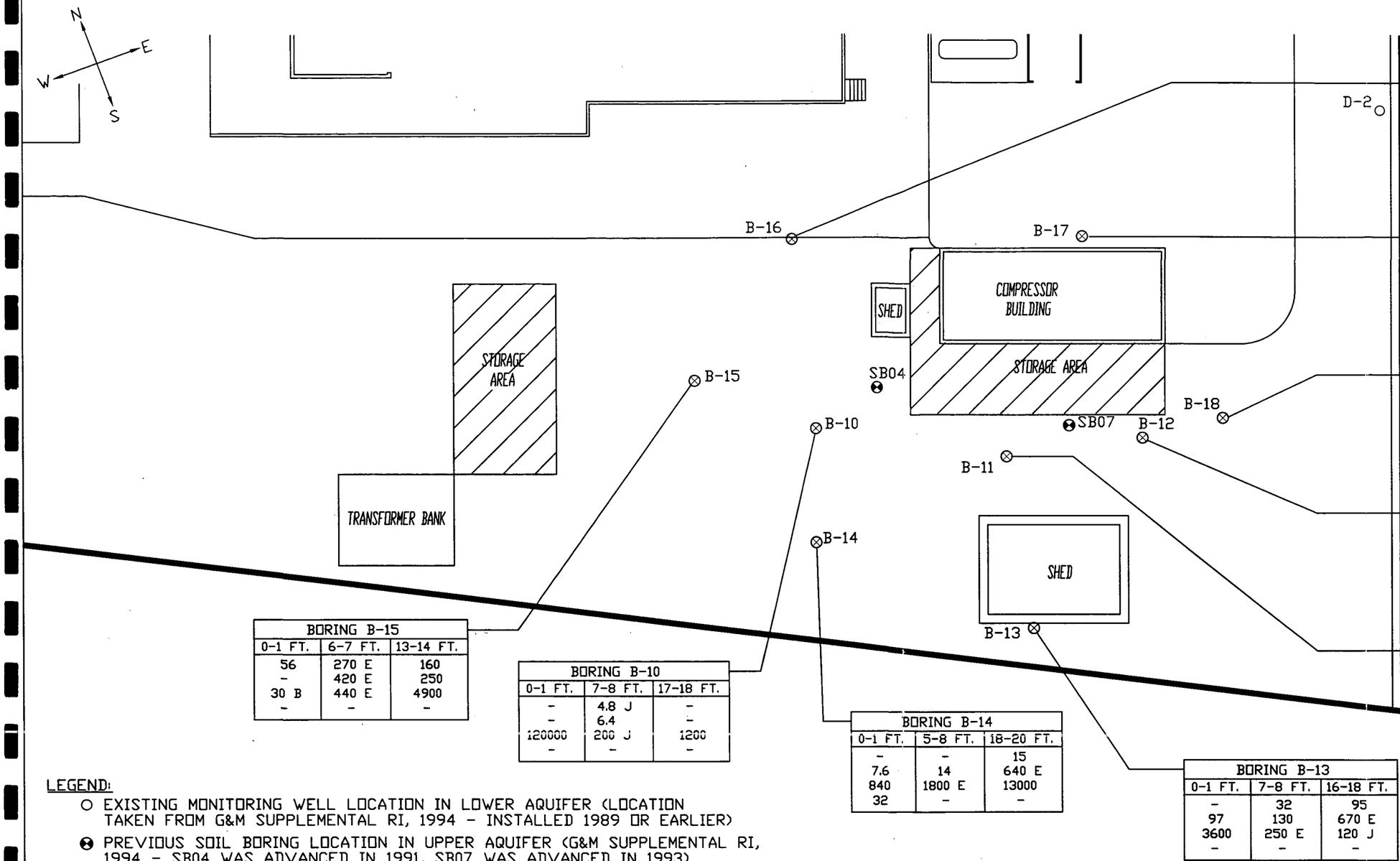
Soil Clean-up Oblective; Table 1, OU2 ROD
USEPA Region II, September, 1996

Borehole Description:
B10 - Borehole Location
SL - Soil Sample
0001 - Sample Interval in feet

Compound	Soil Clean-up Objective*
Vinyl Chloride (µg/kg)	200
Cis/Trans-1,2-Dichloroethene (µg/kg)	300
2-Butanone (MEK) (µg/kg)	300
1,1,1-Trichloroethane (µg/kg)	800
Trichloroethene (µg/kg)	700
Benzene (µg/kg)	60
Tetrachloroethene (µg/kg)	1400
Toluene (µg/kg)	1500
Ethylbenzene (µg/kg)	5500
Xylene (Total) (µg/kg)	1200

JOB NO.: 7072400200 PLOT SCALE: 1=250

STARTED ON: 8/20/99 REVISED: 8/30/99



BORING B-16			
0-1 FT.	6-7 FT.	9-10 FT.	18-19 FT.
–	77	130	2.8 J
–	180	700 E	4.3 J
7.0	580 BE	890	25
–	–	–	–

BORING B-17			
0-1 FT.	6-7 FT.	11-12 FT.	17-18 FT.
–	62	130	5.3 J
–	280 E	110 J	15
17 B	140 B	1900	420
27 J	–	–	3.7 J

BORING B-18		
0-1 FT.	6-7 FT.	14-15 FT.
11	66	–
38	87	–
24	41	–
–	–	–

BORING B-12		
0-1 FT.	6-7 FT.	14-15 FT.
–	–	80
48	2.2 J	180
180	4.4 J	79
–	–	–

BORING B-11		
0-1 FT.	4-5 FT.	11-12 FT.
–	–	15
–	–	170
85	110	2000 E
–	–	–

BORING B-15		
0-1 FT.	6-7 FT.	13-14 FT.
56	270 E	160
–	420 E	250
30 B	440 E	4900
–	–	–

BORING B-10		
0-1 FT.	7-8 FT.	17-18 FT.
–	4.8 J	–
–	6.4	–
120000	200 J	1200
–	–	–

BORING B-14		
0-1 FT.	5-8 FT.	18-20 FT.
–	–	15
7.6	14	640 E
840	1800 E	13000
32	–	–

BORING B-13		
0-1 FT.	7-8 FT.	16-18 FT.
–	32	95
97	130	670 E
3600	250 E	120 J
–	–	–

LEGEND:

- ○ EXISTING MONITORING WELL LOCATION IN LOWER AQUIFER (LOCATION TAKEN FROM G&M SUPPLEMENTAL RI, 1994 - INSTALLED 1989 OR EARLIER)
- ⊗ PREVIOUS SOIL BORING LOCATION IN UPPER AQUIFER (G&M SUPPLEMENTAL RI, 1994 - SB04 WAS ADVANCED IN 1991, SB07 WAS ADVANCED IN 1993)
- ⊗ SOIL BORING LOCATION IN UPPER AQUIFER DRILLED JULY 7 TO JULY 12 1999

MAXIMUM CONCENTRATIONS ABOVE GROUNDWATER

CHEMICAL COMPOUNDS	OU2 ROD CLEAN UP LEVELS
VINYL CHLORIDE	200 ppb
CIS 1,2 DICHLOROETHENE	300 ppb
TRICHLOROETHENE	700 ppb
2-BUTANONE (MEK)	300 ppb

0 20 40

SCALE IN FEET

FIGURE 3.1.2

ALUMINUM COMPANY OF AMERICA
ALCOA, TENNESSEE

IT CORPORATION
PITTSBURGH, PA

ANALYTICAL RESULTS FOR SOILS
ALCAS FACILITY - OLEAN, NEW YORK

DATE: 8/20/99 DR.: B. SNYDER

SCALE: AS NOTED FILE NAME: 20153019

TABLE 3-3
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number		B10A-23.4-23.8	B10A-25.0-25.3	B10A-28.3-28.7	B11A-15.0-15.3	B11A-21.5-21.8
Sampling Depth (ft)		23.4 - 23.8	25.0 - 25.3	28.3 - 28.7	15.0 - 15.3	21.5 - 21.8
Field Duplicate Identification						
Laboratory Dilution Number				S916985A-11-DL	S916985-10-DL	S916985-9-DL
Laboratory Number		S916985A-9	S916985A-10	S916985A-11	S916985-10	S916985-9
Parameter (units)	**SCO**					
1,1,1-Trichloroethane (ug/kg)	800					
1,1-Dichloroethane (ug/kg)						
1,1-Dichloroethene (ug/kg)						
1,2-Dichloroethane (ug/kg)						
2-Butanone (MEK) (ug/kg)	300					
Acetone (ug/kg)					45 J	
Benzene (ug/kg)	60			4.6 J	5.4 J	
Carbon disulfide (ug/kg)						
Chloroethane (ug/kg)						
Chloromethane (ug/kg)						
Cis/Trans-1,2-Dichloroethene (ug/kg)	300			5.1 J	95	12
Ethylbenzene (ug/kg)	5500					
Methylene chloride (Dichloromethane) (ug/kg)						
Styrene (ug/kg)						
Tetrachloroethene (ug/kg)	1400				6.5 J	
Toluene (ug/kg)	1500			5.7		
Trichloroethene (ug/kg)	700	530	2400	160 JD	150 JD	120 JD
Vinyl chloride (ug/kg)	200				12 J	
Xylenes, Total (ug/kg)	1200			3.4 J		
Total Volatiles		530	2400	179	321.9	132

Notes:

1. Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives (SCOs), from Table 1 of the OU2 ROD, USEPA Region II, September, 1996.
2. Blank cells denote nondetected values.
3. Values in parentheses are for undiluted sample analyses when parameter was not detected during the analysis of the dilution.
4. Parameters not listed were not detected in any of the samples.

Qualifiers:

D = Value derived from analysis of a dilution.
E = Value estimated, exceeds the calibration range.
J = Value estimated, below quantitation limit.
U = Not detected.

TABLE 3-3
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number		B11A-27.2-27.7	B11A-30.3-30.7	B13A-24.2-24.7	B13A-35.4-36.2	B14A-24.1-24.6
Sampling Depth (ft)		27.2 - 27.7	30.3 - 30.7	24.2 - 24.7	35.4 - 36.2	24.1 - 24.6
Field Duplicate Identification						
Laboratory Dilution Number		S916985-11-DL	S916985-12-DL	S916985-7-DL	S916985-8-DL	
Laboratory Number		S916985-11	S916985-12	S916985-7	S916985-8	S916985A-2
Parameter (units)	**SCO**					
1,1,1-Trichloroethane (ug/kg)	800					
1,1-Dichloroethane (ug/kg)						
1,1-Dichloroethene (ug/kg)			6.8			
1,2-Dichloroethane (ug/kg)						
2-Butanone (MEK) (ug/kg)	300					
Acetone (ug/kg)		32 J			43 J	
Benzene (ug/kg)	60	3.7 J	3.4 J			
Carbon disulfide (ug/kg)						
Chloroethane (ug/kg)						
Chloromethane (ug/kg)						
Cis/Trans-1,2-Dichloroethene (ug/kg)	300	67	83	12	15	
Ethylbenzene (ug/kg)	5500					
Methylene chloride (Dichloromethane) (ug/kg)						
Styrene (ug/kg)						
Tetrachloroethene (ug/kg)	1400					
Toluene (ug/kg)	1500					
Trichloroethene (ug/kg)	700	200 JD	1800 D	220 UD (320 E)	330 D	13
Vinyl chloride (ug/kg)	200	9.3 J	13			
Xylenes, Total (ug/kg)	1200					
Total Volatiles		312	1906.2	332	388	13

Notes:

1. Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives (SCOs), from Table 1 of the OU2 ROD, USEPA Region II, September, 1996.
2. Blank cells denote nondetected values.
3. Values in parentheses are for undiluted sample analyses when parameter was not detected during the analysis of the dilution.
4. Parameters not listed were not detected in any of the samples.

Qualifiers:

D = Value derived from analysis of a dilution.
E = Value estimated, exceeds the calibration range.
J = Value estimated, below quantitation limit.
U = Not detected.

TABLE 3-3
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number		B14A-30.4-30.8	B15A-23.2-23.5	B15A-27.1-27.5		B19-.45-.62
Sampling Depth (ft)		30.4 - 30.8	23.2 - 23.5	27.1 - 27.5	27.1 - 27.5	0.45 - 0.62
Field Duplicate Identification					B15A-27.1-27.5-DUP	
Laboratory Dilution Number		S916985A-1-DL	S917074-3-DL	S917074-1-DL	S917074-2-DL	S916985-4-DL
Laboratory Number		S916985A-1	S917074-3	S917074-1	S917074-2	S916985-4
Parameter (units)	**SCO**					
1,1,1-Trichloroethane (ug/kg)	800					
1,1-Dichloroethane (ug/kg)						
1,1-Dichloroethene (ug/kg)				6.1		
1,2-Dichloroethane (ug/kg)						
2-Butanone (MEK) (ug/kg)	300					
Acetone (ug/kg)						30 J
Benzene (ug/kg)	60		5.5 J	4 J		
Carbon disulfide (ug/kg)						4.6 J
Chloroethane (ug/kg)						
Chloromethane (ug/kg)						
Cis/Trans-1,2-Dichloroethene (ug/kg)	300		220 UD (640 E)	220 UD (390 E)		
Ethylbenzene (ug/kg)	5500					
Methylene chloride (Dichloromethane) (ug/kg)						
Styrene (ug/kg)						
Tetrachloroethene (ug/kg)	1400		27	5 J		
Toluene (ug/kg)	1500			2.8 J		
Trichloroethene (ug/kg)	700	500	920 D	2200 D	2300	16
Vinyl chloride (ug/kg)	200		190	61		
Xylenes, Total (ug/kg)	1200					
Total Volatiles		500	1782.5	2668.9	2300	50.6

Notes:

1. Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives (SCOs), from Table 1 of the OU2 ROD, USEPA Region II, September, 1996.
2. Blank cells denote nondetected values.
3. Values in parentheses are for undiluted sample analyses when parameter was not detected during the analysis of the dilution.
4. Parameters not listed were not detected in any of the samples.

Qualifiers:

D = Value derived from analysis of a dilution.
E = Value estimated, exceeds the calibration range.
J = Value estimated, below quantitation limit.
U = Not detected.

TABLE 3-3
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number		B19-5.7-6.0	B19-15.0-15.3	B19-23.2-23.6	B19-27.0-27.4	B19-31.4-31.7
Sampling Depth (ft)		5.7 - 6.0	15.0 - 15.3	23.2 - 23.6	27.0 - 27.4	31.4 - 31.7
Field Duplicate Identification						
Laboratory Dilution Number		S916985-2-DL	S916985-5-DL	S916985-3-DL	S916985-6-DL	S916985-1-DL
Laboratory Number		S916985-2	S916985-5	S916985-3	S916985-6	S916985-1
Parameter (units)	**SCO**					
1,1,1-Trichloroethane (ug/kg)	800					
1,1-Dichloroethane (ug/kg)						
1,1-Dichloroethene (ug/kg)						
1,2-Dichloroethane (ug/kg)						5.7 J
2-Butanone (MEK) (ug/kg)	300					
Acetone (ug/kg)				32 J		
Benzene (ug/kg)	60		1.9 J			
Carbon disulfide (ug/kg)						
Chloroethane (ug/kg)						
Chloromethane (ug/kg)						
Cis/Trans-1,2-Dichloroethene (ug/kg)	300		80	160	110	7.6
Ethylbenzene (ug/kg)	5500					
Methylene chloride (Dichloromethane) (ug/kg)						
Styrene (ug/kg)						
Tetrachloroethene (ug/kg)	1400			5.8 J		
Toluene (ug/kg)	1500					
Trichloroethene (ug/kg)	700	16	230 UD (1800 E)	580 D	840 D	220 JD
Vinyl chloride (ug/kg)	200		11	30	19	
Xylenes, Total (ug/kg)	1200					
Total Volatiles		16	1892.9	807.8	969	233.3

Notes:

1. Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives (SCOs), from Table 1 of the OU2 ROD, USEPA Region II, September, 1996.
2. Blank cells denote nondetected values.
3. Values in parentheses are for undiluted sample analyses when parameter was not detected during the analysis of the dilution.
4. Parameters not listed were not detected in any of the samples.

Qualifiers:

D = Value derived from analysis of a dilution.
E = Value estimated, exceeds the calibration range.
J = Value estimated, below quantitation limit.
U = Not detected.

TABLE 3-3
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number		B20-.4-.7	B20-3.6-4.0	B20-11.0-11.3	B20-15.0-15.6	B20-23.6-24.0
Sampling Depth (ft)		0.4 - 0.7	3.6 - 4.0	11.0 - 11.3	15.0 - 15.6	23.6 - 24.0
Field Duplicate Identification						
Laboratory Dilution Number				S916985A-14-DL	S916985A-15-DL	
Laboratory Number		S916985A-12	S916985A-13	S916985A-14	S916985A-15	S916985A-16
Parameter (units)	**SCO**					
1,1,1-Trichloroethane (ug/kg)	800					
1,1-Dichloroethane (ug/kg)						
1,1-Dichloroethene (ug/kg)						
1,2-Dichloroethane (ug/kg)						
2-Butanone (MEK) (ug/kg)	300					
Acetone (ug/kg)				30 J		
Benzene (ug/kg)	60	3.1 J			3.5 J	
Carbon disulfide (ug/kg)						
Chloroethane (ug/kg)						
Chloromethane (ug/kg)						
Cis/Trans-1,2-Dichloroethene (ug/kg)	300	110	5.5 J	220	78	
Ethylbenzene (ug/kg)	5500					
Methylene chloride (Dichloromethane) (ug/kg)						
Styrene (ug/kg)						
Tetrachloroethene (ug/kg)	1400				6.1 J	
Toluene (ug/kg)	1500				4.8 J	
Trichloroethene (ug/kg)	700	85	7.9	230 UD (660 E)	220 UD (1300 E)	1400
Vinyl chloride (ug/kg)	200			32	21	
Xylenes, Total (ug/kg)	1200				3.1 J	
Total Volatiles		198.1	13.4	942	1416.5	1400

Notes:

1. Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives (SCOs), from Table 1 of the OU2 ROD, USEPA Region II, September, 1996.
2. Blank cells denote nondetected values.
3. Values in parentheses are for undiluted sample analyses when parameter was not detected during the analysis of the dilution.
4. Parameters not listed were not detected in any of the samples.

Qualifiers:

D = Value derived from analysis of a dilution.
E = Value estimated, exceeds the calibration range.
J = Value estimated, below quantitation limit.
U = Not detected.

TABLE 3-3
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number		B20-24.5-24.8	B21-0.0-0.5	B21-3.7-4.0	B21-14.7-15.0	B21-22.7-23.0
Sampling Depth (ft)		24.5 - 24.8	0.0 - 0.5	3.7 - 4.0	14.7 - 15.0	22.7 - 23.0
Field Duplicate Identification						
Laboratory Dilution Number			S917074A-20-DL			
Laboratory Number		S916985A-17	S917074A-20	S917074B-1	S917074B-2	S917074B-3
Parameter (units)	**SCO**					
1,1,1-Trichloroethane (ug/kg)	800		220 UD (500 E)			
1,1-Dichloroethane (ug/kg)			32			
1,1-Dichloroethene (ug/kg)						
1,2-Dichloroethane (ug/kg)						
2-Butanone (MEK) (ug/kg)	300		50			
Acetone (ug/kg)			380	140	31 J	
Benzene (ug/kg)	60					
Carbon disulfide (ug/kg)						
Chloroethane (ug/kg)						
Chloromethane (ug/kg)						
Cis/Trans-1,2-Dichloroethene (ug/kg)	300				3.5 J	
Ethylbenzene (ug/kg)	5500		11			
Methylene chloride (Dichloromethane) (ug/kg)			12			
Styrene (ug/kg)						
Tetrachloroethene (ug/kg)	1400		8.5			
Toluene (ug/kg)	1500		10			
Trichloroethene (ug/kg)	700	250	3.2 J		84	3.8 J
Vinyl chloride (ug/kg)	200					13
Xylenes, Total (ug/kg)	1200		51			
Total Volatiles		250	1057.7	140	118.5	16.8

Notes:

1. Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives (SCOs), from Table 1 of the OU2 ROD, USEPA Region II, September, 1996.
2. Blank cells denote nondetected values.
3. Values in parentheses are for undiluted sample analyses when parameter was not detected during the analysis of the dilution.
4. Parameters not listed were not detected in any of the samples.

Qualifiers:

D = Value derived from analysis of a dilution.
E = Value estimated, exceeds the calibration range.
J = Value estimated, below quantitation limit.
U = Not detected.

TABLE 3-3
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number		B21-25.5-25.8	B22-0.0-0.5	B22-4.0-4.4	B22-15.1-15.4	B22-22.7-23.0
Sampling Depth (ft)		25.5 - 25.8	0.0 - 0.5	4.0 - 4.4	15.1 - 15.4	22.7 - 23.0
Field Duplicate Identification						
Laboratory Dilution Number						
Laboratory Number		S917074B-4	S917074A-15	S917074A-16	S917074A-17	S917074A-18
Parameter (units)	**SCO**					
1,1,1-Trichloroethane (ug/kg)	800					
1,1-Dichloroethane (ug/kg)						
1,1-Dichloroethene (ug/kg)						
1,2-Dichloroethane (ug/kg)						
2-Butanone (MEK) (ug/kg)	300		18 J			
Acetone (ug/kg)			120	78	28 J	
Benzene (ug/kg)	60			5.2 J		
Carbon disulfide (ug/kg)						
Chloroethane (ug/kg)						
Chloromethane (ug/kg)			12			
Cis/Trans-1,2-Dichloroethene (ug/kg)	300		4.8 J	5 J	19	7.8
Ethylbenzene (ug/kg)	5500					
Methylene chloride (Dichloromethane) (ug/kg)						
Styrene (ug/kg)						
Tetrachloroethene (ug/kg)	1400					
Toluene (ug/kg)	1500					
Trichloroethene (ug/kg)	700	59	17	8.2	28	10
Vinyl chloride (ug/kg)	200				26	
Xylenes, Total (ug/kg)	1200					
Total Volatiles		59	171.8	96.4	101	17.8

Notes:

1. Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives (SCOs), from Table 1 of the OU2 ROD, USEPA Region II, September, 1996.
2. Blank cells denote nondetected values.
3. Values in parentheses are for undiluted sample analyses when parameter was not detected during the analysis of the dilution.
4. Parameters not listed were not detected in any of the samples.

Qualifiers:

D = Value derived from analysis of a dilution.
E = Value estimated, exceeds the calibration range.
J = Value estimated, below quantitation limit.
U = Not detected.

TABLE 3-3
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number		B22-25.4-25.7	B23-0.0-0.5	B23-3.7-4.0	B23-6.5-6.8	
Sampling Depth (ft)		25.4 - 25.7	0.0 - 0.5	3.7 - 4.0	6.5 - 6.8	6.5 - 6.8
Field Duplicate Identification						B23-6.5-6.8-DUP
Laboratory Dilution Number				S917074-17-DL		
Laboratory Number		S917074A-19	S917074-16	S917074-17	S917074-18	S917074-19
Parameter (units)	**SCO**					
1,1,1-Trichloroethane (ug/kg)	800					
1,1-Dichloroethane (ug/kg)						
1,1-Dichloroethene (ug/kg)				5.7 J		
1,2-Dichloroethane (ug/kg)						
2-Butanone (MEK) (ug/kg)	300					
Acetone (ug/kg)				34 J		
Benzene (ug/kg)	60					
Carbon disulfide (ug/kg)						
Chloroethane (ug/kg)						
Chloromethane (ug/kg)						
Cis/Trans-1,2-Dichloroethene (ug/kg)	300		7100	240 UD (2100 E)		
Ethylbenzene (ug/kg)	5500					
Methylene chloride (Dichloromethane) (ug/kg)						
Styrene (ug/kg)						
Tetrachloroethene (ug/kg)	1400					
Toluene (ug/kg)	1500					
Trichloroethene (ug/kg)	700	420	510	240 UD (530 E)	600	590
Vinyl chloride (ug/kg)	200		460	480 UD (540 E)		
Xylenes, Total (ug/kg)	1200					
Total Volatiles		420	8070	3209.7	600	590

Notes:

1. Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives (SCOs), from Table 1 of the OU2 ROD, USEPA Region II, September, 1996.
2. Blank cells denote nondetected values.
3. Values in parentheses are for undiluted sample analyses when parameter was not detected during the analysis of the dilution.
4. Parameters not listed were not detected in any of the samples.

Qualifiers:

D = Value derived from analysis of a dilution.
E = Value estimated, exceeds the calibration range.
J = Value estimated, below quantitation limit.
U = Not detected.

TABLE 3-3
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number		B23-15.0-15.3	B23-24.3-24.5	B23-25.1-25.3	B24-0.0-0.5	B24-3.7-4.0
Sampling Depth (ft)		15.0 - 15.3	24.3 - 24.5	25.1 - 25.3	0.0 - 0.5	3.7 - 4.0
Field Duplicate Identification						
Laboratory Dilution Number			S917074A-2-DL			
Laboratory Number		S917074A-1	S917074A-2	S917074A-3	S917074-11	S917074-12
Parameter (units)	**SCO**					
1,1,1-Trichloroethane (ug/kg)	800					
1,1-Dichloroethane (ug/kg)						
1,1-Dichloroethene (ug/kg)						
1,2-Dichloroethane (ug/kg)					5.9 J	
2-Butanone (MEK) (ug/kg)	300				34 J	
Acetone (ug/kg)					130	44 J
Benzene (ug/kg)	60				3.6 J	3.2 J
Carbon disulfide (ug/kg)						
Chloroethane (ug/kg)						8.2 J
Chloromethane (ug/kg)						
Cis/Trans-1,2-Dichloroethene (ug/kg)	300					8.1
Ethylbenzene (ug/kg)	5500					
Methylene chloride (Dichloromethane) (ug/kg)						
Styrene (ug/kg)					3.9 J	
Tetrachloroethene (ug/kg)	1400					
Toluene (ug/kg)	1500					
Trichloroethene (ug/kg)	700	24000	3100	3900	42	9.8
Vinyl chloride (ug/kg)	200					29
Xylenes, Total (ug/kg)	1200				5.3 J	
Total Volatiles		24000	3100	3900	224.7	102.3

Notes:

1. Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives (SCOs), from Table 1 of the OU2 ROD, USEPA Region II, September, 1996.
2. Blank cells denote nondetected values.
3. Values in parentheses are for undiluted sample analyses when parameter was not detected during the analysis of the dilution.
4. Parameters not listed were not detected in any of the samples.

Qualifiers:

D = Value derived from analysis of a dilution.
E = Value estimated, exceeds the calibration range.
J = Value estimated, below quantitation limit.
U = Not detected.

TABLE 3-3
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number		B24-15.2-15.5	B24-22.8-23.1	B24-26.2-26.6	B25-0.0-0.5	B25-3.7-4.0
Sampling Depth (ft)		15.2 - 15.5	22.8 - 23.1	26.2 - 26.6	0.0 - 0.5	3.7 - 4.0
Field Duplicate Identification						
Laboratory Dilution Number				S917074-15-DL		
Laboratory Number		S917074-13	S917074-14	S917074-15	S917074A-4	S917074A-5
Parameter (units)	**SCO**					
1,1,1-Trichloroethane (ug/kg)	800					
1,1-Dichloroethane (ug/kg)						
1,1-Dichloroethene (ug/kg)				7.5		
1,2-Dichloroethane (ug/kg)						
2-Butanone (MEK) (ug/kg)	300					19 J
Acetone (ug/kg)					180	170
Benzene (ug/kg)	60			4.4 J		
Carbon disulfide (ug/kg)						
Chloroethane (ug/kg)						
Chloromethane (ug/kg)						
Cis/Trans-1,2-Dichloroethene (ug/kg)	300			230 UD (350 E)		3.5 J
Ethylbenzene (ug/kg)	5500					
Methylene chloride (Dichloromethane) (ug/kg)						
Styrene (ug/kg)						
Tetrachloroethene (ug/kg)	1400					
Toluene (ug/kg)	1500					
Trichloroethene (ug/kg)	700	3700	2200	1600 D	17	29
Vinyl chloride (ug/kg)	200			62		
Xylenes, Total (ug/kg)	1200					
Total Volatiles		3700	2200	2023.9	197	221.5

Notes:

1. *Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives (SCOs), from Table 1 of the OU2 ROD, USEPA Region II, September, 1996.*
2. Blank cells denote nondetected values.
3. Values in parentheses are for undiluted sample analyses *when parameter was not detected during the analysis of* the dilution.
4. Parameters not listed were not detected in any of the samples.

Qualifiers:

D = Value derived from analysis of a dilution.
E = Value estimated, exceeds the calibration range.
J = Value estimated, below quantitation limit.
U = Not detected.

TABLE 3-3
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number		B25-15.6-16.0		B25-20.8-21.2	B25-26.7-27.0	B26-0.0-0.5
Sampling Depth (ft)		15.6 - 16.0	15.6 - 16.0	20.8 - 21.2	26.7 - 27.0	0.0 - 0.5
Field Duplicate Identification			B25-15.6-16.0-DUP			
Laboratory Dilution Number						
Laboratory Number		S917074A-6	S917074A-7	S917074A-8	S917074A-9	S917074A-10
Parameter (units)	**SCO**					
1,1,1-Trichloroethane (ug/kg)	800					
1,1-Dichloroethane (ug/kg)						
1,1-Dichloroethene (ug/kg)						
1,2-Dichloroethane (ug/kg)						
2-Butanone (MEK) (ug/kg)	300					17 J
Acetone (ug/kg)					22 J	190
Benzene (ug/kg)	60					
Carbon disulfide (ug/kg)						
Chloroethane (ug/kg)						
Chloromethane (ug/kg)						23
Cis/Trans-1,2-Dichloroethene (ug/kg)	300				2.9 J	
Ethylbenzene (ug/kg)	5500					
Methylene chloride (Dichloromethane) (ug/kg)						
Styrene (ug/kg)						
Tetrachloroethene (ug/kg)	1400					
Toluene (ug/kg)	1500					
Trichloroethene (ug/kg)	700	4000	4500	1900	16	5.3 J
Vinyl chloride (ug/kg)	200					
Xylenes, Total (ug/kg)	1200					
Total Volatiles		4000	4500	1900	40.9	235.3

Notes:

1. Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives (SCOs), from Table 1 of the OU2 ROD, USEPA Region II, September, 1996.
2. Blank cells denote nondetected values.
3. Values in parentheses are for undiluted sample analyses when parameter was not detected during the analysis of the dilution.
4. Parameters not listed were not detected in any of the samples.

Qualifiers:

D = Value derived from analysis of a dilution.
E = Value estimated, exceeds the calibration range.
J = Value estimated, below quantitation limit.
U = Not detected.

TABLE 3-3
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number		B26-3.7-4.0	B26-15.7-16.0	B26-21.5-21.8	B26-27.5-27.8	B27-.1-.6
Sampling Depth (ft)		3.7 - 4.0	15.7 - 16.0	21.5 - 21.8	27.5 - 27.8	0.1 - 0.6
Field Duplicate Identification						
Laboratory Dilution Number						
Laboratory Number		S917074A-11	S917074A-12	S917074A-13	S917074A-14	S916985A-3
Parameter (units)	**SCO**					
1,1,1-Trichloroethane (ug/kg)	800					
1,1-Dichloroethane (ug/kg)						
1,1-Dichloroethene (ug/kg)						
1,2-Dichloroethane (ug/kg)						
2-Butanone (MEK) (ug/kg)	300					
Acetone (ug/kg)		58 J		20 J	23 J	
Benzene (ug/kg)	60					
Carbon disulfide (ug/kg)						
Chloroethane (ug/kg)						
Chloromethane (ug/kg)						
Cis/Trans-1,2-Dichloroethene (ug/kg)	300					
Ethylbenzene (ug/kg)	5500					
Methylene chloride (Dichloromethane) (ug/kg)						
Styrene (ug/kg)						
Tetrachloroethene (ug/kg)	1400					
Toluene (ug/kg)	1500					
Trichloroethene (ug/kg)	700	6.2 J	450	10	6.8	1200
Vinyl chloride (ug/kg)	200			12		
Xylenes, Total (ug/kg)	1200					
Total Volatiles		64.2	450	42	29.8	1200

Notes:

1. Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives (SCOs), from Table 1 of the OU2 ROD, USEPA Region II, September, 1996.
2. Blank cells denote nondetected values.
3. Values in parentheses are for undiluted sample analyses when parameter was not detected during the analysis of the dilution.
4. Parameters not listed were not detected in any of the samples.

Qualifiers:

D = Value derived from analysis of a dilution.
E = Value estimated, exceeds the calibration range.
J = Value estimated, below quantitation limit.
U = Not detected.

TABLE 3-3
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number		B27-4.0-4.4	B27-15.5-15.9	B27-21.2-21.6	B27-31.8-32.3	B27-33.2-33.6
Sampling Depth (ft)		4.0 - 4.4	15.5 - 15.9	21.2 - 21.6	31.8 - 32.3	33.2 - 33.6
Field Duplicate Identification						
Laboratory Dilution Number		S916985A-4-DL	S916985A-5-DL			
Laboratory Number		S916985A-4	S916985A-5	S916985A-6	S916985A-7	S916985A-8
Parameter (units)	**SCO**					
1,1,1-Trichloroethane (ug/kg)	800					
1,1-Dichloroethane (ug/kg)						
1,1-Dichloroethene (ug/kg)						
1,2-Dichloroethane (ug/kg)						
2-Butanone (MEK) (ug/kg)	300					
Acetone (ug/kg)						
Benzene (ug/kg)	60			5.4 J		
Carbon disulfide (ug/kg)						
Chloroethane (ug/kg)						
Chloromethane (ug/kg)						
Cis/Trans-1,2-Dichloroethene (ug/kg)	300	270	17	10		5.6 J
Ethylbenzene (ug/kg)	5500					
Methylene chloride (Dichloromethane) (ug/kg)						
Styrene (ug/kg)						
Tetrachloroethene (ug/kg)	1400					
Toluene (ug/kg)	1500			3.7 J		
Trichloroethene (ug/kg)	700	1300	120	11	1600	98
Vinyl chloride (ug/kg)	200					
Xylenes, Total (ug/kg)	1200					
Total Volatiles		1570	187	30.11	1600	103.6

Notes:

1. Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives (SCOs), from Table 1 of the OU2 ROD, USEPA Region II, September, 1996.
2. Blank cells denote nondetected values.
3. Values in parentheses are for undiluted sample analyses when parameter was not detected during the analysis of the dilution.
4. Parameters not listed were not detected in any of the samples.

Qualifiers:

D = Value derived from analysis of a dilution.
E = Value estimated, exceeds the calibration range.
J = Value estimated, below quantitation limit.
U = Not detected.

TABLE 3-3
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number		B28-0.0-0.5	B28-4.0-4.4	B28-15.5-15.8	B28-19.1-19.3	
Sampling Depth (ft)		0.0 - 0.5	4.0 - 4.4	15.5 - 15.8	19.1 - 19.3	19.1 - 19.3
Field Duplicate Identification						B28-19.1-19.3-DUP
Laboratory Dilution Number		S917074-4-DL	S917074-5-DL	S917074-6-DL	S917074-7-DL	
Laboratory Number		S917074-4	S917074-5	S917074-6	S917074-7	S917074-8
Parameter (units)	**SCO**					
1,1,1-Trichloroethane (ug/kg)	800					
1,1-Dichloroethane (ug/kg)						
1,1-Dichloroethene (ug/kg)						
1,2-Dichloroethane (ug/kg)						
2-Butanone (MEK) (ug/kg)	300	49 J				
Acetone (ug/kg)		270		32 J		
Benzene (ug/kg)	60	24		5 J		
Carbon disulfide (ug/kg)						
Chloroethane (ug/kg)						
Chloromethane (ug/kg)						
Cis/Trans-1,2-Dichloroethene (ug/kg)	300	120	12	29		
Ethylbenzene (ug/kg)	5500	19				
Methylene chloride (Dichloromethane) (ug/kg)						
Styrene (ug/kg)						
Tetrachloroethene (ug/kg)	1400			8.9		
Toluene (ug/kg)	1500	74		6.9 J		
Trichloroethene (ug/kg)	700	280 D	84	190 JD	1600	1600
Vinyl chloride (ug/kg)	200					
Xylenes, Total (ug/kg)	1200	96				
Total Volatiles		932	96	271.8	1600	1600

Notes:

1. Shaded cells denote analytical values exceeding the *OU2 ROD soil clean-up objectives (SCOs), from* Table 1 of the OU2 ROD, USEPA Region II, September, 1996.
2. Blank cells denote nondetected values.
3. Values in parentheses are for undiluted sample analyses when parameter was not detected during the analysis of the dilution.
4. Parameters not listed were not detected in any of the samples.

Qualifiers:

D = Value derived from analysis of a dilution.
E = Value estimated, exceeds the calibration range.
J = Value estimated, below quantitation limit.
U = Not detected.

TABLE 3-3
Analytical Results for Soil Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number		B28-22.5-22.8	B28-31.7-32.0
Sampling Depth (ft)		22.5 - 22.8	31.7 - 32.0
Field Duplicate Identification			
Laboratory Dilution Number			
Laboratory Number		S917074-9	S917074-10
Parameter (units)	**SCO**		
1,1,1-Trichloroethane (ug/kg)	800		
1,1-Dichloroethane (ug/kg)			
1,1-Dichloroethene (ug/kg)			
1,2-Dichloroethane (ug/kg)			
2-Butanone (MEK) (ug/kg)	300		
Acetone (ug/kg)			
Benzene (ug/kg)	60		
Carbon disulfide (ug/kg)			
Chloroethane (ug/kg)			
Chloromethane (ug/kg)			
Cis/Trans-1,2-Dichloroethene (ug/kg)	300		
Ethylbenzene (ug/kg)	5500		
Methylene chloride (Dichloromethane) (ug/kg)			
Styrene (ug/kg)			
Tetrachloroethene (ug/kg)	1400		
Toluene (ug/kg)	1500		
Trichloroethene (ug/kg)	700	7200	25
Vinyl chloride (ug/kg)	200		
Xylenes, Total (ug/kg)	1200		
Total Volatiles		*7200*	*25*

Notes:

1. Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives (SCOs), from Table 1 of the OU2 ROD, USEPA Region II, September, 1996.
2. Blank cells denote nondetected values.
3. Values in parentheses are for undiluted sample analyses when parameter was not detected during the analysis of the dilution.
4. Parameters not listed were not detected in any of the samples.

Qualifiers:

D = Value derived from analysis of a dilution.
E = Value estimated, exceeds the calibration range.
J = Value estimated, below quantitation limit.
U = Not detected.

DRAWING NUMBER 870724-B1
APPROVED BY
CHECKED BY
DRAWN BY A. Smith 10/7/99
OFFICE Pittsburgh, PA

STOP STOP STOP

SB02

ALCAS MAIN PLANT

RICHMOND AVE.

N

SG65

SG99 SG95 SG103 SG108 SG107 SG91 SG87 SG67 B21 B22 SG83 SG74 B23 SG70 B20 SG68 B19 SG66

STORAGE AREA

COMPRESSOR BUILDING

SG79 B24 B-16 B-17 SG69 SG67

B-1 SG104 B-2 SG100 SG96 SG92 B21 SG88

SHED SB04 SG75 B-8 B-5 B-3 B-1 B-2 B-4 SG71 D-2 B-18 B-6 B-12 SB07 B-9

STORAGE AREA SG80 B25 SG80 B-7

SB01 GRAVEL PARKING SB06 SB05 SG93

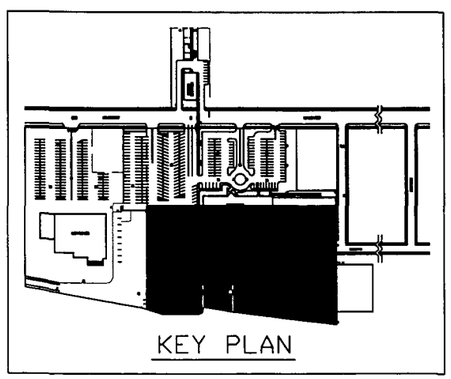
TRANSFORMER BANK SG89 B26 SG85 B28

SG105 SG101 SG97

SHED SG81 SG76 SG72

SG106 SG102 SG98 SG94 SG90 B27 SG77

SG86 SG82 SG78 SG73



KEY PLAN

SCALE
0 50 100 FEET

LEGEND:

- (M) MUNICIPAL WELL
- D-2 ○ EXISTING MONITORING WELL LOCATION IN LOWER AQUIFER (LOCATION TAKEN FROM G&M SUPPLEMENTAL RI, 1994 INSTALLATION DATE UNKNOWN - D2 WAS PRIOR TO 1989 AND B2 WAS PRIOR TO 1991)
- B-1 ⊙ EXISTING MONITORING WELL LOCATION IN UPPER AQUIFER (LOCATION TAKEN FROM G&M SUPPLEMENTAL RI, 1994, INSTALLATION DATE UNKNOWN BUT PRIOR TO 1991)
- SB04 ⊕ PREVIOUS SOIL BORING LOCATION IN UPPER AQUIFER (G&M SUPPLEMENTAL RI, 1994 - SB04 WAS ADVANCED IN 1991, SB07 WAS ADVANCED IN 1993)
- B-6 ● LOCATION OF GEOPROBE SOIL BORING (G&M LETTER, 1994)
- SG65 B19 ⊕ SOIL GAS & GEOPROBE LOCATION
- SG76 ⊕ SOIL GAS SURVEY LOCATION
- ⊕ LOCATION OF EXSITING SOIL BORING TO BE EXTENDED.

IT CORPORATION

ALCOA
ALCOA, TENNESSEE

FIGURE 3.1.3

SAMPLE LOCATION MAP

ALCAS FACILITY
OLEAN, NEW YORK

D:\Project\870724\870724B1.dwg
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APPROVED BY
CHECKED BY
DRAWN BY A. Smith 10/7/99
OFFICE Pittsburgh, PA
X-REF ---
IMAGE ---
PLOT DATE:11/26/99
FORMAT REVISION 11/4/99

LEGEND:

D-2 ○ EXISTING MONITORING WELL LOCATION IN LOWER AQUIFER (LOCATION TAKEN FROM G&M SUPPLEMENTAL RI, 1994 INSTALLATION DATE UNKNOWN - D2 WAS PRIOR TO 1989 AND B2 WAS PRIOR TO 1991)

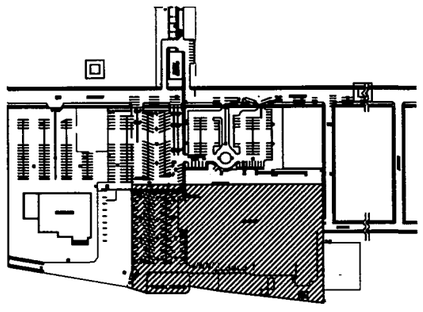
B-16 ⊗ SOIL BORING LOCATION IN UPPER AQUIFER DRILLED JULY 7 TO JULY 12, 1999

B19 ◐ SG68 SOIL BORING LOCATION IN UPPER AQUIFER DRILLED OCTOBER 11 TO OCTOBER 20, 1999

B-13/ B-13A ⊕ LOCATION OF SOIL BORINGS THAT WERE EXTENDED.

MAXIMUM CONCENTRATIONS ABOVE GROUNDWATER

CHEMICAL COMPOUNDS	OU2 ROD CLEAN UP LEVELS
VINYL CHLORIDE	200 ppb
CIS 1,2 DICHLORDETHENE	300 ppb
TRICHLORDETHENE	700 ppb
2-BUTANONE (MEK)	300 ppb



KEY PLAN

ALCAS MAIN PLANT

MAIN BUILDING

GRAVEL PARKING

GATE

PROPERTY LINE

CHAIN LINK FENCE

RICHMOND AVE.

BLOCK BUILDING

SHED

TRANS-FORMER AREA

SHED

GATE

B19 B20 B21 B22 B23 B24 B25 B26 B27 B28 B-10/B-10A B-11/B-11A B-12 B-13/B-13A B-14/B-14A B-15/B-15A B-16 B-17 B-18 D-2

BORING B-22

0-0.5 FT.	4.0-4.4 FT.	15.1-15.4 FT.	22.7-23.0 FT.	25.4-25.7 FT.
-	-	26	-	-
4.8 J	5 J	19	7.8	-
17	8.2	28	10	420
18 J	-	-	-	-

BORING B-24

0-0.5 FT.	3.7-4.0 FT.	15.2-15.5 FT.	22.8-23.1 FT.	26.2-26.6 FT.
-	29	-	-	62
-	8.1	-	-	350 E
42	9.8	3700	2200	1600 D
34 J	-	-	-	-

BORING B-23

0-0.5 FT.	3.7-4.0 FT.	6.5-6.8 FT.	15.0-15.3 FT.	24.3-24.5 FT.	25.1-25.3 FT.
460	540 E	-	-	-	-
7100	2100 E	-	-	-	-
510	530 E	600	24000	3100	3900
-	-	-	-	-	-

BORING B-16

0-1 FT.	6-7 FT.	9-10 FT.	18-19 FT.
-	77	130	2.8 J
-	180	700 E	4.3 J
7.0	580 BE	890	4 25 5
-	-	-	-

BORING B-20

0.4-0.7 FT.	3.6-4.0 FT.	11.0-11.3 FT.	15.0-15.6 FT.	23.6-24.0 FT.	24.5-24.8 FT.
-	-	32	21	-	-
110	5.5 J	220	78	-	-
85	7.9	660 E	1300 E	1400	250
-	-	-	-	-	-

BORING B-19

0.45-0.62 FT.	5.7-6.0 FT.	15.0-15.3 FT.	23.2-23.6 FT.	27.0-27.4 FT.	31.4-31.7 FT.
-	-	11	30	19	-
-	-	80	160	110	7.6
16	16	1800 E	580 D	840 D	220 JD
-	-	-	-	-	-

BORING B-17

0-1 FT.	6-7 FT.	11-12 FT.	17-18 FT.
-	62	130	5.3 J
-	280 E	110 J	15
17 B	140 B	1900	420
27 J	-	-	3.7 J

BORING B-18

0-1 FT.	6-7 FT.	14-15 FT.
11	66	-
38	87	-
24	41	-
-	-	-

BORING B-12

0-1 FT.	6-7 FT.	14-15 FT.
-	-	80
48	2.2 J	180
180	4.4 J	79
-	-	-

BORING B-25

0-0.5 FT.	3.7-4.0 FT.	15.6-16.0 FT.	20.8-21.2 FT.	26.7-27.0 FT.
-	-	-	-	-
-	3.5 J	-	-	2.9 J
17	29	4000	1900	16
-	19 J	-	-	-

BORING B-21

0-0.5 FT.	3.7-4.0 FT.	14.7-15.0 FT.	22.7-23.0 FT.	25.5-25.8 FT.
-	-	-	13	-
-	-	3.5 J	-	-
3.2	-	84	3.8 J	59
50	-	-	-	-

BORING B-26

0-0.5 FT.	3.7-4 FT.	15.7-16 FT.	21.5-21.8 FT.	27.5-27.8 FT.
-	-	-	12	-
-	-	-	-	-
5.3 J	6.2 J	450	10	6.8
17 J	-	-	-	-

BORING B-28

0-0.5 FT.	4.0-4.4 FT.	15.5-15.8 FT.	19.1-19.3 FT.	22.5-22.8 FT.	31.7-32 FT.
-	-	-	-	-	-
120	12	29	-	-	-
280 D	84	190 JD	1600	7200	25
49 J	-	-	-	-	-

BORING B-10

0-1 FT.	7-8 FT.	17-18 FT.
-	4.8 J	-
-	6.4	-
120000	200 J	1200
-	-	-

BORING B-10A

23.4-23.8 FT.	25.0-25.3 FT.	28.3-28.7 FT.
-	-	-
-	-	5.1 J
530	2400	160 JD
-	-	-

BORING 15

0-1 FT.	6-7 FT.	13-14 FT.
56	270 E	160
-	420 E	250
30 B	440 E	4900
-	-	-

BORING B-15A

23.2-23.5 FT.	27.1-27.5 FT.
190	61
640 E	390 E
920	2200 D
-	-

BORING 14

0-1 FT.	5-8 FT.	18-20 FT.
-	-	15
7.6	14	640 E
840	1800 E	13000
32	-	-

BORING B-14A

24.1-24.6 FT.	30.4-30.8 FT.
-	-
-	-
13	500
-	-

BORING B-11

0-1 FT.	4-5 FT.	11-12 FT.
-	-	15
-	-	170
85	110	2000 E
-	-	-

BORING B-11A

15.0-15.3 FT.	21.5-21.8 FT.	27.2-27.7 FT.	30.3-30.7 FT.
12 J	-	9.3 J	13
95	12	67	83
150 JD	120 JD	200 JD	1800 D
-	-	-	-

BORING 13

0-1 FT.	7-8 FT.	16-18 FT.
-	32	95
97	130	670 E
3600	250 E	120 J
-	-	-

BORING B-13A

24.2-24.7 FT.	35.4-36.2 FT.
-	-
12	15
320 E	330 D
-	-

BORING B-27

0.1-0.6 FT.	4-4.4 FT.	15.5-15.9 FT.	21.2-21.6 FT.	31.8-32.3 FT.	33.2-33.6 FT.
-	-	-	-	-	-
-	270	17	10	-	5.6 J
1200	1300	120	11	1600	98
-	-	-	-	-	-

SCALE 0 50 100 FEET

IT CORPORATION

ALCOA
ALCOA, TENNESSEE

FIGURE 3.1.4

ANALYTICAL RESULTS IN SOIL

ALCAS FACILITY
OLEAN, NEW YORK

TABLE 3-4
Soil Sampling Analytical Result Summary
Alcas Facility Site
Olean, New York
September 2001

Sample Identification Number		**RU-13 9'**	**RU-13 20'**	**RU14-SL-8**	**RU14-SL-25**		**RU-17C 5'**	**RU-17C 25'**
Dilution Identification Number						**RU14-SL-25DL**		
Laboratory Number		913008-006	913008-07	913008-001	913008-002	913008-023	913008-017	913008-018
	units							
Tetrachloroethene	*ug/Kg*	5.9 U	5.6 U	6.3 U	5.7 U	57 U	5.1 U	5.1 U
Trichloroethene	*ug/Kg*	2.0 J	5.6 U	9.4	1900 E	1600 D	3.3	20
cis-1,2-Dichloroethene	*ug/Kg*	5.9 U	5.6 U	1.0 J	40	24 JD	5.1 U	0.53 J
trans-1,2-Dichloroethene	*ug/Kg*	5.9 U	5.6 U	6.3 U	3.2 J	57 U	5.1 U	5.1 U
Vinyl chloride	*ug/Kg*	12 U	11 U	13 U	11 U	110 U	10 U	10 U

"J" denotes an estimated value
"E" denotes sample result exceeds calibration range
"U" denotes compound less than detection limit
"D" denotes analyte value from diluted sample
"*" denotes duplicate analyses not within control limit.

TABLE 3-4
Soil Sampling Analytical Result Summary
Alcas Facility Site
Olean, New York
September 2001

Sample Identification Number		**RU-17C 46'**	**RU18-SL-05**	**RU18-SL-25**		**RU18-SL-46**
Dilution Identification Number					**RU18-SL-25DL**	
Laboratory Number		913008-019	913008-003	913008-004	913008-024	913008-005
	units					
Tetrachloroethene	*ug/Kg*	5.4 U	6.2 U	5.8 U	29 U	5.9 U
Trichloroethene	*ug/Kg*	2.4 J	2.9 J	490 E	330 D	150
cis-1,2-Dichloroethene	*ug/Kg*	5.4 U	0.66* J	9.5	4.4 JD	4.3 J
trans-1,2-Dichloroethene	*ug/Kg*	5.4 U	6.2 U	5.8 U	29 U	5.9 U
Vinyl chloride	*ug/Kg*	11 U	13 U	12 U	58 U	12 U

"J" denotes an estimated value
"E" denotes sample result exceeds calibration r
"U" denotes compound less than detection limit
"D" denotes analyte value from diluted sample
"*" denotes duplicate analyses not within contr

APPENDIX C

Groundwater Sampling Results – Upper Zone

- **Phase I Investigation (*July, 1999*)**
  - Analytical Summary Table (Table 3-5)
  - Boring Locations & Data Plot (Figure 3.2.1)
- **Phase II Investigation (*October, 1999*)**
  - Field and Analytical Data Summary Table (Table 3-6)
  - Well/Boring Locations & Data Plot (Figure 3.2.2)
- **Phase III Investigation (*October, 2000*)**
  - Analytical Summary Table (Table 3-7)
- **Phase IV Investigation (*September, 2001*)**
  - Analytical Summary Table (Table 3-8)
  - Well Locations & Data Plot (*Composite of Phase III & IV Work*) (Figure 3.2.3)

TABLE 3-5 - Analytical Results for Groundwater Sampling
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number	B10-GW-189	B11-GW-193	B12-GW-193	B13-GW-188	B14-GW-188		B15-GW-188	B16-GW-188	B17-GW-189
Field Duplicate Identification						B14D-GW-188			
Laboratory Dilution Number	14569-9-DL			14569-3DL					
Laboratory Number	14569-9	14629A-2	14629A-1	14569-3	14569-1	14569-2	14569-4	14569-5	14629-7
Vinyl Chloride (µg/L)[1]	260 J		120	220			500 J		460J
Cis/Trans-1,2-Dichloroethene (µg/L)	1900	110	830	3100	73	68	2100	1500	2700
Trichloroethene (µg/L)	20000	860	280	1600	1600	1300	9700	5200	12000
Phenanthrene (µg/L)		11							
Fluoranthene (µg/L)		12							
Pyrene (µg/L)		9.4 J							
Carbazole (µg/L)		6.9 J							

Notes:
(1) All analytical results are in µg/L or parts per billion
(2) "J" designation denotes an estimated value
(3) "E" designation denotes a serial dilution of the sample
Shaded cells denote analytical values exceeding the OU2 ROD groundwater clean-up objectives. See below:

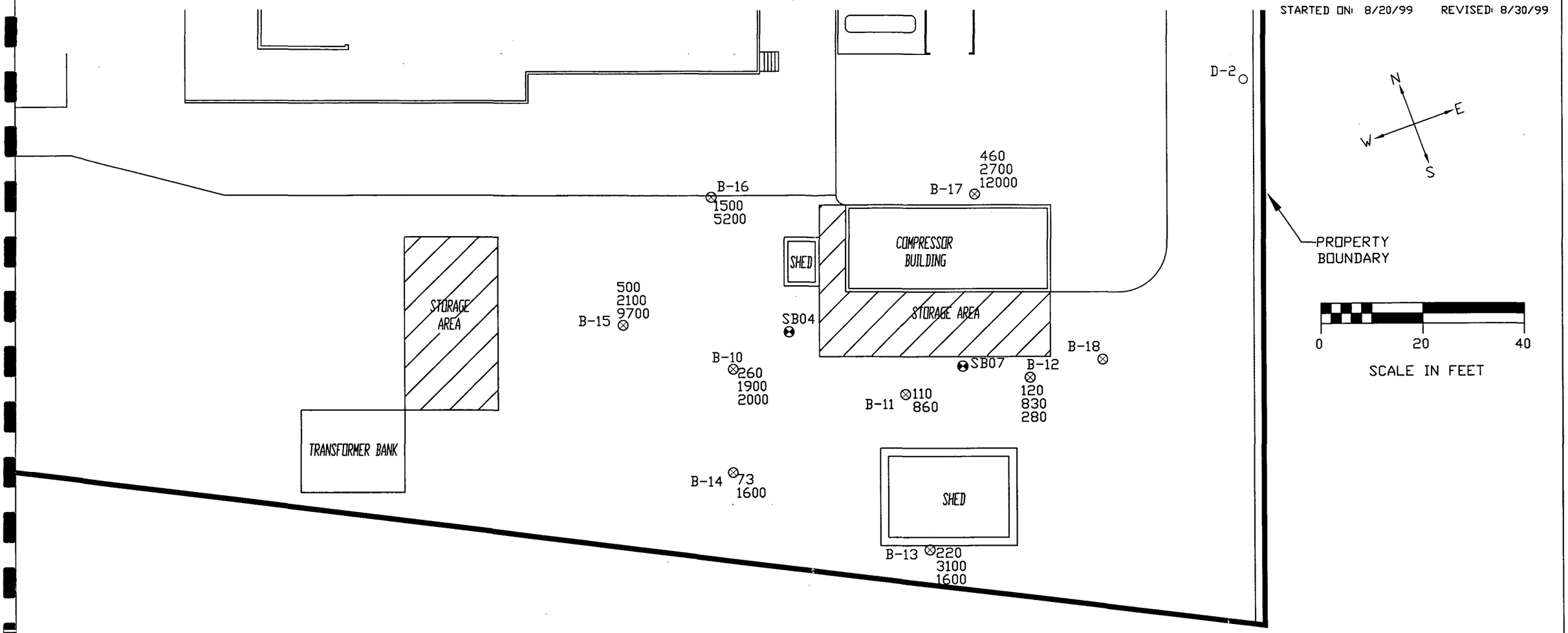
Compound	**MCL[4]**
Vinyl Chloride (µg/L)	2
Cis/Trans-1,2-Dichloroethene (µg/L)	70
Trichloroethene (µg/L)	5

(4) Maximum Contaminant Level (MCL); Table 1, OU2 ROD
USEPA Region II, September, 1996

Note: Borehole Description
B10 - Borehole Location
GW - Groundwater
193 - Calender Date

JOB NO.: 7072400200 PLOT SCALE: 1=250

STARTED ON: 8/20/99 REVISED: 8/30/99



LEGEND:

- ○ EXISTING MONITORING WELL LOCATION IN LOWER AQUIFER (LOCATION TAKEN FROM G&M SUPPLEMENTAL RI, 1994 - INSTALLED 1989 OR EARLIER)
- ⊗ PREVIOUS SOIL BORING LOCATION IN UPPER AQUIFER (G&M SUPPLEMENTAL RI, 1994 - SB04 WAS ADVANCED IN 1991, SB07 WAS ADVANCED IN 1993)
- ⊗ SOIL BORING LOCATION IN UPPER AQUIFER DRILLED JULY 7 TO JULY 12 1999

MAXIMUM CONCENTRATIONS IN GROUNDWATER

CHEMICAL COMPOUNDS	OU2 ROD CLEAN UP LEVELS
VINYL CHLORIDE	2 ppb
CIS 1,2 DICHLORDETHENE	70 ppb
TRICHLORDETHENE	5 ppb

FIGURE 3.2.1

ALUMINUM COMPANY OF AMERICA ALCOA, TENNESSEE	ANALYTICAL RESULTS IN GROUNDWATER ALCAS FACILITY OLEAN, NEW YORK	
IT CORPORATION PITTSBURGH, PA	DATE: 8/10/99	DR.: B. SNYDER
	SCALE: AS NOTED	FILE NAME: 20153018

TABLE 3-6
Data Summary for UZ Groundwater Samples
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number		B-1	CW-13A	CW-15A	P1 *(Depth Unknown)*	P2 *(Depth Unknown)*	RW-1	SW-14	VERMW1
Parameter (units)	**SCO**								
Volatile Organics									
Benzene (ug/l)		0.93 J	ND	ND	NA	ND	ND	ND	NA
1,1-Dichloroethene (ug/l)		ND	ND	ND	NA	0.64 J	ND	ND	NA
Chloroethane (ug/l)		ND	ND	ND	NA	ND	ND	ND	NA
cis-1,2-Dichloroethene (ug/l)	70	1.8	ND	1.8	NA	ND	3700	9.5	NA
Methylene chloride (ug/l)		ND	ND	ND	NA	ND	ND	ND	NA
Tetrachloroethene (ug/l)		0.63 J	1	24	NA	0.55 J	ND	22	NA
trans-1,2-Dichloroethene (ug/l)		ND	ND	ND	NA	1.7	29 J	ND	NA
Trichloroethene (ug/l)	5	ND	ND	ND	NA	21	39000	ND	NA
Vinyl chloride (ug/l)	2	1	ND	ND	NA	12	1400	0.66 J	NA
Total Volatiles		4.36	1	25.8	0	35.89	44129	32.16	0
Natural Attenuation Parameters									
Alkalinity (mg/l)		360	NA	NA	NA	160	310	NA	NA
Ammonia (mg/l)		8	NA	NA	NA	0.059	0.51	NA	NA
Chloride (mg/l)		100	NA	NA	NA	13	290	NA	NA
Iron (2+) (mg/l)		1.7	NA	NA	NA	ND	ND	NA	NA
Manganese (mg/l)		6.5	NA	NA	NA	ND	4.1	NA	NA
Nitrate (mg/l)		ND	NA	NA	NA	4.7	0.9	NA	NA
Totlal Kjeldahl Nitrogen (mg/l)		8	NA	NA	NA	0.7	1.3	NA	NA
Total Phosphorus (mg/l)		0.15	NA	NA	NA	ND	ND	NA	NA
Ortho Phosphate (mg/l)		0.12	NA	NA	NA	0.15	0.14	NA	NA
Sulfate (mg/l)		ND	NA	NA	NA	60	62	NA	NA
Sulfide (mg/l)		ND	NA	NA	NA	ND	ND	NA	NA
Dissolved Gases - Methane (mg/l)		35	NA	NA	NA	ND	0.11	NA	NA
Dissolved Gases - Ethane (mg/l)		ND	NA	NA	NA	ND	0.022	NA	NA
Dissolved Gases - Ethene (mg/l)		ND	NA	NA	NA	ND	0.043	NA	NA
Field Parameters									
Water Level (feet below Top of Casing)		9.1	9.26	21.6	5.67	4.44	11.26	17.13	9.96
Total Depth (feet below Top of Casing)		16.15	18.85	41.15	13.13	9.28	19.23	21.23	19.35
Dissolved Oxygen (mg/l)		0.5	***	1	NA	***	1.4	4.4	NA
Specific Conductivity (ms/cm)		106	42 ***	22.9	NA	49 ***	154	41	NA
pH		6.4	6.9 ***	5.32	NA	6.66 ***	6.67	6	NA
Temperature (Celsius)		15.5	10.9 ***	12.1	NA	14.9 ***	16.5	13.5	NA
Turbidity (NTU)		10	160 ***	14.2	NA	>999 ***	18	1	NA
Oxidation-Reduction Potential (mV)		122	-48 ***	84	NA	204 ***	126	240	NA
Total Dissolved Solids (g/l)		0.7	0.27	0.15	NA	0.32 ***	1	NA	NA
Survey Data (Plant Coordinate System)									
Northing		71.20	-339.98	-674.29	-80.60	-99.18	-54.27	-490.63	-43.18
Easting		-401.35	-36.05	-964.32	-35.18	-43.26	-127.34	-485.94	-122.90
Ground Elevation (ft-amsl)		1427.53	1416.32	1416.00	1425.90	1425.55	1424.30	1421.33	1424.58
Casing Elevation (ft-amsl)		1428.43	1419.75	1418.50	1425.90	1425.55	1424.30	1423.83	1424.58

Notes:

1. Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives (SCOs), from Table 1 of the OU2 ROD, USEPA Region II, September, 1996.

Qualifiers:

J = Value estimated, below quantitation limit.
NA = Not analyzed.
ND = Not Detected.
*** = Well purged dry.

TABLE 3-6
Data Summary for UZ Groundwater Samples
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number		VERMW2	VERMW3	VERMW4
Parameter (units)	**SCO**			
Volatile Organics				
Benzene (ug/l)		ND	ND	ND
1,1-Dichloroethene (ug/l)		19 J	ND	ND
Chloroethane (ug/l)		35 J	ND	ND
cis-1,2-Dichloroethene (ug/l)	70	1300	320	120
Methylene chloride (ug/l)		ND	ND	ND
Tetrachloroethene (ug/l)		58 J	ND	22
trans-1,2-Dichloroethene (ug/l)		16 J	ND	ND
Trichloroethene (ug/l)	5	16000	2200	2300
Vinyl chloride (ug/l)	2	150	74	ND
Total Volatiles		17578	2594	2442
Natural Attenuation Parameters				
Alkalinity (mg/l)		NA	NA	NA
Ammonia (mg/l)		NA	NA	NA
Chloride (mg/l)		NA	NA	NA
Iron (2+) (mg/l)		NA	NA	NA
Manganese (mg/l)		NA	NA	NA
Nitrate (mg/l)		NA	NA	NA
Totlal Kjeldahl Nitrogen (mg/l)		NA	NA	NA
Total Phosphorus (mg/l)		NA	NA	NA
Ortho Phosphate (mg/l)		NA	NA	NA
Sulfate (mg/l)		NA	NA	NA
Sulfide (mg/l)		NA	NA	NA
Dissolved Gases - Methane (mg/l)		NA	NA	NA
Dissolved Gases - Ethane (mg/l)		NA	NA	NA
Dissolved Gases - Ethene (mg/l)		NA	NA	NA
Field Parameters				
Water Level (feet below Top of Casing)		7.56	7.19	7.82
Total Depth (feet below Top of Casing)		19.73	19.51	19.79
Dissolved Oxygen (mg/l)		0.2	4.6	2.6
Specific Conductivity (ms/cm)		78	80	73
pH		6.2	6.5	7.2
Temperature (Celsius)		16	15.9	14.8
Turbidity (NTU)		84	8	33
Oxidation-Reduction Potential (mV)		220	39	87
Total Dissolved Solids (g/l)		0.52	0.51	0.47
Survey Data (Plant Coordinate System)				
Northing		-61.10	-72.84	-41.50
Easting		-113.46	-134.44	-159.30
Ground Elevation (ft-amsl)		1424.74	1424.20	1424.70
Casing Elevation (ft-amsl)		1424.74	1424.20	1424.70

Notes:

1. Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives (SCOs), from Table 1 of the OU2 ROD, USEPA Region II, September, 1996.

Qualifiers:

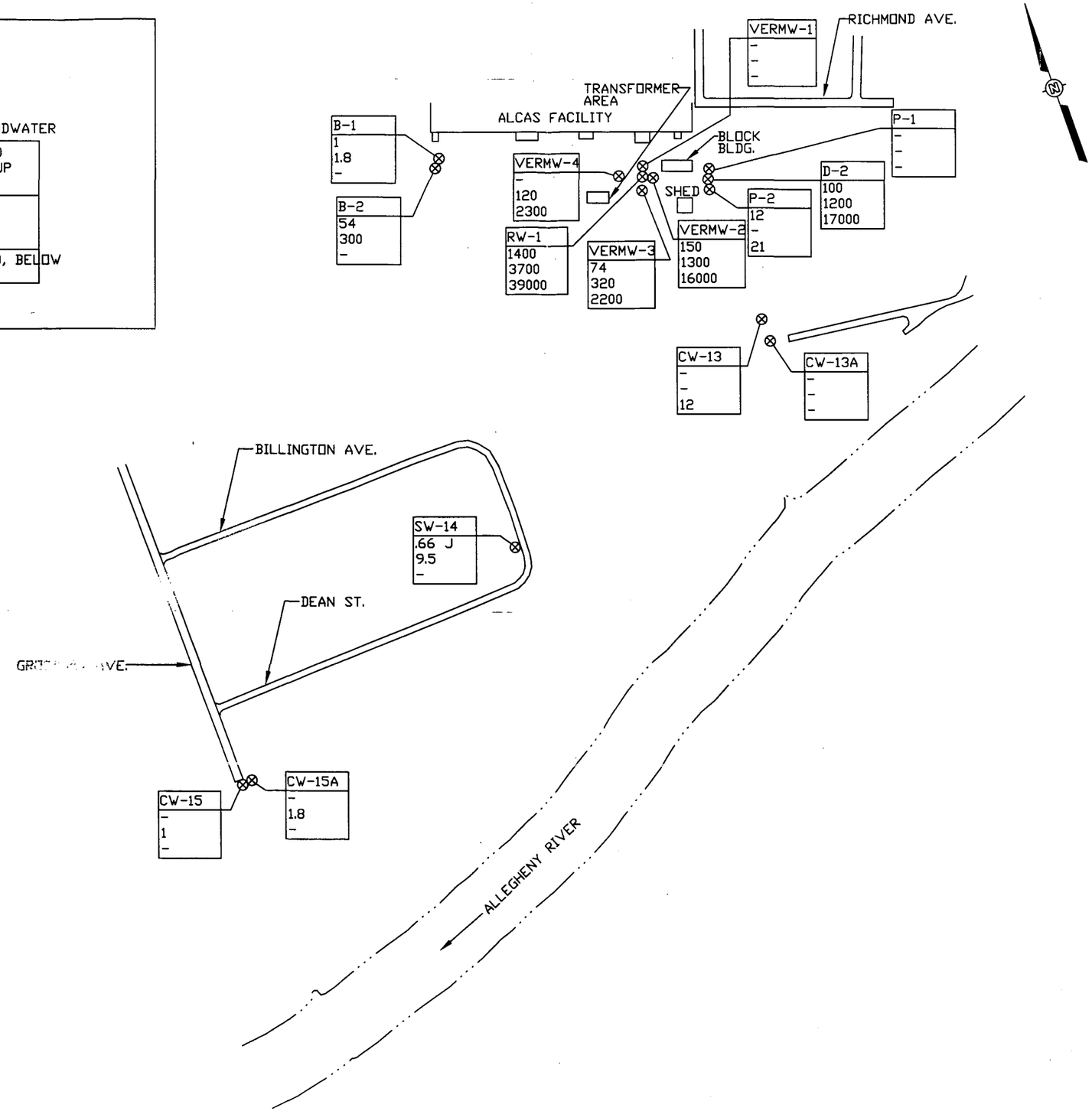
J = Value estimated, below quantitation limit.
NA = Not analyzed.
ND = Not Detected.
*** = Well purged dry.

LEGEND:

D-2 ⊗ MONITORING WELL

MAXIMUM CONCENTRATIONS IN GROUNDWATER

CHEMICAL COMPOUNDS	OU2 ROD CLEAN UP LEVELS
VINYL CHLORIDE	2 ppb
CIS 1,2 DICHLOROETHENE	70 ppb
TRICHLOROETHENE	5 ppb
QUALIFIER: J = VALUE ESTIMATED, BELOW QUANTITATION LIMITS	



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D. Evans 12/4/99		

IMAGE	X-REF	OFFICE	DRAWING NUMBER
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PLOT DATE: 11/26/99
FORMAT REVISION 12/4/99

IT CORPORATION

ALUMINUM COMPANY OF AMERICA
ALCOA, TENNESSEE

FIGURE 3.2.2

ANALYTICAL RESULTS IN GROUNDWATER

ALCAS FACILITY
OLEAN, NEW YORK

TABLE 3-7
PHASE III - UPPER ZONE DATA
Ground Water Sampling Analytical Result Summary
Alcas Facility Site - Olean, New York
October, 2000

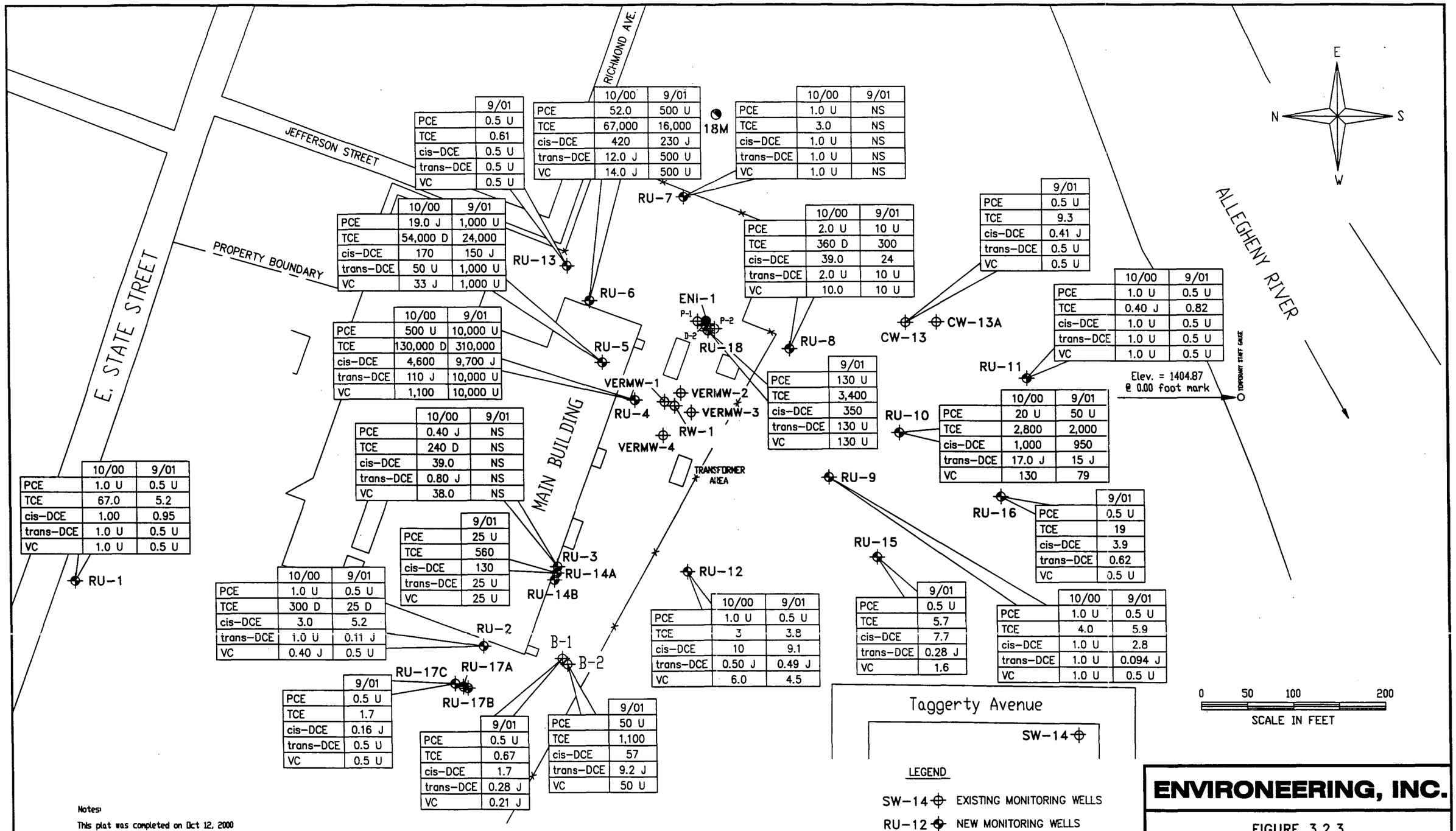
Sample Identification Number	Dilution Identification Number	Laboratory Number	Units	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Vinyl chloride
RU-1		06098-01	ug/L	1.0 U	67	1	1.0 U	1.0 U
RU-4		06098-04	ug/L	500U	130,000 D	4,600	110 J(500)	1,100
RU-5		06098-05	ug/L	19.0 J	54,000 D	170	50 U	33.0 J(50)
RU-6		06098-06	ug/L	52	67,000	420	12.0 J(50)	14.0 J(50)
RU-7		06098-07	ug/L	1.0 U	3	1.0 U	1.0 U	1.0 U
RU-8		06098-08	ug/L	2.0 U	360 D	39	2.0 U	10
RU-9		06098-09	ug/L	1.0 U	4	1.0 U	1.0 U	1.0 U
RU-10		06098-10	ug/L	20 U	2,800	1,000	17.0 J(20)	130
RU-11		06098-11	ug/L	1.0 U	0.40 J(1.0)	1.0 U	1.0 U	1.0 U
RU-12		06098-12	ug/L	1.0 U	3	10	0.50 J(1.0)	6
TRIP BLANK		06098-16	ug/L	1 U	0.3 J	1 U	1 U	1 U

"J" denotes an estimated value
"E" denotes sample result exceeds calibration range
"U" denotes compound less than detection limit
"D" denotes analyte value from diluted sample
"*" denotes duplicate analyses not withing control limit.

TABLE 3-8
PHASE IV - UPPER ZONE DATA
Ground Water Sampling Analytical Result Summary
Alcas Facility Site - Olean, New York
September 2001

Sample Identification Number	Dilution Identification Number	Laboratory Number	Units	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Vinyl chloride
RU-1		913001-001	ug/L	0.5 U	5.2	0.95	0.5 U	0.5 U
RU-4		913091-007	ug/L	10,000 U	310,000	9,700 J	10,000 U	10,000 U
RU-5		913091-008	ug/L	1,000 U	24,000	150 J	1,000 U	1,000 U
RU-6		913001-002	ug/L	500 U	16,000	230 J	500 U	500 U
RU-8		913001-003	ug/L	10 U	300	24	10 U	10 U
RU-9		913091-012	ug/L	0.5 U	5.9	2.8	0.094 J	0.5 U
RU-10		913091-005	ug/L	50 U	2,000	950	15 J	79
RU-11		913091-009	ug/L	0.5 U	0.82	0.5 U	0.5 U	0.5 U
RU-12		913091-006	ug/L	0.5 U	3.8	9.1	0.49 J	4.5
RU-13		913091-004	ug/L	0.5 U	0.61	0.5 U	0.5 U	0.5 U
RU-14		913091-002	ug/L	25 U	560	130	25 U	25 U
RU-15		913091-016	ug/L	0.5 U	5.7	7.7	0.28 J	1.6
RU-16		913091-011	ug/L	0.5 U	19	3.9	0.62	0.5 U
B-1		913091-001	ug/L	0.5 U	0.67	1.7	0.28 J	0.21 J
TRIP BLANK		913001-004	ug/L	0.5 U	0.022 J	0.5 U	0.5 U	0.5 U

"J" denotes an estimated value
"E" denotes sample result exceeds calibration range
"U" denotes compound less than detection limit
"D" denotes analyte value from diluted sample
"*" denotes duplicate analyses not withing control limit.



	10/00	9/01
PCE	1.0 U	0.5 U
TCE	67.0	5.2
cis-DCE	1.00	0.95
trans-DCE	1.0 U	0.5 U
VC	1.0 U	0.5 U

RU-1

	10/00	9/01
PCE	1.0 U	0.5 U
TCE	300 D	25 D
cis-DCE	3.0	5.2
trans-DCE	1.0 U	0.11 J
VC	0.40 J	0.5 U

RU-2

	9/01
PCE	0.5 U
TCE	1.7
cis-DCE	0.16 J
trans-DCE	0.5 U
VC	0.5 U

RU-17C

	10/00	9/01
PCE	0.40 J	NS
TCE	240 D	NS
cis-DCE	39.0	NS
trans-DCE	0.80 J	NS
VC	38.0	NS

	9/01
PCE	25 U
TCE	560
cis-DCE	130
trans-DCE	25 U
VC	25 U

RU-3

	9/01
PCE	0.5 U
TCE	0.67
cis-DCE	1.7
trans-DCE	0.28 J
VC	0.21 J

RU-17B

	10/00	9/01
PCE	19.0 J	1,000 U
TCE	54,000 D	24,000
cis-DCE	170	150 J
trans-DCE	50 U	1,000 U
VC	33 J	1,000 U

RU-13

	10/00	9/01
PCE	500 U	10,000 U
TCE	130,000 D	310,000
cis-DCE	4,600	9,700 J
trans-DCE	110 J	10,000 U
VC	1,100	10,000 U

RU-4

	9/01
PCE	0.5 U
TCE	0.61
cis-DCE	0.5 U
trans-DCE	0.5 U
VC	0.5 U

	10/00	9/01
PCE	52.0	500 U
TCE	67,000	16,000
cis-DCE	420	230 J
trans-DCE	12.0 J	500 U
VC	14.0 J	500 U

RU-7

	10/00	9/01
PCE	1.0 U	NS
TCE	3.0	NS
cis-DCE	1.0 U	NS
trans-DCE	1.0 U	NS
VC	1.0 U	NS

	10/00	9/01
PCE	2.0 U	10 U
TCE	360 D	300
cis-DCE	39.0	24
trans-DCE	2.0 U	10 U
VC	10.0	10 U

RU-8

	9/01
PCE	130 U
TCE	3,400
cis-DCE	350
trans-DCE	130 U
VC	130 U

	9/01
PCE	0.5 U
TCE	9.3
cis-DCE	0.41 J
trans-DCE	0.5 U
VC	0.5 U

CW-13 CW-13A

	10/00	9/01
PCE	1.0 U	0.5 U
TCE	0.40 J	0.82
cis-DCE	1.0 U	0.5 U
trans-DCE	1.0 U	0.5 U
VC	1.0 U	0.5 U

RU-11

	10/00	9/01
PCE	20 U	50 U
TCE	2,800	2,000
cis-DCE	1,000	950
trans-DCE	17.0 J	15 J
VC	130	79

RU-10

	9/01
PCE	0.5 U
TCE	19
cis-DCE	3.9
trans-DCE	0.62
VC	0.5 U

RU-16

	10/00	9/01
PCE	1.0 U	0.5 U
TCE	4.0	5.9
cis-DCE	1.0 U	2.8
trans-DCE	1.0 U	0.094 J
VC	1.0 U	0.5 U

	9/01
PCE	0.5 U
TCE	5.7
cis-DCE	7.7
trans-DCE	0.28 J
VC	1.6

RU-15

	10/00	9/01
PCE	1.0 U	0.5 U
TCE	3	3.8
cis-DCE	10	9.1
trans-DCE	0.50 J	0.49 J
VC	6.0	4.5

RU-12

	9/01
PCE	50 U
TCE	1,100
cis-DCE	57
trans-DCE	9.2 J
VC	50 U

B-1 B-2

LEGEND

- SW-14 ⊕ EXISTING MONITORING WELLS
- RU-12 ⊕ NEW MONITORING WELLS
- 18M ◔ PUBLIC WATER WELL
- ENI-1 ● BORING
- PROPERTY BOUNDARY
- FENCE

Notes:

This plat was completed on Oct 12, 2000 from an instrument survey on Oct. 6, 1999 & Oct2 & 4, 2000. 2000 Robert C. Ackerman, P.L.S No. 49845

All elevations were taken on the top of the 2" PVC pipe casing around the 1" PVC well pipe and were marked thereon with a black marker pen.

Elevation datum from the City of Olean, Engineering Office, Olean, NY. Base being USGS.

E1371515

ENVIRONEERING, INC.

FIGURE 3.2.3
ANALYTICAL DATA MAP
CUTCO CUTLERY CORPORATION
ALCAS FACILITY
OLEAN, NEW YORK

DRAWN BY:	DATE:	PROJ. NO.
LMG	4-29-02	137-18

SEVERN TRENT SERVICES
STL Savannah
5102 LaRoche Avenue • Savannah, GA 31404 • Tel: 912 354 7858 • Fax: 912 352 0165 • www.stl-inc.com

LOG NO: S0-06908
Received: 06 OCT 00
Reported: 26 OCT 00

Mr. Andrew Harper
Environeering, Inc.
16350 Park Ten Place Ste 140
Houston, TX 77084

Project: ALCAS/137-08
Sampled By: Client
Code: 180701025

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
06908-1	RU1-GW-2780	10-04-00/12:30	ALCA10
06908-2	RU2-GW-2790	10-05-00/14:00	ALCA10
06908-2-DL	RU2-GW-2790	10-05-00/14:00	ALCA10
06908-3	RU3-GW-2780	10-04-00/11:00	ALCA10
06908-3-DL	RU3-GW-2780	10-04-00/11:00	ALCA10

PARAMETER	06908-1	06908-2	06908-2-DL	06908-3	06908-3-DL
Volatiles (CLP-10/92)					
Tetrachloroethene, ug/l	1U	1U	2U	0.4J	2U
Trichloroethene, ug/l	67	270E	300D	210E	240D
cis-1,2-Dichloroethene, ug/l	1	3	5D	39	47D
trans-1,2-Dichloroethene, ug/l	1U	1U	2U	0.8J	1DJ
Vinyl chloride, ug/l	1U	0.4J	2D	38	32D
Dilution Factor	1	1	2	1	2
Analysis Date	10.16.00	10.15.00	10.16.00	10.15.00	10.16.00
Batch ID	2B1016	1B1015	2B1016	1B1015	2B1016

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SEVERN TRENT SERVICES

STL Savannah

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Mr. Andrew Harper
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16350 Park Ten Place Ste 140
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Project: ALCAS/137-08
Sampled By: Client
Code: 180701025

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
06908-4	RU4-GW-2780	10-04-00/18:30	ALCA10
06908-4-DL	RU4-GW-2780	10-04-00/18:30	ALCA10
06908-5	RU5-GW-2770	10-03-00/17:30	ALCA10
06908-5-DL	RU5-GW-2770	10-03-00/17:30	ALCA10
06908-6	RU6-GW-2780	10-04-00/17:15	ALCA10

PARAMETER	06908-4	06908-4-DL	06908-5	06908-5-DL	06908-6
Volatiles (CLP-10/92)					
Tetrachloroethene, ug/l	500U	2500U	19J	500U	52
Trichloroethene, ug/l	190000E	130000D	56000E	54000D	58000E
cis-1,2-Dichloroethene, ug/l	4600	4300D	170	260DJ	420
trans-1,2-Dichloroethene, ug/l	110J	2500U	50U	500U	12J
Vinyl chloride, ug/l	1100	2500U	33J	500U	14J
Dilution Factor	500	2500	50	500	50
Analysis Date	10.15.00	10.16.00	10.15.00	10.16.00	10.15.00
Batch ID	1B1015	2B1016	1B1015	2B1016	1B1015

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Sampled By: Client
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
06908-6-DL	RU6-GW-2780	10-04-00/17:15	ALCA10
06908-7	RU7-GW-2780	10-04-00/14:45	ALCA10
06908-8	RU8-GW-2770	10-03-00/16:45	ALCA10
06908-8-DL	RU8-GW-2770	10-03-00/16:45	ALCA10
06908-9	RU9-GW-2770	10-03-00/14:40	ALCA10

PARAMETER	06908-6-DL	06908-7	06908-8	06908-8-DL	06908-9
Volatiles (CLP-10/92)					
Tetrachloroethene, ug/l	500U	1U	2U	4U	1U
Trichloroethene, ug/l	67000D	3	480E	360D	4
cis-1,2-Dichloroethene, ug/l	570D	1U	39	30D	1U
trans-1,2-Dichloroethene, ug/l	500U	1U	2U	4U	1U
Vinyl chloride, ug/l	500U	1U	10	7D	1U
Dilution Factor	500	1	2	4	1
Analysis Date	10.16.00	10.15.00	10.16.00	10.16.00	10.15.00
Batch ID	2B1016	1B1015	2B1016	2B1016	1B1015

SEVERN TRENT SERVICES
STL Savannah
5102 LaRoche Avenue • Savannah, GA 31404 • Tel: 912 354 7858 • Fax: 912 352 0165 • www.stl-inc.com

LOG NO: S0-06908
Received: 06 OCT 00
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Mr. Andrew Harper
Environeering, Inc.
16350 Park Ten Place Ste 140
Houston, TX 77084

Project: ALCAS/137-08
Sampled By: Client
Code: 180701025

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
06908-10	RU10-GW-2770	10-03-00/15:00	ALCA10
06908-11	RU11-GW-2770	10-03-00/15:30	ALCA10
06908-12	RU12-GW-2770	10-03-00/14:15	ALCA10
06908-13	RU4-GW-2780D	10-04-00/18:30	ALCA10
06908-16	Trip Blank	10-05-00	ALCA10

PARAMETER	06908-10	06908-11	06908-12	06908-13	06908-16
Volatiles (CLP-10/92)					
Tetrachloroethene, ug/l	20U	1U	1U	500U	1U
Trichloroethene, ug/l	2800	0.4J	3	79000	0.3J
cis-1,2-Dichloroethene, ug/l	1000	1U	10	2900	1U
trans-1,2-Dichloroethene, ug/l	17J	1U	0.5J	500U	1U
Vinyl chloride, ug/l	130	1U	6	780	1U
Dilution Factor	20	1	1	500	1
Analysis Date	10.15.00	10.15.00	10.15.00	10.16.00	10.15.00
Batch ID	1B1015	1B1015	1B1015	2B1016	1B1015

SEVERN TRENT SERVICES
STL Savannah
5102 LaRoche Avenue • Savannah, GA 31404 • Tel: 912 354 7858 • Fax: 912 352 0165 • www.stl-inc.com

LOG NO: S0-06908
Received: 06 OCT 00
Reported: 26 OCT 00

Mr. Andrew Harper
Environeering, Inc.
16350 Park Ten Place Ste 140
Houston, TX 77084

Project: ALCAS/137-08
Sampled By: Client
Code: 180701025

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	DATE/ TIME SAMPLED	SDG#
06908-17	Method Blank		ALCA10
06908-18	Lab Control Standard % Recovery		ALCA10
06908-19	LCS Accuracy Control Limit (%R)		ALCA10
06908-20	Method Blank		ALCA10
06908-21	Lab Control Standard % Recovery		ALCA10

PARAMETER	06908-17	06908-18	06908-19	06908-20	06908-21
Volatiles (CLP-10/92)					
Tetrachloroethene, ug/l	1U	140 %	60-140 %	1U	100 %
Trichloroethene, ug/l	1U	100 %	60-140 %	1U	100 %
cis-1,2-Dichloroethene, ug/l	1U	---	---	1U	---
trans-1,2-Dichloroethene, ug/l	1U	---	---	1U	---
Vinyl chloride, ug/l	1U	140 %	60-140 %	1U	140 %
Dilution Factor	1	1	---	1	1
Analysis Date	10.15.00	10.15.00	---	10.16.00	10.16.00
Batch ID	1B1015	1B1015	1B1015	2B1016	2B1016

NEW YORK LAB ID#10842

Steven J. White
Steven J. White, Project Manager

Final Page Of Report

Serial Number: 012204 Lot # [illegible]

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Savannah Laboratories
a division of Severn Trent Laboratories, Inc

- 5102 LaRoche Avenue, Savannah, GA 31404 — Phone: (912) 354-7858 — Fax: (912) 352-0165
- 2846 Industrial Plaza Drive, Tallahassee, FL 32301 — Phone: (850) 878-3994 — Fax: (850) 878-9504
- 900 Lakeside Drive, Mobile, AL 36693 — Phone: (334) 666-6633 — Fax: (334) 666-6696
- 6712 Benjamin Rd., Suite 100, Tampa, FL 33634 — Phone: (813) 885-7427 — Fax: (813) 885-7049

PROJECT REFERENCE	PROJECT NO.	PROJECT LOCATION (STATE)
	137-08	NC

STL (LAB) PROJECT MANAGER	P.O. NUMBER	CONTRACT NO.
White		

CLIENT (SITE) PM	CLIENT PHONE	CLIENT FAX
Alcas	281 578 5800	2815785875

CLIENT NAME	CLIENT EMAIL
ENI (ENVIRONEERING)	twhite@environceringinc.com

CLIENT ADDRESS: 16350 Park Ten Place Ste 140 Houston TX 77084

COMPANY CONTRACTING THIS WORK (if applicable):

MATRIX TYPE

REQUIRED ANALYSES: VOC; HCl

PAGE 1 OF 2

STANDARD REPORT DELIVERY ○

DATE DUE ____

EXPEDITED REPORT DELIVERY (SURCHARGE) ○

DATE DUE ____

NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

SAMPLE DATE	SAMPLE TIME	SAMPLE IDENTIFICATION	COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ETC)	NUMBER OF CONTAINERS SUBMITTED	REMARKS
10/4/00	1230	RU1-GW-2780	G	X				3	
10/5/00	1400	RU2-GW-2790							
10/4/00	1100	RU3-GW-2780	G	X				3	
10/4/00	1830	RU4-GW-2780	G	X				3	
10/3/00	1730	RU5-GW-2770	G	X				3	
10/4/00	1715	RU6-GW-2780	G	X				3	
10/4/00	1445	RU7-GW-2780	G	X				3	
10/3/00	1645	RU8-GW-2770	G	X				3	
10/3/00	1440	RU9-GW-2770	G	X				3	
10/3/00	1500	RU10-GW-2770	G	X				3	
10/3/00	1530	RU11-GW-~~1530~~ 2770	G	X				3	
10/3/00	1415	RU12-GW-~~1415~~ 2770	G	X				3	

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[signature]	9/19/00		[signature]	10/5/00	1400			

RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
[signature]	9/25/00	1600						

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	STL-SL LOG NO.	LABORATORY REMARKS:
[signature]	10/6/00	8:15	YES / NO		SL-06908	

ORIGINAL

Serial Number 02[illegible] Lot #

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Savannah Laboratories
a division of Severn Trent Laboratories, Inc

- 5102 LaRoche Avenue, Savannah, GA 31404 — Phone: (912) 354-7858 — Fax: (912) 352-0165
- 2846 Industrial Plaza Drive, Tallahassee, FL 32301 — Phone: (850) 878-3994 — Fax: (850) 878-9504
- 900 Lakeside Drive, Mobile, AL 36693 — Phone: (334) 666-6633 — Fax: (334) 666-6696
- 6712 Benjamin Rd., Suite 100, Tampa, FL 33634 — Phone: (813) 885-7427 — Fax: (813) 885-7049

PROJECT REFERENCE	PROJECT NO.	PROJECT LOCATION (STATE)
	137-08	NY
STL (LAB) PROJECT MANAGER	P.O. NUMBER	CONTRACT NO.
White		
CLIENT (SITE) PM	CLIENT PHONE	CLIENT FAX
Alcas	2815785800	2815785800
CLIENT NAME	CLIENT EMAIL	
ENI (ENVIRONEERING)	twhite@environeeringinc.com	
CLIENT ADDRESS		
16350 Park Ten Place Ste 140; Houston TX, 77084		
COMPANY CONTRACTING THIS WORK (if applicable):		

PAGE 2 OF 2

STANDARD REPORT DELIVERY ○

DATE DUE ____

EXPEDITED REPORT DELIVERY (SURCHARGE) ○

DATE DUE ____

NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

SAMPLE DATE	SAMPLE TIME	SAMPLE IDENTIFICATION	MATRIX: COMPOSITE (C) OR GRAB (G) INDICATE	MATRIX: AQUEOUS (WATER)	MATRIX: SOLID OR SEMISOLID	MATRIX: AIR	MATRIX: NONAQUEOUS LIQUID (OIL, SOLVENT, ETC)	REQUIRED ANALYSES: NUMBER OF CONTAINERS SUBMITTED	REMARKS
								VOC / HCL	
10/4/00	1830	RU4-GW-27800	G	X				3	

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
Swafford	9/19/00		Byo	10/5/00	1400			
RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
Byo	9/25/00	1600						

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	STL-SL LOG NO.	LABORATORY REMARKS:
	10/6/00	8:55	(YES) NO		50-06908	

ORIGINAL

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

RU-13 9

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: SAS No.: SDG No.: 913008

Matrix: (soil/water) SOIL Lab Sample ID: 913008-006

Sample wt/vol: 5.0 (g/mL) G Lab File ID: C4460

Level: (low/med) LOW Date Received: 09/05/01

% Moisture: not dec. 16.3 Date Analyzed: 09/18/01

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

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

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-01-4	VINYL CHLORIDE	12	U
156-60-5	TRANS-1 2-DICHLOROETHENE	5.9	U
156-59-2	CIS-1 2-DICHLOROETHENE	5.9	U
79-01-6	TRICHLOROETHENE	2.0	J
127-18-4	TETRACHLOROETHENE	5.9	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

RU-13 20

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: SAS No.: SDG No.: 913008

Matrix: (soil/water) SOIL Lab Sample ID: 913008-007

Sample wt/vol: 5.0 (g/mL) G Lab File ID: C4461

Level: (low/med) LOW Date Received: 09/05/01

% Moisture: not dec. 11.2 Date Analyzed: 09/18/01

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

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

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-01-4	VINYL CHLORIDE	11	U
156-60-5	TRANS-1 2-DICHLOROETHENE	5.6	U
156-59-2	CIS-1 2-DICHLOROETHENE	5.6	U
79-01-6	TRICHLOROETHENE	5.6	U
127-18-4	TETRACHLOROETHENE	5.6	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

RU14-SL-8

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: SAS No.: SDG No.: 913008

Matrix: (soil/water) SOIL Lab Sample ID: 913008-001

Sample wt/vol: 4.9 (g/mL) G Lab File ID: C4453

Level: (low/med) LOW Date Received: 09/05/01

% Moisture: not dec. 20.0 Date Analyzed: 09/18/01

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

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

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-01-4	VINYL CHLORIDE	13	U
156-60-5	TRANS-1 2-DICHLOROETHENE	6.3	U
156-59-2	CIS-1 2-DICHLOROETHENE	1.0	J
79-01-6	TRICHLOROETHENE	9.4	
127-18-4	TETRACHLOROETHENE	6.3	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

RU14-SL-25

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: SAS No.: SDG No.: 913008

Matrix: (soil/water) SOIL Lab Sample ID: 913008-002

Sample wt/vol: 5.0 (g/mL) G Lab File ID: C4454

Level: (low/med) LOW Date Received: 09/05/01

% Moisture: not dec. 12.6 Date Analyzed: 09/18/01

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

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

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-01-4	VINYL CHLORIDE	11	U
156-60-5	TRANS-1 2-DICHLOROETHENE	3.2	J
156-59-2	CIS-1 2-DICHLOROETHENE	40	
79-01-6	TRICHLOROETHENE	1900	E
127-18-4	TETRACHLOROETHENE	5.7	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

RU14-SL-25DL

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: SAS No.: SDG No.: 913008

Matrix: (soil/water) SOIL Lab Sample ID: 913008-023

Sample wt/vol: 0.5 (g/mL) G Lab File ID: C4476

Level: (low/med) LOW Date Received: 09/05/01

% Moisture: not dec. 12.6 Date Analyzed: 09/19/01

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

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

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-01-4	VINYL CHLORIDE	110	U
156-60-5	TRANS-1 2-DICHLOROETHENE	57	U
156-59-2	CIS-1 2-DICHLOROETHENE	24	DJ
79-01-6	TRICHLOROETHENE	1600	D
127-18-4	TETRACHLOROETHENE	57	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

RU-17C 5

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: SAS No.: SDG No.: 913008

Matrix: (soil/water) SOIL Lab Sample ID: 913091-017

Sample wt/vol: 5.0 (g/mL) G Lab File ID: F8932

Level: (low/med) LOW Date Received: 09/08/01

% Moisture: not dec. 2.4 Date Analyzed: 09/22/01

GC Column: RTX-624 ID: 0.18 (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
75-01-4	VINYL CHLORIDE	10	U
156-60-5	TRANS-1 2-DICHLOROETHENE	5.1	U
156-59-2	CIS-1 2-DICHLOROETHENE	5.1	U
79-01-6	TRICHLOROETHENE	3.3	
127-18-4	TETRACHLOROETHENE	5.1	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

RU-17C 25

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: SAS No.: SDG No.: 913008

Matrix: (soil/water) SOIL Lab Sample ID: 913091-018

Sample wt/vol: 5.0 (g/mL) G Lab File ID: F8933

Level: (low/med) LOW Date Received: 09/08/01

% Moisture: not dec. 3.4 Date Analyzed: 09/22/01

GC Column: RTX-624 ID: 0.18 (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
75-01-4	VINYL CHLORIDE	10	U
156-60-5	TRANS-1 2-DICHLOROETHENE	5.1	U
156-59-2	CIS-1 2-DICHLOROETHENE	0.53	J
79-01-6	TRICHLOROETHENE	20	
127-18-4	TETRACHLOROETHENE	5.1	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

RU-17C 46

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: SAS No.: SDG No.: 913008

Matrix: (soil/water) SOIL Lab Sample ID: 913091-019

Sample wt/vol: 5.0 (g/mL) G Lab File ID: F8934

Level: (low/med) LOW Date Received: 09/10/01

% Moisture: not dec. 7.6 Date Analyzed: 09/22/01

GC Column: RTX-624 ID: 0.18 (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
75-01-4	VINYL CHLORIDE	11	U
156-60-5	TRANS-1 2-DICHLOROETHENE	5.4	U
156-59-2	CIS-1 2-DICHLOROETHENE	5.4	U
79-01-6	TRICHLOROETHENE	2.4	J
127-18-4	TETRACHLOROETHENE	5.4	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

RU18-SL-05

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: SAS No.: SDG No.: 913008

Matrix: (soil/water) SOIL Lab Sample ID: 913008-003

Sample wt/vol: 5.0 (g/mL) G Lab File ID: C4457

Level: (low/med) LOW Date Received: 09/07/01

% Moisture: not dec. 20.2 Date Analyzed: 09/18/01

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

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

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-01-4	VINYL CHLORIDE	13	U
156-60-5	TRANS-1 2-DICHLOROETHENE	6.2	U
156-59-2	CIS-1 2-DICHLOROETHENE	0.66	J*
79-01-6	TRICHLOROETHENE	2.9	J
127-18-4	TETRACHLOROETHENE	6.2	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

RU18-SL-25

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: SAS No.: SDG No.: 913008

Matrix: (soil/water) SOIL Lab Sample ID: 913008-004

Sample wt/vol: 5.0 (g/mL) G Lab File ID: C4458

Level: (low/med) LOW Date Received: 09/07/01

% Moisture: not dec. 14.0 Date Analyzed: 09/18/01

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

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

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-01-4	VINYL CHLORIDE	12	U
156-60-5	TRANS-1 2-DICHLOROETHENE	5.8	U
156-59-2	CIS-1 2-DICHLOROETHENE	9.5	
79-01-6	TRICHLOROETHENE	490	E
127-18-4	TETRACHLOROETHENE	5.8	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

RU18-SL-25DL

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: SAS No.: SDG No.: 913008

Matrix: (soil/water) SOIL Lab Sample ID: 913008-024

Sample wt/vol: 1.0 (g/mL) G Lab File ID: C4479

Level: (low/med) LOW Date Received: 09/05/01

% Moisture: not dec. 14.0 Date Analyzed: 09/19/01

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

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

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-01-4	VINYL CHLORIDE	58	U
156-60-5	TRANS-1 2-DICHLOROETHENE	29	U
156-59-2	CIS-1 2-DICHLOROETHENE	4.4	DJ
79-01-6	TRICHLOROETHENE	330	D
127-18-4	TETRACHLOROETHENE	29	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

RU18-SL-46

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: SAS No.: SDG No.: 913008

Matrix: (soil/water) SOIL Lab Sample ID: 913008-005

Sample wt/vol: 5.0 (g/mL) G Lab File ID: C4459

Level: (low/med) LOW Date Received: 09/07/01

% Moisture: not dec. 15.9 Date Analyzed: 09/18/01

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

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

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-01-4	VINYL CHLORIDE	12	U
156-60-5	TRANS-1 2-DICHLOROETHENE	5.9	U
156-59-2	CIS-1 2-DICHLOROETHENE	4.3	J
79-01-6	TRICHLOROETHENE	150	
127-18-4	TETRACHLOROETHENE	5.9	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

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Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: SAS No.: SDG No.: 913008

Matrix: (soil/water) WATER Lab Sample ID: 913008-008

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: C4415

Level: (low/med) LOW Date Received: 09/05/01

% Moisture: not dec. _____ Date Analyzed: 09/14/01

GC Column: RTX-624 ID: 0.18 (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
75-01-4	VINYL CHLORIDE	2.0	U
156-60-5	TRANS-1 2-DICHLOROETHENE	1.0	U
156-59-2	CIS-1 2-DICHLOROETHENE	1.0	U
79-01-6	TRICHLOROETHENE	1.0	U*
127-18-4	TETRACHLOROETHENE	1.0	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.

RU-1

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913001-001 Date Received: 09/08/2001

Lab File ID: A2185 Date Analyzed: 09/17/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.95	
79-01-6	Trichloroethene	5.2	
127-18-4	Tetrachloroethene	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

RU-1

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913001-001 Date Received: 09/08/2001

Lab File ID: A2185 Date Analyzed: 09/17/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 4

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01	354-23-4	ETHANE, 1,2-DICHLORO-1,1,2-T	2.58	0.81	NJ
02		CIS-1,3-DICHLOROPROPENE-D4	7.39	1.9	JB
03	124-19-6	NONANAL	14.27	1.1	NJ
04	112-31-2	DECANAL	15.53	0.59	NJ
05					
06					
07					
08					
09					
10					
11					
12					
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1LCA
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.

RU-2

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-020 Date Received: 09/14/2001

Lab File ID: A2228 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.11	J
156-59-2	cis-1,2-Dichloroethene	5.2	
79-01-6	Trichloroethene	37	E
127-18-4	Tetrachloroethene	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

RU-2

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-020 Date Received: 09/14/2001

Lab File ID: A2228 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 5

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		UNKNOWN	1.70	2.0	J
02	67-64-1	ACETONE	2.89	0.69	NJ
03		CIS-1,3-DICHLOROPROPENE-D4	7.40	1.9	JB
04	108-88-3	TOLUENE	7.77	4.2	NJ
05		UNKNOWN	13.16	0.60	J
06					
07					
08					
09					
10					
11					
12					
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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.

RU-2DL

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-029 Date Received: 09/14/2001

Lab File ID: A2232 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 10.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
156-59-2	cis-1,2-Dichloroethene	3.6	DJ
79-01-6	Trichloroethene	25	D
127-18-4	Tetrachloroethene	5.0	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS EPA SAMPLE NO.

RU-2DL

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-029 Date Received: 09/14/2001

Lab File ID: A2232 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 10.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 1

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		CIS-1,3-DICHLOROPROPENE-D4	7.40	19	JBD
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.

RU-4

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-007 Date Received: 09/14/2001

Lab File ID: A2247 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 20000.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	10000	U
156-60-5	trans-1,2-Dichloroethene	10000	U
156-59-2	cis-1,2-Dichloroethene	9700	J
79-01-6	Trichloroethene	310000	
127-18-4	Tetrachloroethene	10000	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS EPA SAMPLE NO.

RU-4

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-007 Date Received: 09/14/2001

Lab File ID: A2247 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 20000.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 1

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		CIS-1,3-DICHLOROPROPENE-D4	7.39	36000	JB
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
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1LCA
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.

RU-5

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-008 Date Received: 09/14/2001

Lab File ID: A2246 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 2000.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	1000	U
156-60-5	trans-1,2-Dichloroethene	1000	U
156-59-2	cis-1,2-Dichloroethene	150	J
79-01-6	Trichloroethene	24000	
127-18-4	Tetrachloroethene	1000	U

1LCF
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS EPA SAMPLE NO.

RU-5

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-008 Date Received: 09/14/2001

Lab File ID: A2246 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 2000.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 1

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		CIS-1,3-DICHLOROPROPENE-D4	7.40	3800	JB
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

RU-6

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913001-002 Date Received: 09/08/2001

Lab File ID: A2196 Date Analyzed: 09/17/2001

Purge Volume: 25.0(ML) Dilution Factor: 1000.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	500	U
156-60-5	trans-1,2-Dichloroethene	500	U
156-59-2	cis-1,2-Dichloroethene	230	J
79-01-6	Trichloroethene	16000	
127-18-4	Tetrachloroethene	500	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS EPA SAMPLE NO.

RU-6

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913001-002 Date Received: 09/08/2001

Lab File ID: A2196 Date Analyzed: 09/17/2001

Purge Volume: 25.0(ML) Dilution Factor: 1000.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 1

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		CIS-1,3-DICHLOROPROPENE-D4	7.39	2000	JB
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
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1LCA
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.

RU-8

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913001-003 Date Received: 09/08/2001

Lab File ID: A2195 Date Analyzed: 09/17/2001

Purge Volume: 25.0(ML) Dilution Factor: 20.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	10	U
156-60-5	trans-1,2-Dichloroethene	10	U
156-59-2	cis-1,2-Dichloroethene	24	
79-01-6	Trichloroethene	300	
127-18-4	Tetrachloroethene	10	U

1LCF

LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

RU-8

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913001-003 Date Received: 09/08/2001

Lab File ID: A2195 Date Analyzed: 09/17/2001

Purge Volume: 25.0(ML) Dilution Factor: 20.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 1

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		CIS-1,3-DICHLOROPROPENE-D4	7.39	39	JB
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
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24					
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28					
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1LCA
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.

RU-9

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-012 Date Received: 09/14/2001

Lab File ID: A2221 Date Analyzed: 09/20/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.094	J
156-59-2	cis-1,2-Dichloroethene	2.8	
79-01-6	Trichloroethene	5.9	
127-18-4	Tetrachloroethene	0.50	U

1LCF

LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

RU-9

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-012 Date Received: 09/14/2001

Lab File ID: A2221 Date Analyzed: 09/20/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 6

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		CIS-1,3-DICHLOROPROPENE-D4	7.40	1.9	JB
02		UNKNOWN	15.39	0.85	J
03		UNKNOWN	15.44	2.0	J
04		UNKNOWN	15.53	2.3	J
05		UNKNOWN	15.72	1.3	J
06		UNKNOWN	15.83	1.0	J
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

RU-10

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-005 Date Received: 09/14/2001

Lab File ID: A2241 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 100.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	79	
156-60-5	trans-1,2-Dichloroethene	15	J
156-59-2	cis-1,2-Dichloroethene	950	
79-01-6	Trichloroethene	2000	
127-18-4	Tetrachloroethene	50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS EPA SAMPLE NO.

RU-10

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-005 Date Received: 09/14/2001

Lab File ID: A2241 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 100.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 1

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		CIS-1,3-DICHLOROPROPENE-D4	7.40	190	JB
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.

RU-11

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-009 Date Received: 09/14/2001

Lab File ID: A2230 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
79-01-6	Trichloroethene	0.82	
127-18-4	Tetrachloroethene	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

RU-11

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-009 Date Received: 09/14/2001

Lab File ID: A2230 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 1

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		CIS-1,3-DICHLOROPROPENE-D4	7.40	1.9	JB
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
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28					
29					
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1LCA
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.

RU-12

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-006 Date Received: 09/14/2001

Lab File ID: A2225 Date Analyzed: 09/20/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	4.5	
156-60-5	trans-1,2-Dichloroethene	0.49	J
156-59-2	cis-1,2-Dichloroethene	9.1	
79-01-6	Trichloroethene	3.8	
127-18-4	Tetrachloroethene	0.50	U

1LCF

LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS EPA SAMPLE NO.

RU-12

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-006 Date Received: 09/14/2001

Lab File ID: A2225 Date Analyzed: 09/20/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 7

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		CIS-1,3-DICHLOROPROPENE-D4	7.41	1.9	JB
02		UNKNOWN	15.39	1.7	J
03		UNKNOWN	15.44	4.2	J
04		UNKNOWN	15.54	3.6	J
05		UNKNOWN	15.67	0.54	J
06		UNKNOWN	15.72	1.7	J
07		UNKNOWN	15.83	2.9	J
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
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28					
29					
30					

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.

RU-13

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-004 Date Received: 09/14/2001

Lab File ID: A2220 Date Analyzed: 09/20/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
79-01-6	Trichloroethene	0.61	
127-18-4	Tetrachloroethene	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

RU-13

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-004 Date Received: 09/14/2001

Lab File ID: A2220 Date Analyzed: 09/20/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 11

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01	75-15-0	CARBON DISULFIDE	2.91	0.76	NJ
02		CIS-1,3-DICHLOROPROPENE-D4	7.39	2.0	JB
03	66-25-1	HEXANAL	8.81	0.61	NJ
04	124-19-6	NONANAL	14.28	1.6	NJ
05		UNKNOWN	15.12	0.76	J
06		UNKNOWN	15.30	0.80	J
07		UNKNOWN	15.38	1.8	J
08		UNKNOWN	15.43	2.9	J
09		UNKNOWN	15.53	2.0	J
10		UNKNOWN	15.57	0.91	J
11		UNKNOWN	15.83	0.92	J
12					
13					
14					
15					
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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.

RU-14

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-002 Date Received: 09/14/2001

Lab File ID: A2240 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 50.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	25	U
156-60-5	trans-1,2-Dichloroethene	25	U
156-59-2	cis-1,2-Dichloroethene	130	
79-01-6	Trichloroethene	560	
127-18-4	Tetrachloroethene	25	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS EPA SAMPLE NO.

RU-14

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-002 Date Received: 09/14/2001

Lab File ID: A2240 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 50.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 1

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		CIS-1,3-DICHLOROPROPENE-D4	7.41	91	JB
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
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21					
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1LCA
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
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EPA SAMPLE NO.

RU-15

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-016 Date Received: 09/14/2001

Lab File ID: A2224 Date Analyzed: 09/20/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	1.6	
156-60-5	trans-1,2-Dichloroethene	0.28	J
156-59-2	cis-1,2-Dichloroethene	7.7	
79-01-6	Trichloroethene	5.7	
127-18-4	Tetrachloroethene	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
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EPA SAMPLE NO.

RU-15

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-016 Date Received: 09/14/2001

Lab File ID: A2224 Date Analyzed: 09/20/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 11

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01	75-15-0	CARBON DISULFIDE	2.91	1.1	NJ
02		CIS-1,3-DICHLOROPROPENE-D4	7.40	1.8	JB
03		UNKNOWN	14.64	0.90	J
04		UNKNOWN	15.12	0.54	J
05		UNKNOWN	15.31	0.64	J
06		UNKNOWN	15.36	0.94	J
07		UNKNOWN	15.38	1.2	J
08		UNKNOWN	15.44	3.1	J
09		UNKNOWN	15.54	2.5	J
10		UNKNOWN	15.72	1.0	J
11		UNKNOWN	15.83	1.1	J
12					
13					
14					
15					
16					
17					
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21					
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23					
24					
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26					
27					
28					
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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.

RU-16

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-011 Date Received: 09/14/2001

Lab File ID: A2231 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.62	
156-59-2	cis-1,2-Dichloroethene	3.9	
79-01-6	Trichloroethene	19	
127-18-4	Tetrachloroethene	0.50	U

1LCF

LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS EPA SAMPLE NO.

RU-16

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-011 Date Received: 09/14/2001

Lab File ID: A2231 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 3

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		CIS-1,3-DICHLOROPROPENE-D4	7.40	1.9	JB
02	124-19-6	NONANAL	14.29	0.53	NJ
03	112-31-2	DECANAL	15.53	1.1	NJ
04					
05					
06					
07					
08					
09					
10					
11					
12					
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14					
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DATA SHEET

EPA SAMPLE NO.

RU-17C

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-022 Date Received: 09/14/2001

Lab File ID: A2226 Date Analyzed: 09/20/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.16	J
79-01-6	Trichloroethene	1.7	
127-18-4	Tetrachloroethene	0.50	U

1LCF

LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
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RU-17C

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-022 Date Received: 09/14/2001

Lab File ID: A2226 Date Analyzed: 09/20/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 4

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		CIS-1,3-DICHLOROPROPENE-D4	7.41	1.8	JB
02	108-88-3	TOLUENE	7.77	1.1	NJ
03	106-42-3	P-XYLENE	9.86	0.56	NJ
04		UNKNOWN	14.29	0.63	J
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
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EPA SAMPLE NO.

RU-18

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-003 Date Received: 09/14/2001

Lab File ID: A2244 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 250.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	130	U
156-60-5	trans-1,2-Dichloroethene	130	U
156-59-2	cis-1,2-Dichloroethene	350	
79-01-6	Trichloroethene	3400	
127-18-4	Tetrachloroethene	130	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
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RU-18

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-003 Date Received: 09/14/2001

Lab File ID: A2244 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 250.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 1

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		CIS-1,3-DICHLOROPROPENE-D4	7.40	470	JB
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
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16					
17					
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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
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EPA SAMPLE NO.

B-1

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-001 Date Received: 09/14/2001

Lab File ID: A2222 Date Analyzed: 09/20/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	0.21	J
156-60-5	trans-1,2-Dichloroethene	0.28	J
156-59-2	cis-1,2-Dichloroethene	1.7	
79-01-6	Trichloroethene	0.67	
127-18-4	Tetrachloroethene	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
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B-1

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-001 Date Received: 09/14/2001

Lab File ID: A2222 Date Analyzed: 09/20/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 2

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01	67-64-1	ACETONE	2.89	0.60	NJ
02		CIS-1,3-DICHLOROPROPENE-D4	7.40	1.9	JB
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
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18					
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EPA SAMPLE NO.

B-2

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-013 Date Received: 09/14/2001

Lab File ID: A2234 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 100.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	50	U
156-60-5	trans-1,2-Dichloroethene	9.2	J
156-59-2	cis-1,2-Dichloroethene	57	
79-01-6	Trichloroethene	1100	
127-18-4	Tetrachloroethene	50	U

1LCF
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B-2

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-013 Date Received: 09/14/2001

Lab File ID: A2234 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 100.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 1

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		CIS-1,3-DICHLOROPROPENE-D4	7.40	190	JB
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
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27					
28					
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1LCA
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.

B-2DUP

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-014 Date Received: 09/14/2001

Lab File ID: A2243 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 200.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	42	J
156-60-5	trans-1,2-Dichloroethene	100	U
156-59-2	cis-1,2-Dichloroethene	310	
79-01-6	Trichloroethene	2800	
127-18-4	Tetrachloroethene	100	U

1LCF

LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

B-2DUP

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-014 Date Received: 09/14/2001

Lab File ID: A2243 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 200.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 1

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		CIS-1,3-DICHLOROPROPENE-D4	7.40	380	JB
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
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1LCA
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.

CW-13

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-010 Date Received: 09/14/2001

Lab File ID: A2223 Date Analyzed: 09/20/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.41	J
79-01-6	Trichloroethene	9.3	
127-18-4	Tetrachloroethene	0.50	U

1LCF
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS EPA SAMPLE NO.

CW-13

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-010 Date Received: 09/14/2001

Lab File ID: A2223 Date Analyzed: 09/20/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 1

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		CIS-1,3-DICHLOROPROPENE-D4	7.40	1.9	JB
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
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1LCA
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.

CW-13 DUP

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-015 Date Received: 09/14/2001

Lab File ID: A2227 Date Analyzed: 09/20/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.42	J
79-01-6	Trichloroethene	9.4	
127-18-4	Tetrachloroethene	0.50	U

1LCF

LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CW-13 DUP

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913091-015 Date Received: 09/14/2001

Lab File ID: A2227 Date Analyzed: 09/20/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 1

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		CIS-1,3-DICHLOROPROPENE-D4	7.41	1.9	JB
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
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1LCA
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.

STORAGE BLANK

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913001-005 Date Received: 09/08/2001

Lab File ID: A2249 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
79-01-6	Trichloroethene	0.50	U
127-18-4	Tetrachloroethene	0.50	U

1LCF

LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

STORAGE BLANK

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913001-005 Date Received: 09/08/2001

Lab File ID: A2249 Date Analyzed: 09/21/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 1

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		CIS-1,3-DICHLOROPROPENE-D4	7.39	1.8	JB
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
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1LCA
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.

TRIP BLANK

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913001-004 Date Received: 09/08/2001

Lab File ID: A2183 Date Analyzed: 09/17/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-01-4	Vinyl Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
79-01-6	Trichloroethene	0.022	J
127-18-4	Tetrachloroethene	0.50	U

1LCF
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS EPA SAMPLE NO.

TRIP BLANK

Lab Name: EN CHEM Contract: ALCAS

Lab Code: ENCHEM Case No.: Client No.: SDG No.: 913001

Lab Sample ID: 913001-004 Date Received: 09/08/2001

Lab File ID: A2183 Date Analyzed: 09/17/2001

Purge Volume: 25.0(ML) Dilution Factor: 1.0

GC Column: RTX-624 ID: 0.18(MM) Length: 20.0(M)

Number TICs found: 1

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		CIS-1,3-DICHLOROPROPENE-D4	7.39	1.8	JB
02					
03					
04					
05					
06					
07					
08					
09					
10					
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APPENDIX D

Groundwater Sampling Results – City Aquifer

- **Phase II Investigation (*October, 1999*)**
  - Field and Analytical Data Summary Table (Table 3-9)
- **Phase III Investigation (*October, 2000*)**
  - Analytical Summary Table (Table 3-10)
- **Phase IV Investigation (*September, 2001*)**
  - Analytical Summary Table (Table 3-11)
  - Composite Summary of Upper and Lower Zone Well Data (Table 3-12)

TABLE 3-9
Data Summary for LZ Groundwater Samples
Alcas-Cutco Cutlery Corporation Facility Site
Olean, New York

Sample Identification Number		B-2	CW-13	CW-15	D2	P1 *(Depth Unknown)*	P2 *(Depth Unknown)*
Parameter (units)	**SCO**						
Volatile Organics							
Benzene (ug/l)		ND	ND	ND	ND	NA	ND
1,1-Dichloroethene (ug/l)		ND	ND	ND	18 J	NA	0.64 J
Chloroethane (ug/l)		ND	ND	ND	ND	NA	ND
cis-1,2-Dichloroethene (ug/l)	70	300	ND	1	1200	NA	ND
Methylene chloride (ug/l)		ND	ND	ND	160 J	NA	ND
Tetrachloroethene (ug/l)		3400	ND	11	180	NA	0.55 J
trans-1,2-Dichloroethene (ug/l)		ND	ND	ND	ND	NA	1.7
Trichloroethene (ug/l)	5	ND	12	ND	17000	NA	21
Vinyl chloride (ug/l)	2	54	ND	ND	100	NA	12
Total Volatiles		3754	12	12	18658	0	35.89
Natural Attenuation Parameters							
Alkalinity (mg/l)		320	NA	NA	200	NA	160
Ammonia (mg/l)		0.07	NA	NA	0.074	NA	0.059
Chloride (mg/l)		96	NA	NA	140	NA	13
Iron (2+) (mg/l)		ND	NA	NA	ND	NA	ND
Manganese (mg/l)		1.2	NA	NA	0.023	NA	ND
Nitrate (mg/l)		0.26	NA	NA	2.3	NA	4.7
Total Kjeldahl Nitrogen (mg/l)		0.3	NA	NA	0.32	NA	0.7
Total Phosphorus (mg/l)		ND	NA	NA	ND	NA	ND
Ortho Phosphate (mg/l)		0.15	NA	NA	0.14	NA	0.15
Sulfate (mg/l)		80	NA	NA	48	NA	60
Sulfide (mg/l)		ND	NA	NA	ND	NA	ND
Dissolved Gases - Methane (mg/l)		35	NA	NA	0.0035	NA	ND
Dissolved Gases - Ethane (mg/l)		ND	NA	NA	0.00055	NA	ND
Dissolved Gases - Ethene (mg/l)		ND	NA	NA	0.00055	NA	ND
Field Parameters							
Water Level (feet below Top of Casing)		26.92	19.08	17.34	25.62	5.67	4.44
Total Depth (feet below Top of Casing)		36.07	91.75	79.83	33.6	13.13	9.28
Dissolved Oxygen (mg/l)		1.5	5.3	0.4	***	NA	***
Specific Conductivity (ms/cm)		110	68.3	33.8	60 ***	NA	49 ***
pH		6.9	7.46	7.34	7.48 ***	NA	6.66 ***
Temperature (Celsius)		13.3	10.8	10.6	12.5	NA	14.9 ***
Turbidity (NTU)		49	8.2	0.5	660 ***	NA	>999 ***
Oxidation-Reduction Potential (mV)		126	145	-140	156 ***	NA	204 ***
Total Dissolved Solids (g/l)		0.7	0.43	0.22	0.54 ***	NA	0.32 ***
Survey Data (Plant Coordinate System)							
Northing		65.27	-306.36	-675.31	-90.01	-80.60	-99.18
Easting		-407.54	-36.70	-979.04	-40.13	-35.18	-43.26
Ground Elevation (ft-amsl)		1426.15	1416.90	1416.00	1425.70	1425.90	1425.55
Casing Elevation (ft-amsl)		1427.65	1420.07	1418.24	1426.80	1425.90	1425.55

Notes:

1. Shaded cells denote analytical values exceeding the OU2 ROD soil clean-up objectives (SCOs), from Table 1 of the OU2 ROD, USEPA Region II, September, 1996.

Qualifiers:

J = Value estimated, below quantitation limit.
NA = Not analyzed.
ND = Not Detected.
*** = Well purged dry.

TABLE 3-10
PHASE III - CITY AQUIFER DATA (LZ)
Ground Water Sampling Analytical Result Summary
Alcas Facility Site - Olean, New York
October, 2000

Sample Identification Number	Dilution Identification Number	Laboratory Number	Units	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Vinyl chloride
RU-2		06908-02	ug/L	1.0 U	300 D	3	1.0 U	0.40 J (1.0)
RU-3		06908-03	ug/L	0.40 J(1.0)	240 D	39	0.80 J(1.0)	38
TRIP BLANK		06908-16	ug/L	1 U	0.3 J	1 U	1 U	1 U

"J" denotes an estimated value
"E" denotes sample result exceeds calibration range
"U" denotes compound less than detection limit
"D" denotes analyte value from diluted sample
"*" denotes duplicate analyses not withing control limit.

TABLE 3-11
PHASE IV - CITY AQUIFER DATA
Ground Water Sampling Analytical Result Summary
Alcas Facility Site - Olean, New York
September 2001

Sample Identification Number	Dilution Identification Number	Laboratory Number	Units	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Vinyl chloride
RU-2		913091-020	ug/L	0.5 U	37 E	5.2	0.11 J	0.5 U
	RU-2DL	913091-029	ug/L	5.0 U	25 D	3.6 DJ	5.0 U	5.0 U
RU-17C		913091-022	ug/L	0.5 U	1.7	0.16 J	0.5 U	0.5 U
RU-18		913091-003	ug/L	130 U	3,400	350	130 U	130 U
B-2		913091-013	ug/L	50 U	1,100	57	9.2 J	50 U
B-2 DUP		913091-014	ug/L	100 U	2,800	310	100 U	42 J
CW-13		913091-010	ug/L	0.5 U	9.3	0.41 J	0.5 U	0.5 U
CW-13 DUP		913091-015	ug/L	0.5 U	9.4	0.42 J	0.5 U	0.5 U
TRIP BLANK		913001-004	ug/L	0.5 U	0.022 J	0.5 U	0.5 U	0.5 U

"J" denotes an estimated value
"E" denotes sample result exceeds calibration range
"U" denotes compound less than detection limit
"D" denotes analyte value from diluted sample
"*" denotes duplicate analyses not withing control limit.

TABLE 3-12
Ground Water Sampling Analytical Result Summary
Phase III & IV Investigations
Alcas Facility Site - Olean, New York
Upper and Lower Aquifers

Sample Identification Number	Dilution Identification Number	Sampling Date	Laboratory Number	Units	Upper or Lower Aquifer	Tetrachloroethene	Trichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Vinyl chloride
RU-1		10/4/2000	06908-01	ug/L	Upper	1.0 U	67.0	1.00	1.0 U	1.0 U
RU-1		9/13/2001	913001-001	ug/L	Upper	0.5 U	5.2	0.95	0.5 U	0.5 U
RU-2		10/5/2000	06908-02	ug/L	Lower (?)	1.0 U	270 E	3.00	1.0 U	0.4 J
	RU-2DL	10/5/2000	06908-02-DL	ug/L	Lower (?)	2.0 U	300 D	5.0 D	2.0 U	2.0 D
RU-2		9/13/2001	913091-020	ug/L	Lower (?)	0.5 U	37 E	5.2	0.11 J	0.5 U
	RU-2DL	9/13/2001	913091-029	ug/L	Lower (?)	5.0 U	25 D	3.6 DJ	5.0 U	5.0 U
RU-3		10/4/2000	06908-03	ug/L	Lower (?)	0.4 J	210 E	39	0.8 J	38
	RU-3DL	10/4/2000	06908-03-DL	ug/L	Lower (?)	2 U	240 D	47 D	1 DJ	32 D
RU-4		10/4/2000	06908-04	ug/L	Upper	500 U	190000 E	4600	110 J	1100
	RU-4DL	10/4/2000	06908-04-DL	ug/L	Upper	2500 U	130000 D	4300 D	2500 U	2500 U
RU-4		9/13/2001	913091-007	ug/L	Upper	10,000 U	310,000	9,700 J	10,000 U	10,000 U
RU-5		10/3/2000	06908-05	ug/L	Upper	19 J	56000 E	170	50 U	33 J
	RU-5DL	10/3/2000	06908-05-DL	ug/L	Upper	500 U	54000 D	260 DJ	500 U	500 U
RU-5		9/13/2001	913091-008	ug/L	Upper	1,000 U	24,000	150 J	1,000 U	1,000 U
RU-6		10/4/2000	06908-06	ug/L	Upper	52	58000 E	420	12 J	14 J
	RU-6DL	10/4/2000	06908-06-DL	ug/L	Upper	500 U	67,000 D	570 D	500 U	500 U
RU-6		9/13/2001	913001-002	ug/L	Upper	500 U	16,000	230 J	500 U	500 U
RU-7		10/4/2000	06908-07	ug/L	Upper	1.0 U	3	1.0 U	1.0 U	1.0 U
RU-8		10/3/2000	06908-08	ug/L	Upper	2 U	480 E	39	2 U	10
	RU-8DL	10/3/2000	06908-08-DL	ug/L	Upper	4 U	360 D	30 D	4 U	7 D
RU-8		9/13/2001	913001-003	ug/L	Upper	10 U	300	24	10 U	10 U
RU-9		10/3/2000	06908-09	ug/L	Upper	1.0 U	4	1.0 U	1.0 U	1.0 U
RU-9		9/13/2001	913091-012	ug/L	Upper	0.5 U	5.9	2.8	0.094 J	0.5 U
RU-10		10/3/2000	06908-10	ug/L	Upper	20 U	2,800	1,000	17.0 J(20)	130
RU-10		9/13/2001	913091-005	ug/L	Upper	50 U	2,000	950	15 J	79
RU-11		10/3/2000	06908-11	ug/L	Upper	1.0 U	0.40 J(1.0)	1.0 U	1.0 U	1.0 U
RU-11		9/13/2001	913091-009	ug/L	Upper	0.5 U	0.82	0.5 U	0.5 U	0.5 U
RU-12		10/3/2000	06908-12	ug/L	Upper	1.0 U	3	10	0.50 J(1.0)	6
RU-12		9/13/2001	913091-006	ug/L	Upper	0.5 U	3.8	9.1	0.49 J	4.5
RU-13		9/13/2001	913091-004	ug/L	Upper	0.5 U	0.61	0.5 U	0.5 U	0.5 U
RU-14		9/13/2001	913091-002	ug/L	Upper	25 U	560	130	25 U	25 U
RU-15		9/13/2001	913091-016	ug/L	Upper	0.5 U	5.7	7.7	0.28 J	1.6
RU-16		9/13/2001	913091-011	ug/L	Upper	0.5 U	19	3.9	0.62	0.5 U
RU-17C		9/13/2001	913091-022	ug/L	Lower	0.5 U	1.7	0.16 J	0.5 U	0.5 U
RU-18		9/13/2001	913091-003	ug/L	Lower	130 U	3,400	350	130 U	130 U
B-1		9/13/2001	913091-001	ug/L	Upper	0.5 U	0.67	1.7	0.28 J	0.21 J
B-2		9/13/2001	913091-013	ug/L	Lower	50 U	1,100	57	9.2 J	50 U
B-2 DUP		9/13/2001	913091-014	ug/L	Lower	100 U	2,800	310	100 U	42 J
CW-13		9/13/2001	913091-010	ug/L	Lower	0.5 U	9.3	0.41 J	0.5 U	0.5 U
CW-13 DUP		9/13/2001	913091-015	ug/L	Lower	0.5 U	9.4	0.42 J	0.5 U	0.5 U
TRIP BLANK		10/5/2000	06908-16	ug/L	NA	1 U	0.3 J	1 U	1 U	1 U
TRIP BLANK		9/13/2001	913001-004	ug/L	NA	0.5 U	0.022 J	0.5 U	0.5 U	0.5 U

"J" denotes an estimated value
"E" denotes sample result exceeds calibration range
"U" denotes compound less than detection limit
"D" denotes analyte value from diluted sample
"*" denotes duplicate analyses not withing control limit.

APPENDIX E

Soil-Gas Sampling Results

- **Tabulated Summaries of GORE-SORBER® Screening Survey Data (Tables 3-13 & 3-14)**
- **GORE-SORBER® Screening Survey Plots for PERC, TCE, and cis- & trans-1,2-DCE**

TABLE 3-13
GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
IT CORPORATION, MONROEVILLE, PA
GORE CHLORINATED VOC (VCA10)
ALCAS CUTLERY, OLEAN, NY
SITE BET - PRODUCTION ORDER #10228929

Sample Name		320221	320222	320223	320224	320225	320226	320227	320228	320229	320230
Soil Gas Point		SG65	SG66	SG67	SG68	SG69	SG70	SG71	SG72	SG77	SG76
Parameter	MDL (ug)										
Chlorobenzene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichloroethene (total)		0.03	nd	nd	1.91	nd	32.62	0.43	7.09	62.24	13.33
trans-1,2-Dichloroethene	0.03	nd	nd	nd	0.33	nd	1.65	0.08	0.95	2.62	1.13
cis-1,2-Dichloroethene	0.02	0.03	nd	nd	1.57	nd	30.97	0.35	6.14	59.62	12.20
1,1-Dichloroethane	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,1-Trichloroethane	0.04	nd	nd	nd	nd	nd	nd	nd	0.09	nd	nd
1,2-Dichloroethane	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Trichloroethene	0.02	0.11	0.06	nd	8.67	0.39	14.80	5.34	520.95	882.85	360.01
Tetrachloroethene	0.03	nd	nd	nd	nd	nd	0.17	nd	51.80	43.45	0.14
1,4-Dichlorobenzene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Vinyl chloride	0.19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.04	nd	nd	nd	nd	nd	0.20	nd	nd	nd	nd
Chloroform	0.03	nd	nd	nd	nd	nd	nd	nd	0.12	0.08	0.11
Carbon tetrachloride	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	0.03	nd	nd	nd	nd	nd	nd	nd	nd	0.72	nd
1,1,1,2-Tetrachloroethane	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.02	bdl	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	0.03	nd	nd	nd	nd	nd	nd	nd	0.05	nd	nd

11-8-99 No mdl is available for summed combinations of individual analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

TABLE 3-13
GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
IT CORPORATION, MONROEVILLE, PA
GORE CHLORINATED VOC (VCA10)
ALCAS CUTLERY, OLEAN, NY
SITE BET - PRODUCTION ORDER #10228929

Sample Name		320231	320232	320233	320234	320235	320236	320237	320239	320240	320241
Soil Gas Point		SG75	SG80	SG74	SG79	SG81	SG85	SG84	SG89	SG88	SG87
Parameter	**MDL (ug)**										
Chlorobenzene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichloroethene (total)		21.77	2.23	297.59	9.43	23.59	2.44	35.71	1.96	2.15	2.99
trans-1,2-Dichloroethene	0.03	0.27	0.21	11.40	1.18	0.82	0.17	0.59	0.10	0.28	0.26
cis-1,2-Dichloroethene	0.02	21.50	2.02	286.20	8.25	22.77	2.27	35.12	1.86	1.86	2.73
1,1-Dichloroethane	0.04	nd	nd	nd	nd	nd	nd	0.20	nd	nd	nd
1,1,1-Trichloroethane	0.04	0.86	nd	1.22	nd	nd	nd	0.49	nd	nd	nd
1,2-Dichloroethane	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Trichloroethene	0.02	911.95	9.56	797.35	5.08	475.18	121.09	146.94	42.15	1.53	18.19
Tetrachloroethene	0.03	101.60	nd	96.42	nd	1.70	0.09	2.25	nd	nd	13.92
1,4-Dichlorobenzene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Vinyl chloride	0.19	nd	nd	1.94	nd	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.04	0.13	nd	0.41	nd	nd	nd	0.25	nd	nd	nd
Chloroform	0.03	0.13	nd	nd	nd	0.11	nd	0.10	nd	nd	nd
Carbon tetrachloride	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	0.03	2.50	nd	0.94	nd	0.05	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

11-8-99 No mdl is available for summed combinations of individual analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

TABLE 3-13
GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
IT CORPORATION, MONROEVILLE, PA
GORE CHLORINATED VOC (VCA10)
ALCAS CUTLERY, OLEAN, NY
SITE BET - PRODUCTION ORDER #10228929

Sample Name		320242	320243	320244	320245	320246	320247	320248	320249	320250	320251
Soil Gas Point		SG93	SG92	SG91	SG96	SG95	SG100	SG99	SG104	SG103	SG73
Parameter	MDL (ug)										
Chlorobenzene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichloroethene (total)		2.80	1.65	2.50	108.62	nd	0.09	nd	2.91	nd	13.90
trans-1,2-Dichloroethene	0.03	0.80	0.06	0.22	1.83	nd	nd	nd	0.91	nd	1.00
cis-1,2-Dichloroethene	0.02	1.99	1.60	2.28	106.79	nd	0.09	nd	2.00	nd	12.89
1,1-Dichloroethane	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,1-Trichloroethane	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Trichloroethene	0.02	0.29	4.38	5.20	62.85	62.59	0.07	0.60	4.35	0.23	88.21
Tetrachloroethene	0.03	nd	nd	nd	10.50	0.25	nd	0.15	nd	nd	0.95
1,4-Dichlorobenzene	0.02	nd	nd	0.10	nd	nd	nd	nd	nd	nd	nd
Vinyl chloride	0.19	nd	nd	nd	0.19	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.04	nd	nd	nd	0.19	nd	nd	nd	nd	nd	nd
Chloroform	0.03	nd	nd	nd	nd	nd	0.97	nd	nd	nd	0.07
Carbon tetrachloride	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.02	bdl	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

11-8-99 No mdl is available for summed combinations of individual analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

TABLE 3-13
GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
IT CORPORATION, MONROEVILLE, PA
GORE CHLORINATED VOC (VCA10)
ALCAS CUTLERY, OLEAN, NY
SITE BET - PRODUCTION ORDER #10228929

Sample Name		320252	320253	320254	320255	320256	320257	320258	320259	320260	320261
Soil Gas Point		SG78	SG86	SG82	SG102	SG106	SG105	SG101	SG90	SG94	SG98
Parameter	**MDL (ug)**										
Chlorobenzene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichloroethene (total)		23.02	nd	nd	nd	nd	nd	23.85	0.83	0.08	7.38
trans-1,2-Dichloroethene	0.03	1.16	nd	nd	nd	nd	nd	5.32	0.06	nd	0.61
cis-1,2-Dichloroethene	0.02	21.86	nd	nd	nd	nd	nd	18.53	0.77	0.08	6.77
1,1-Dichloroethane	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,1-Trichloroethane	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Trichloroethene	0.02	201.61	0.17	0.61	0.13	0.08	7.34	130.66	0.19	nd	6.21
Tetrachloroethene	0.03	1.25	nd	nd	nd	nd	0.62	58.25	nd	nd	nd
1,4-Dichlorobenzene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Vinyl chloride	0.19	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chloroform	0.03	0.14	nd	0.13	nd	nd	0.11	0.12	nd	nd	nd
Carbon tetrachloride	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2-Trichloroethane	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,1,2-Tetrachloroethane	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,1,2,2-Tetrachloroethane	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,3-Dichlorobenzene	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1,2-Dichlorobenzene	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

11-8-99 No mdl is available for summed combinations of individual analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

TABLE 3-13
GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
IT CORPORATION, MONROEVILLE, PA
GORE CHLORINATED VOC (VCA10)
ALCAS CUTLERY, OLEAN, NY
SITE BET - PRODUCTION ORDER #10228929

Sample Name		320262	320263	320264	320265	320266	320267	320268	Method Blank	Method Blank	Maximum Detection
Soil Gas Point		SG97	SG107	SG108	Trip Blanks						
Parameter	**MDL (ug)**										
Chlorobenzene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00
1,2-Dichloroethene (total)		1.55	nd	0.12	nd	nd	nd	nd	nd	nd	297.59
trans-1,2-Dichloroethene	0.03	0.24	nd	nd	nd	nd	nd	nd	nd	nd	11.40
cis-1,2-Dichloroethene	0.02	1.30	nd	0.12	nd	nd	nd	nd	nd	nd	286.20
1,1-Dichloroethane	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.20
1,1,1-Trichloroethane	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd	1.22
1,2-Dichloroethane	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00
Trichloroethene	0.02	13.67	0.23	1.96	0.41	nd	nd	nd	nd	nd	911.95
Tetrachloroethene	0.03	1.53	nd	nd	nd	nd	nd	nd	nd	nd	101.60
1,4-Dichlorobenzene	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.10
Vinyl chloride	0.19	nd	nd	nd	nd	nd	nd	nd	nd	nd	1.94
1,1-Dichloroethene	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.41
Chloroform	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.97
Carbon tetrachloride	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00
1,1,2-Trichloroethane	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	2.50
1,1,1,2-Tetrachloroethane	0.04	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00
1,1,2,2-Tetrachloroethane	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.01
1,3-Dichlorobenzene	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.00
1,2-Dichlorobenzene	0.03	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.05

11-8-99 No mdl is available for summed combinations of individual analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

TABLE 3-13
GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
IT CORPORATION, MONROEVILLE, PA
GORE CHLORINATED VOC (VCA10)
ALCAS CUTLERY, OLEAN, NY
SITE BET - PRODUCTION ORDER #10228929

	Sample Name	Standard	Mean
	Soil Gas Point	Deviation	
Parameter	**MDL (ug)**		
Chlorobenzene	0.02	0.00	0.00
1,2-Dichloroethene (total)		55.74	22.80
trans-1,2-Dichloroethene	0.03	1.91	0.80
cis-1,2-Dichloroethene	0.02	46.51	15.64
1,1-Dichloroethane	0.04	0.03	0.00
1,1,1-Trichloroethane	0.04	0.23	0.06
1,2-Dichloroethane	0.02	0.00	0.00
Trichloroethene	0.02	240.27	114.28
Tetrachloroethene	0.03	24.13	8.95
1,4-Dichlorobenzene	0.02	0.02	0.00
Vinyl chloride	0.19	0.30	0.05
1,1-Dichloroethene	0.04	0.08	0.03
Chloroform	0.03	0.15	0.05
Carbon tetrachloride	0.04	0.00	0.00
1,1,2-Trichloroethane	0.03	0.42	0.10
1,1,1,2-Tetrachloroethane	0.04	0.00	0.00
1,1,2,2-Tetrachloroethane	0.02	0.00	0.00
1,3-Dichlorobenzene	0.03	0.00	0.00
1,2-Dichlorobenzene	0.03	0.01	0.00

11-8-99 No mdl is available for summed combinations of individual analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

TABLE 3-14
GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
IT CORPORATION, MONROEVILLE, PA
GORE CHLORINATED VOC (VCA10)
ALCAS CUTLERY, OLEAN, NY
SITE BET - PRODUCTION ORDER #10228929

Soil Gas Point/Boring	SG-68/B-19		SG-70/B-20		SG-77/B-27		SG-74/B-23	
Sample Number	320224	B19-5.7-6.0*SO	320226	B20-3.6-4.0*SO	320229	B27-4.0-4.4*SO	320233	B23-3.7-4.0*SO
Parameter	(ug)	(ug/kg)	(ug)	(ug/kg)	(ug)	(ug/kg)	(ug)	(ug/kg)
Chlorobenzene	nd	6.1 U	nd	7.4 U	nd	250 U	nd	6.1 U
1,2-Dichloroethene (total	1.91	6.1 U	32.62	5.5 J	62.24	270	297.59	240 UD (2100 E)
trans-1,2-Dichloroethene	0.33	---	1.65	---	2.62	---	11.40	---
cis-1,2-Dichloroethene	1.57	---	30.97	---	59.62	---	286.20	---
1,1-Dichloroethane	nd	6.1 U	nd	7.4 U	nd	250 U	nd	6.1 U
1,1,1-Trichloroethane	nd	6.1 U	nd	7.4 U	nd	250 U	1.22	6.1 U
1,2-Dichloroethane	nd	6.1 U	nd	7.4 U	nd	250 U	nd	6.1 U
Trichloroethene	8.67	16	14.80	7.9	882.85	1300	797.35	240 UD (530 E)
Tetrachloroethene	nd	6.1 U	0.17	7.4 U	43.45	250 U	96.42	6.1 U
1,4-Dichlorobenzene	nd	---	nd	---	nd	---	nd	---
Vinyl chloride	nd	12 U	nd	15 U	nd	500 U	1.94	480 UD (540 E)
1,1-Dichloroethene	nd	6.1 U	0.20	7.4 U	nd	250 U	0.41	5.7 J
Chloroform	nd	6.1 U	nd	7.4 U	0.08	250 U	nd	6.1 U
Carbon tetrachloride	nd	6.1 U	nd	7.4 U	nd	250 U	nd	6.1 U
1,1,2-Trichloroethane	nd	6.1 U	nd	7.4 U	0.72	250 U	0.94	6.1 U
1,1,1,2-Tetrachloroethane	nd	---	nd	---	nd	---	nd	---
1,1,2,2-Tetrachloroethane	nd	6.1 U	nd	7.4 U	nd	250 U	nd	6.1 U
1,3-Dichlorobenzene	nd	---	nd	---	nd	---	nd	---
1,2-Dichlorobenzene	nd	---	nd	---	nd	---	nd	---

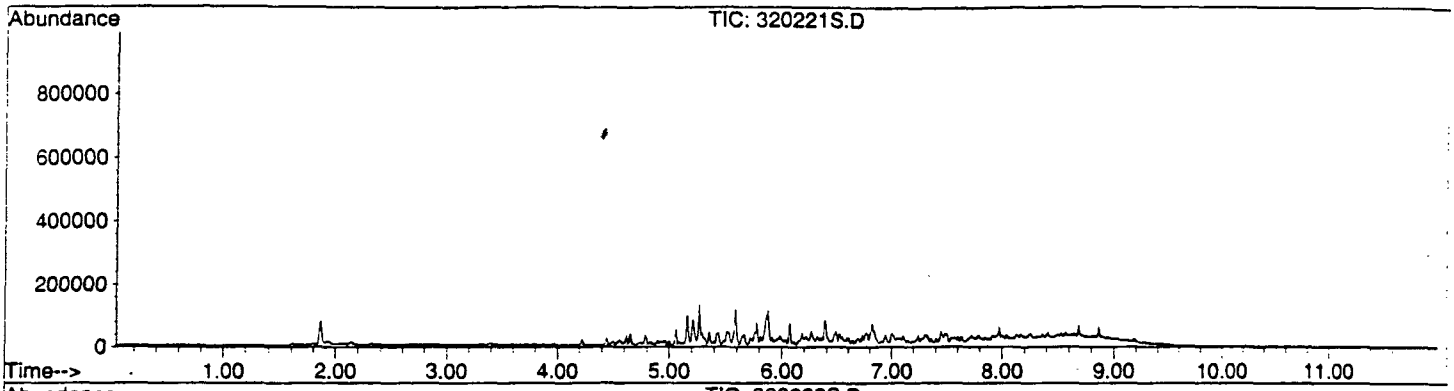
11-8-99 No mdl is available for summed combinations of individual analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

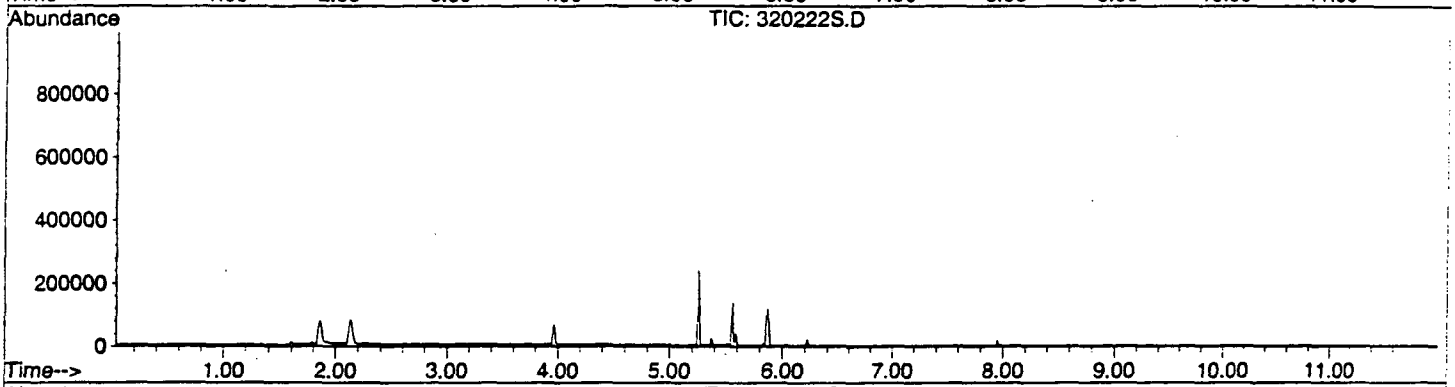
TABLE 3-14
GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
IT CORPORATION, MONROEVILLE, PA
GORE CHLORINATED VOC (VCA10)
ALCAS CUTLERY, OLEAN, NY
SITE BET - PRODUCTION ORDER #10228929

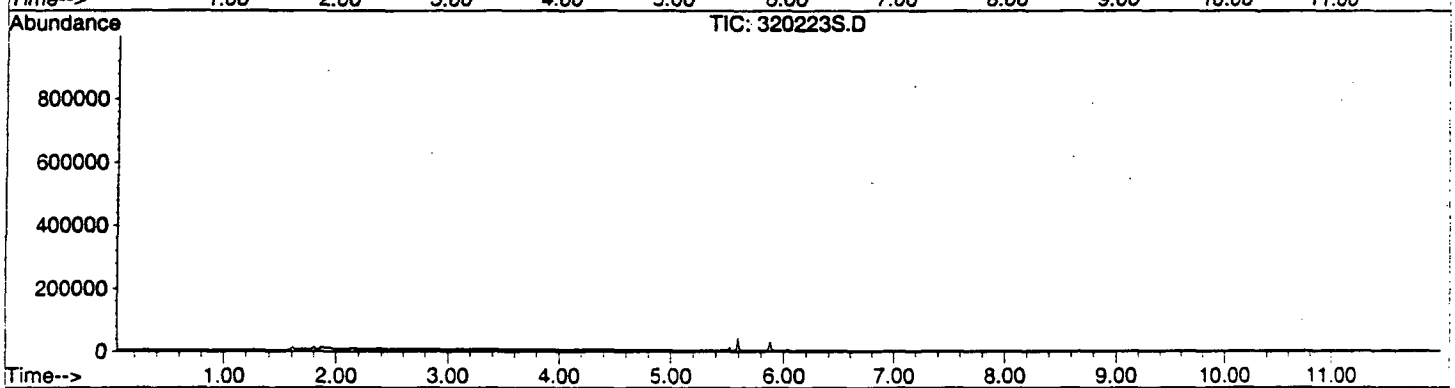
SG-79/B-24		SG-85/B-28		SG-84/B-25		SG-89/B-26		SG-88/B-21	
320234	B24-3.7-4.0*SO	320236	B28-4.0-4.4*SO	320237	B25-3.7-4.0	320239	B26-3.7-4.0	320240	B21-3.7-4.0*SO
(ug)	(ug/kg)	(ug)	(ug/kg)	(ug)	(ug/kg)	(ug)	(ug/kg)	(ug)	(ug/kg)
nd	5.6 U	nd	6.2 U	nd	7 U	nd	6.8 U	nd	8.7 U
9.43	8.1	2.44	12	35.71	3.5 J	1.96	6.8 U	2.15	8.7 U
1.18	---	0.17	---	0.59	---	0.10	---	0.28	---
8.25	---	2.27	---	35.12	---	1.86	---	1.86	---
nd	5.6 U	nd	6.2 U	0.20	7 U	nd	6.8 U	nd	8.7 U
nd	5.6 U	nd	6.2 U	0.49	7 U	nd	6.8 U	nd	8.7 U
nd	5.6 U	nd	6.2 U	nd	7 U	nd	6.8 U	nd	8.7 U
5.08	9.8	121.09	84	146.94	29	42.15	6.2 J	1.53	8.7 U
nd	5.6 U	0.09	6.2 U	2.25	7 U	nd	6.8 U	nd	8.7 U
nd	---	nd	---	nd	---	nd	---	nd	---
nd	29	nd	12 U	nd	14 U	nd	14 U	nd	17 U
nd	5.6 U	nd	6.2 U	0.25	7 U	nd	6.8 U	nd	8.7 U
nd	5.6 U	nd	6.2 U	0.10	7 U	nd	6.8 U	nd	8.7 U
nd	5.6 U	nd	6.2 U	nd	7 U	nd	6.8 U	nd	8.7 U
nd	5.6 U	nd	6.2 U	nd	7 U	nd	6.8 U	nd	8.7 U
nd	---	nd	---	nd	---	nd	---	nd	---
nd	5.6 U	nd	6.2 U	nd	7 U	nd	6.8 U	nd	8.7 U
nd	---	nd	---	nd	---	nd	---	nd	---
nd	---	nd	---	nd	---	nd	---	nd	---

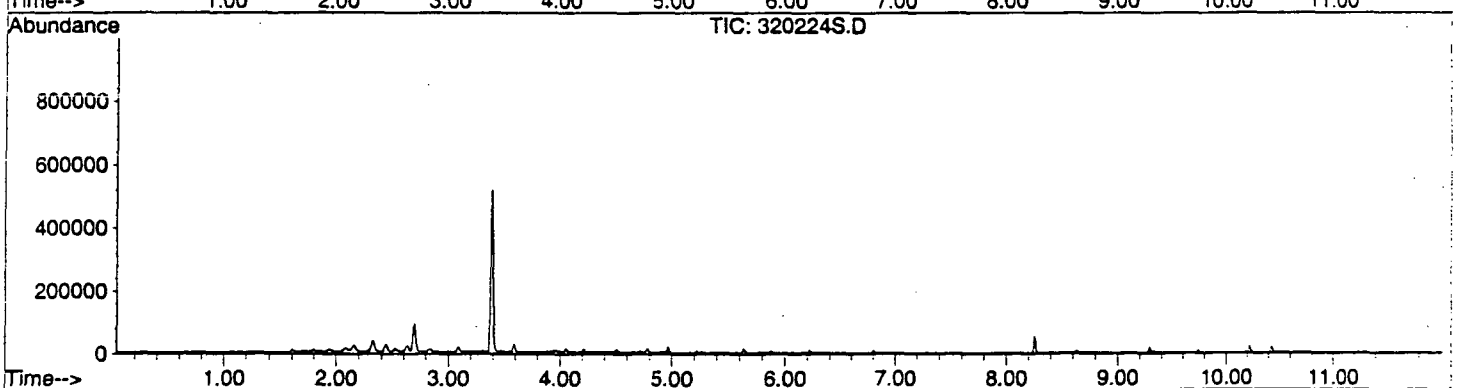
11-8-99 No mdl is available for summed combinations of individual analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

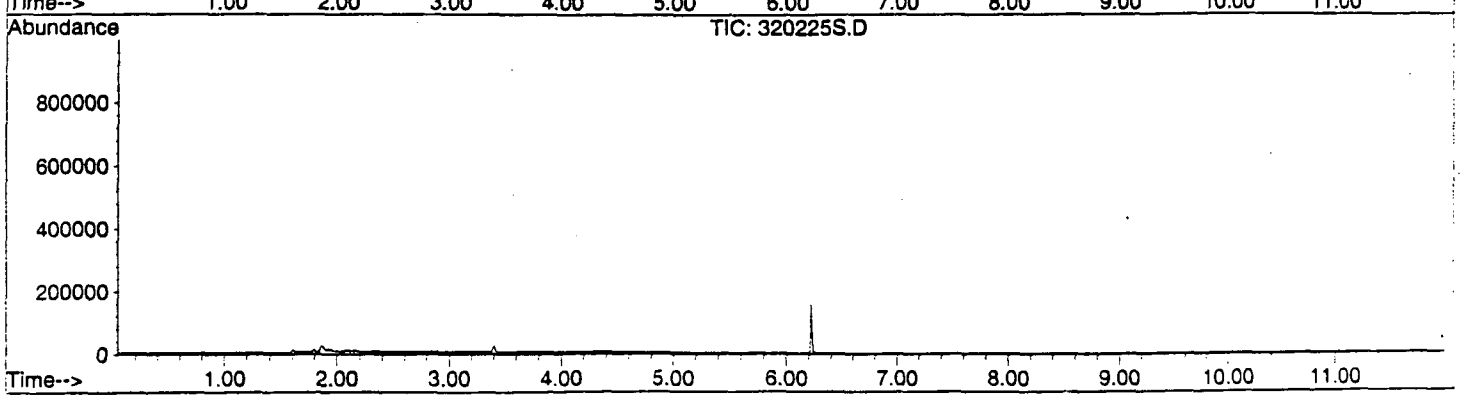
TIC - SITE BET - PRODUCTION ORDER #10228929
In Sequence Order



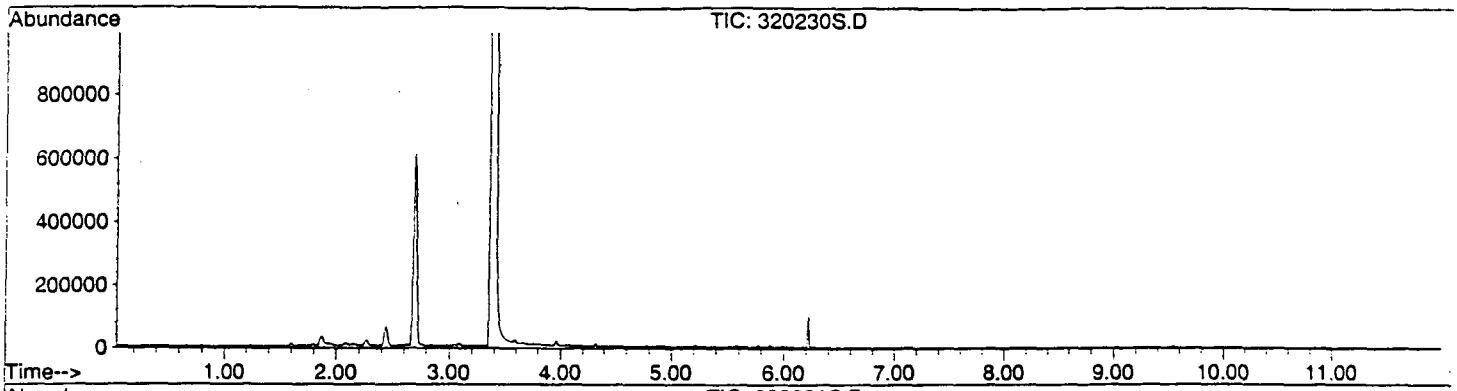


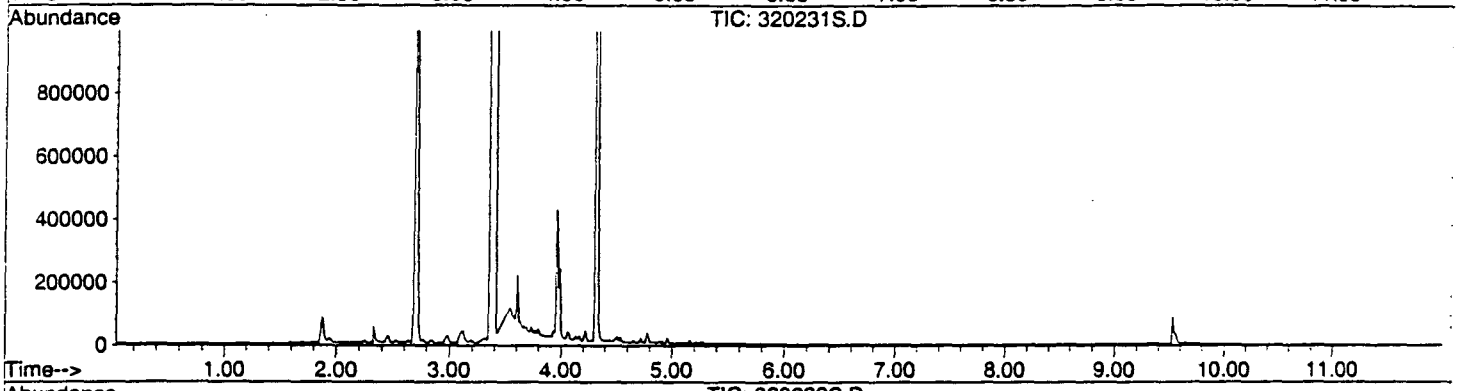


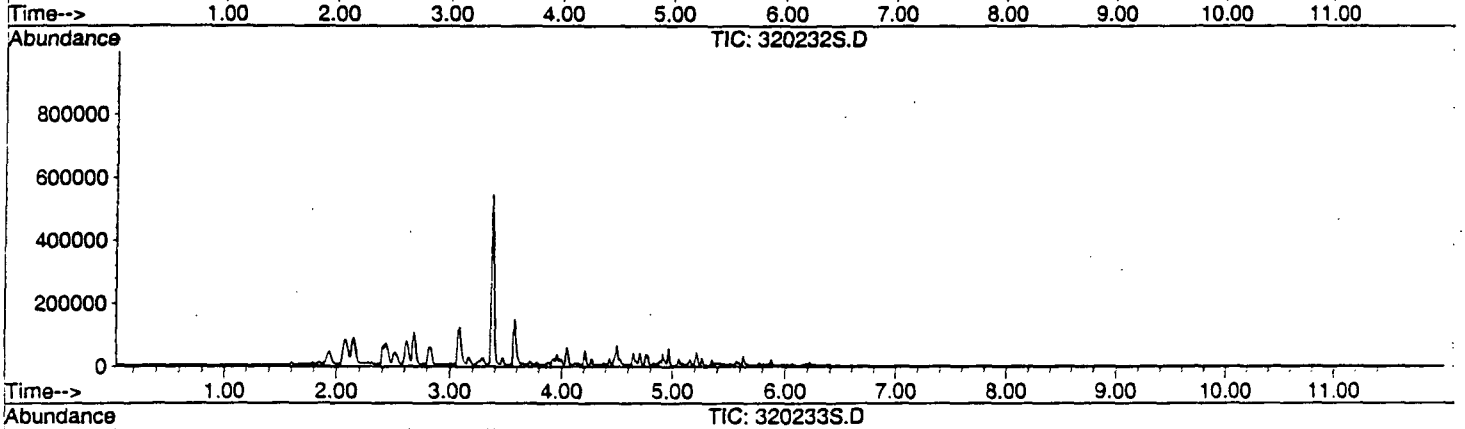


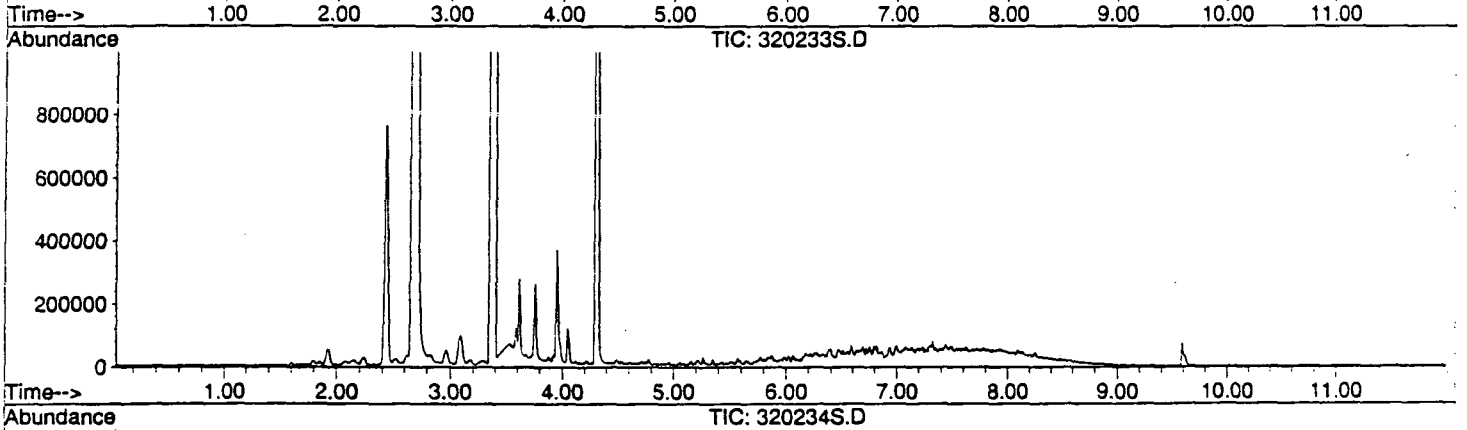


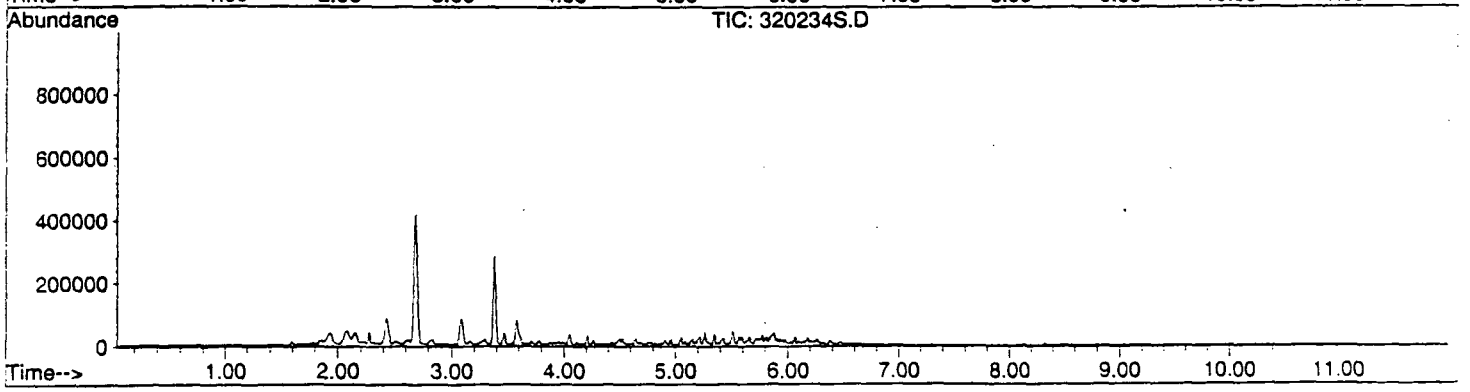
TIC - SITE BET - PRODUCTION ORDER #10228929
In Sequence Order











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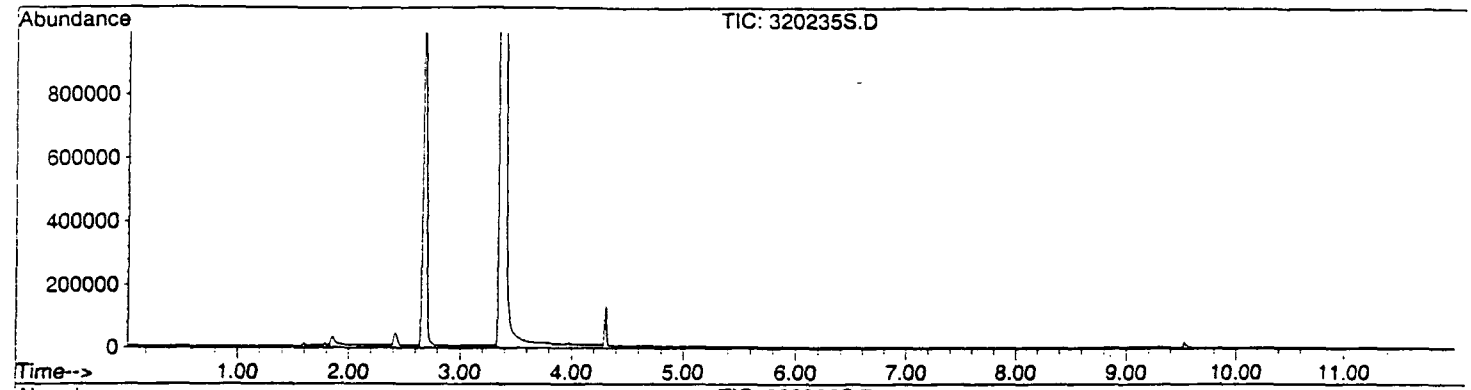

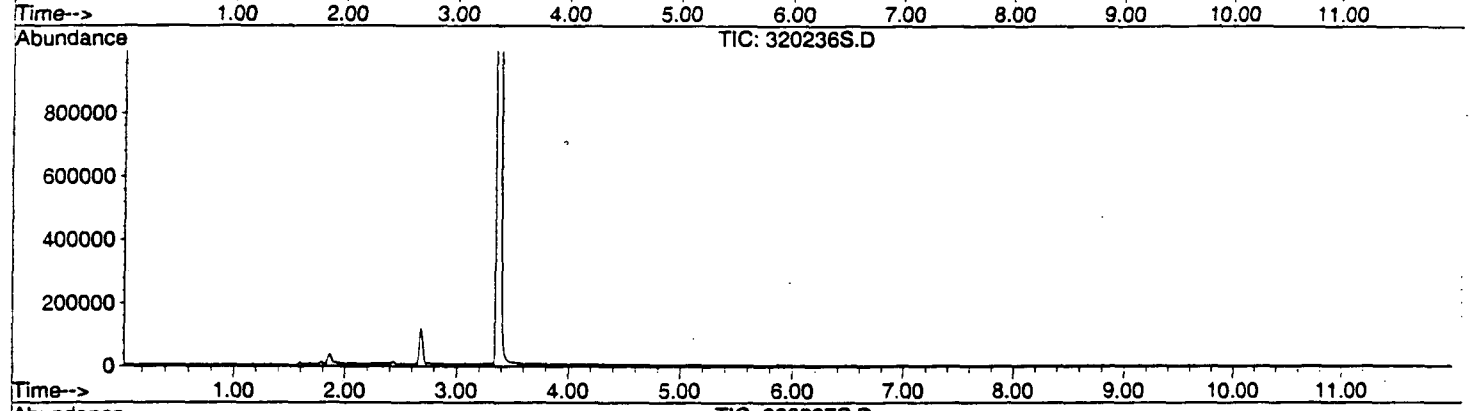

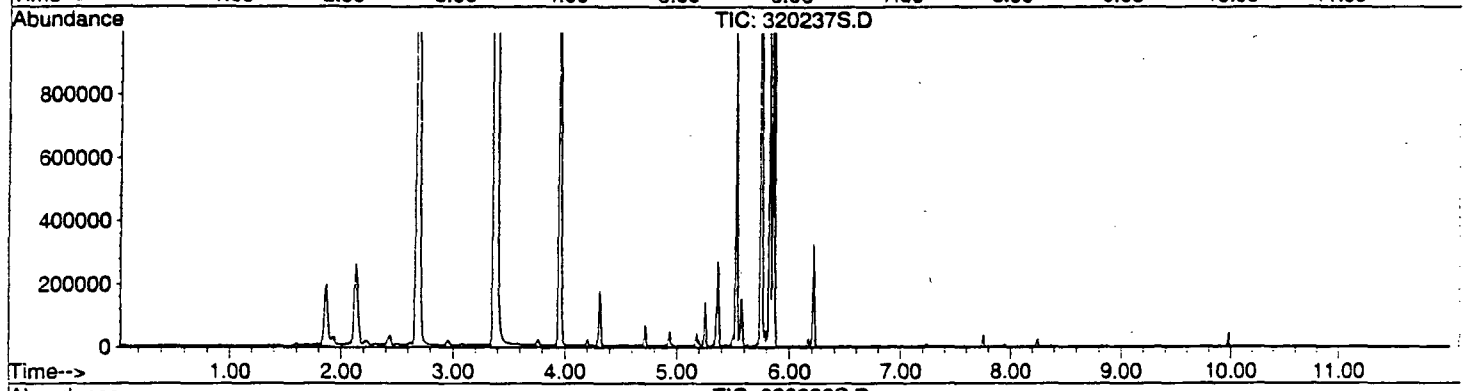

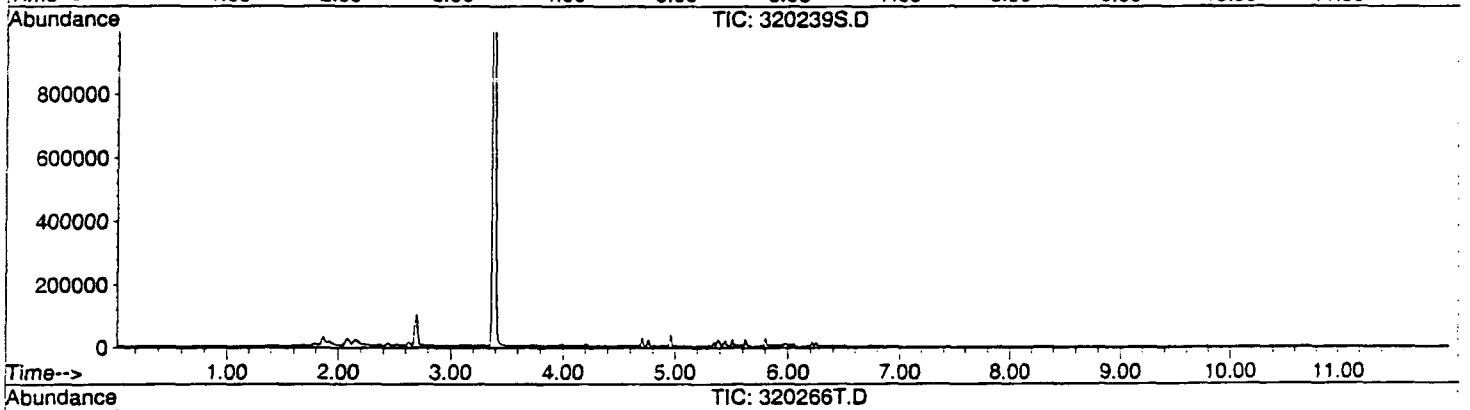

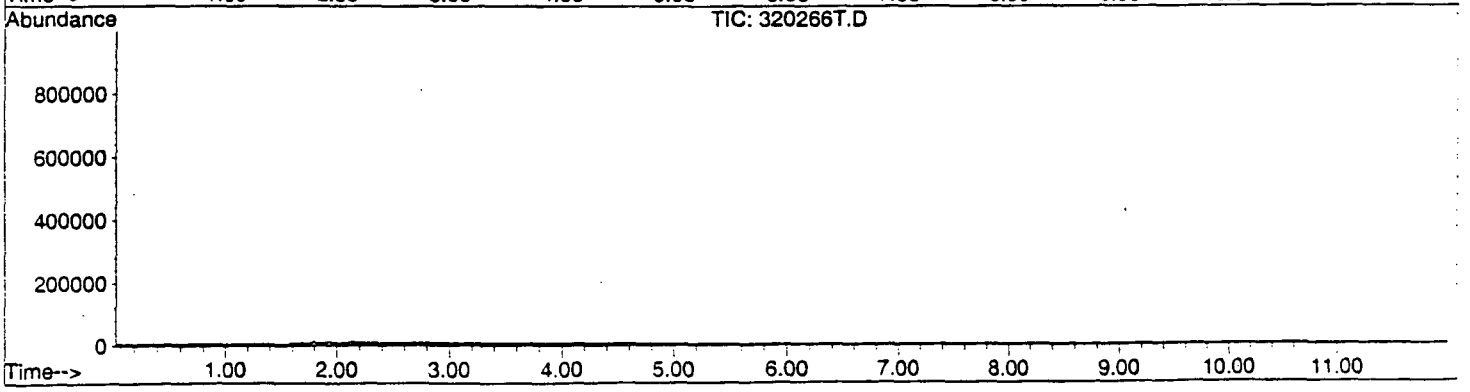

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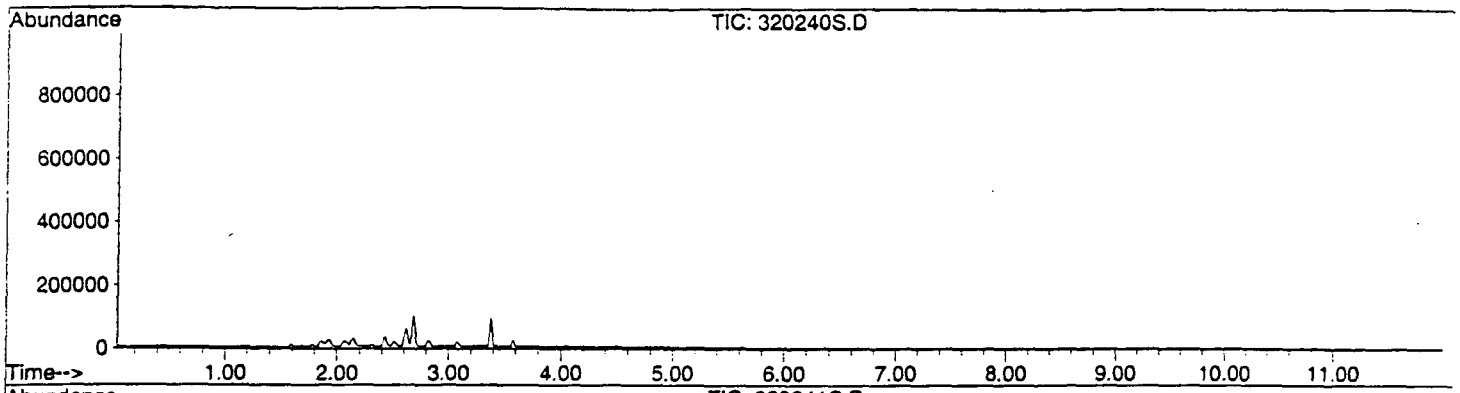

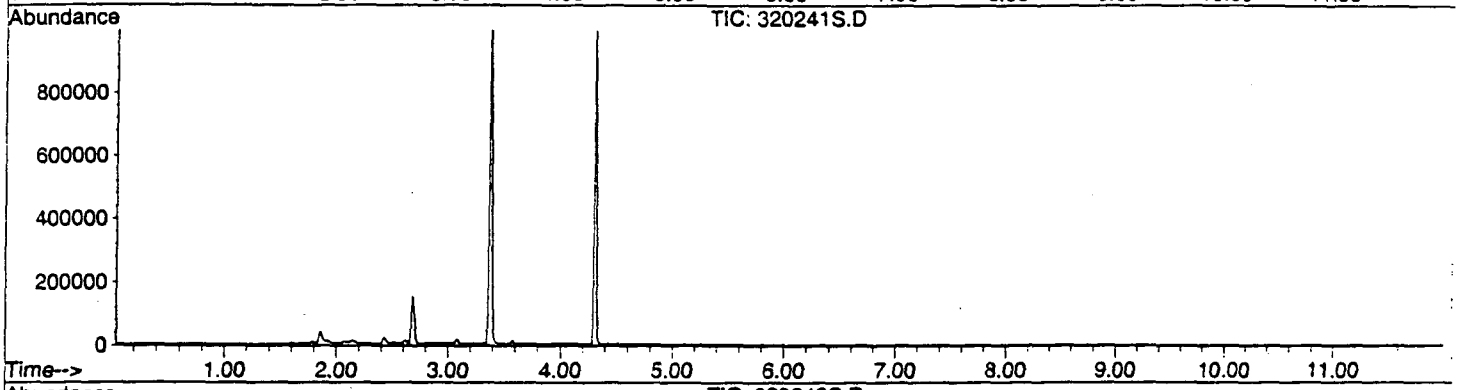

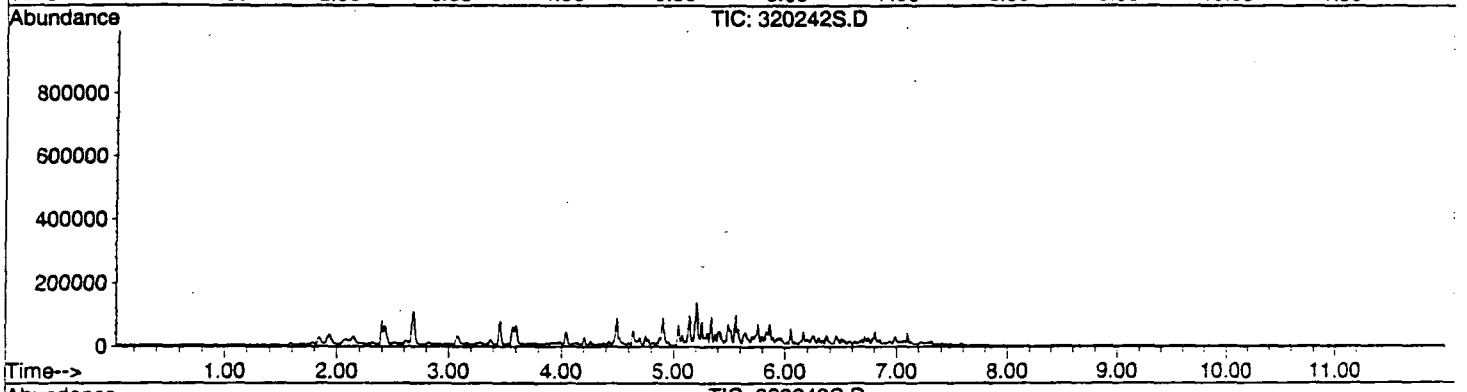

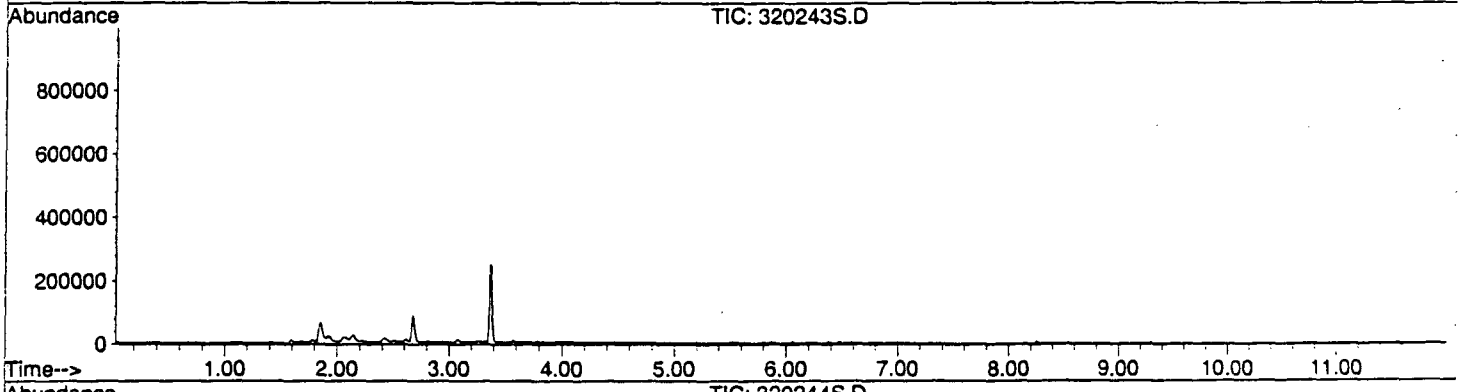

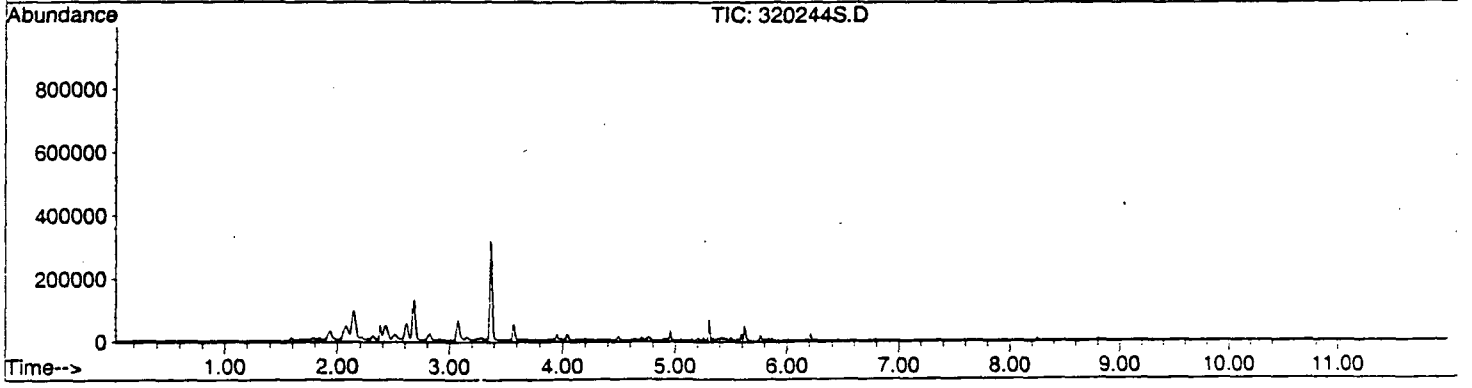

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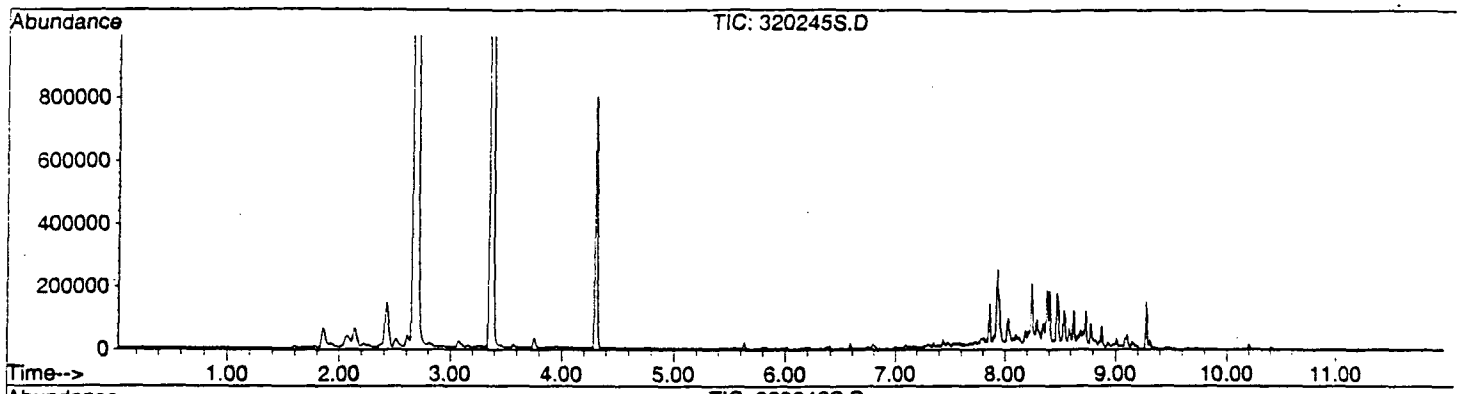

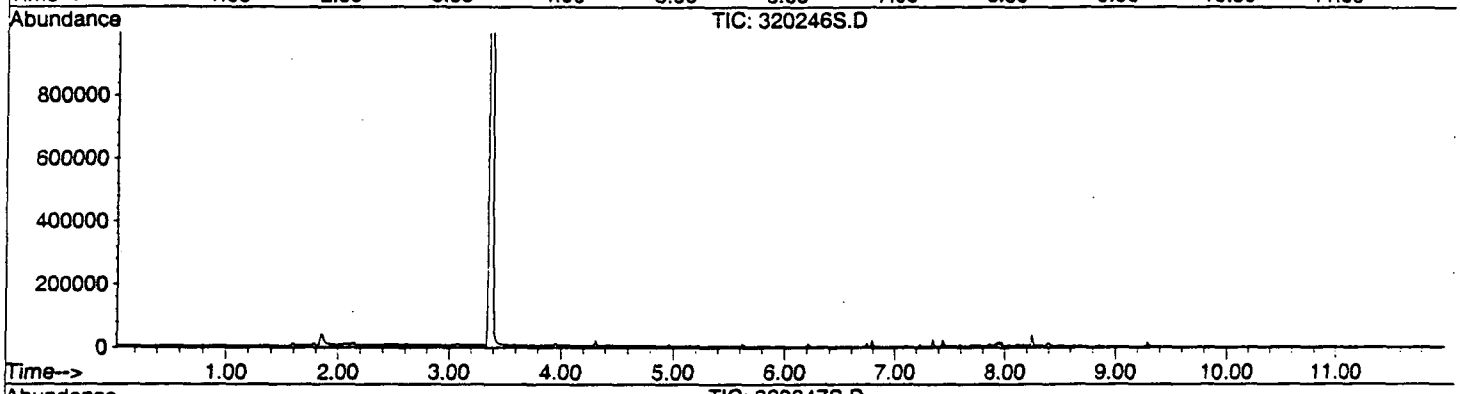

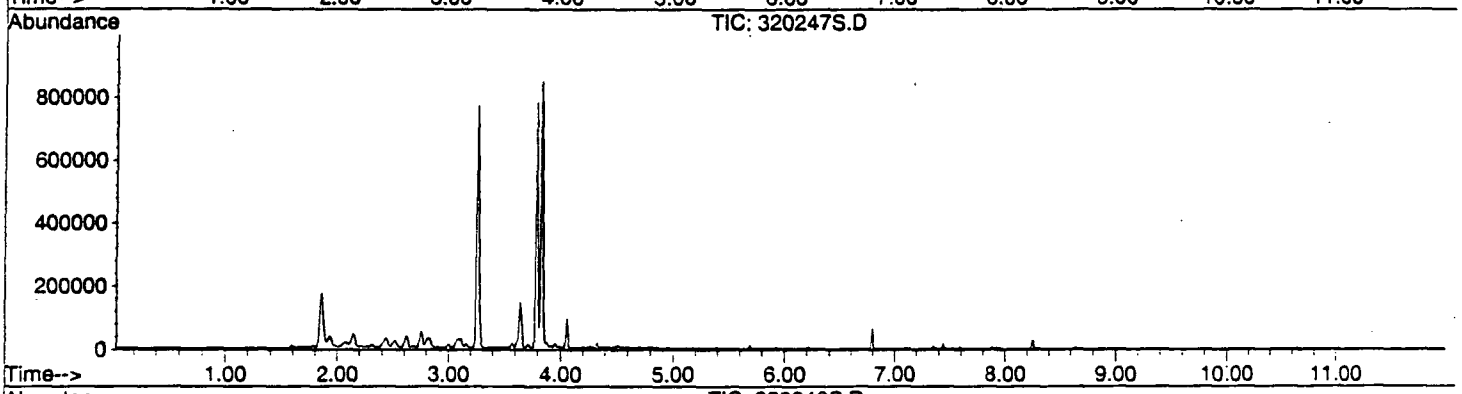

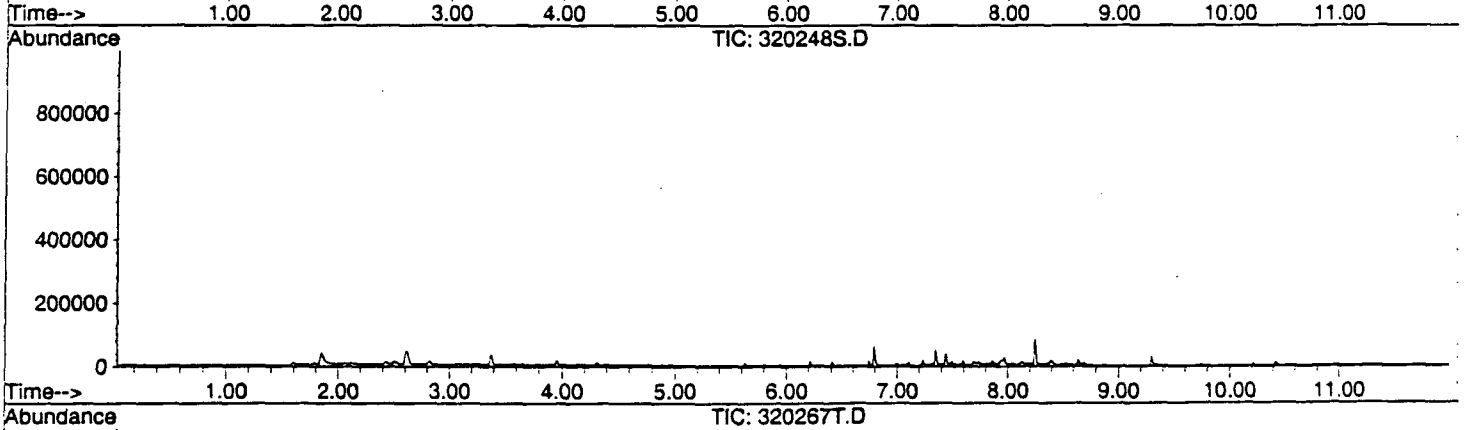

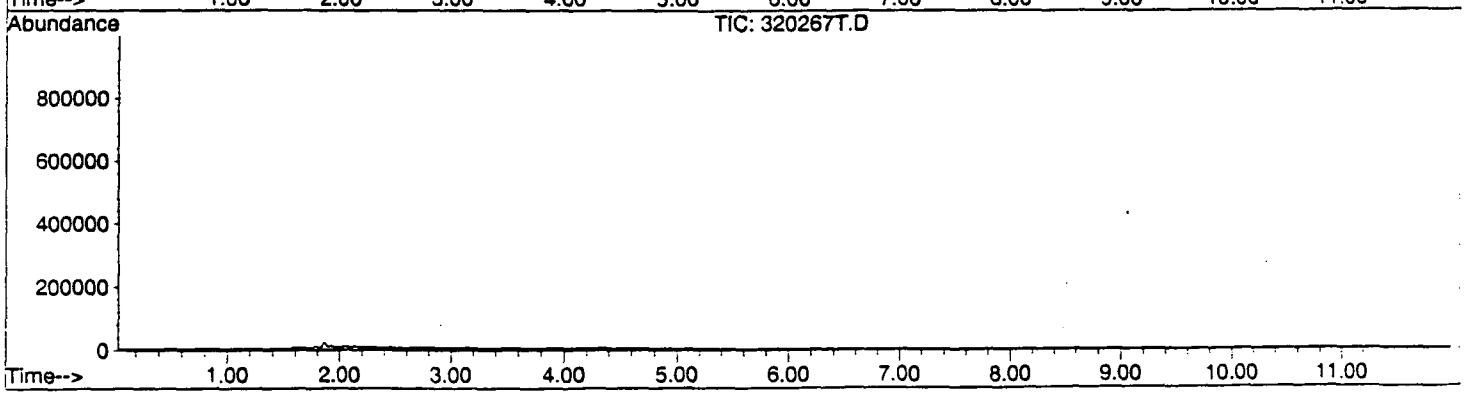

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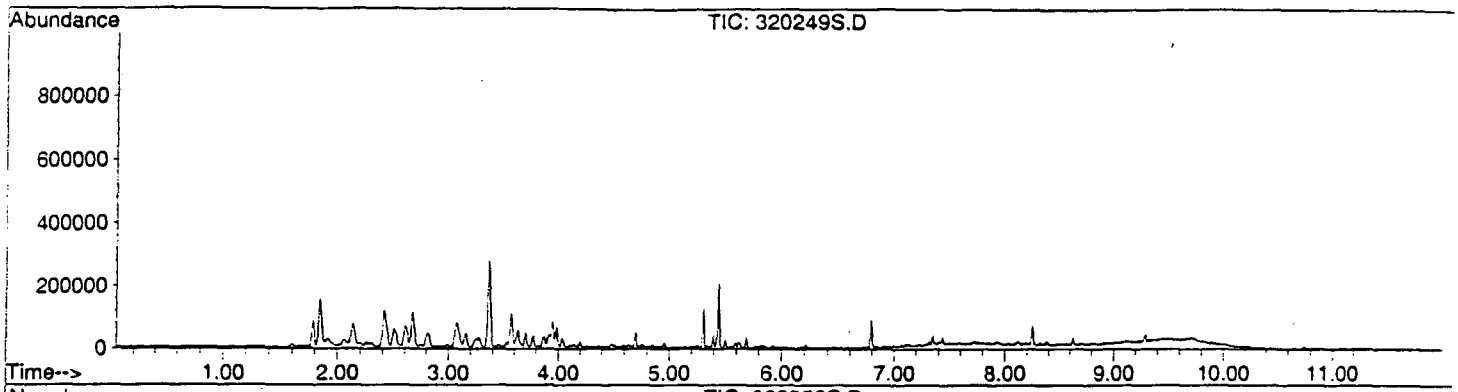

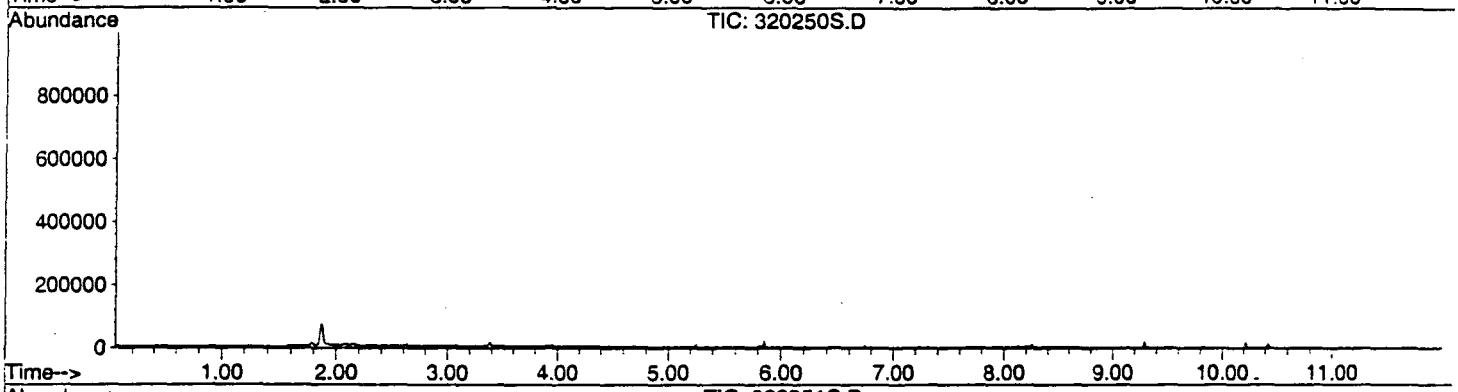

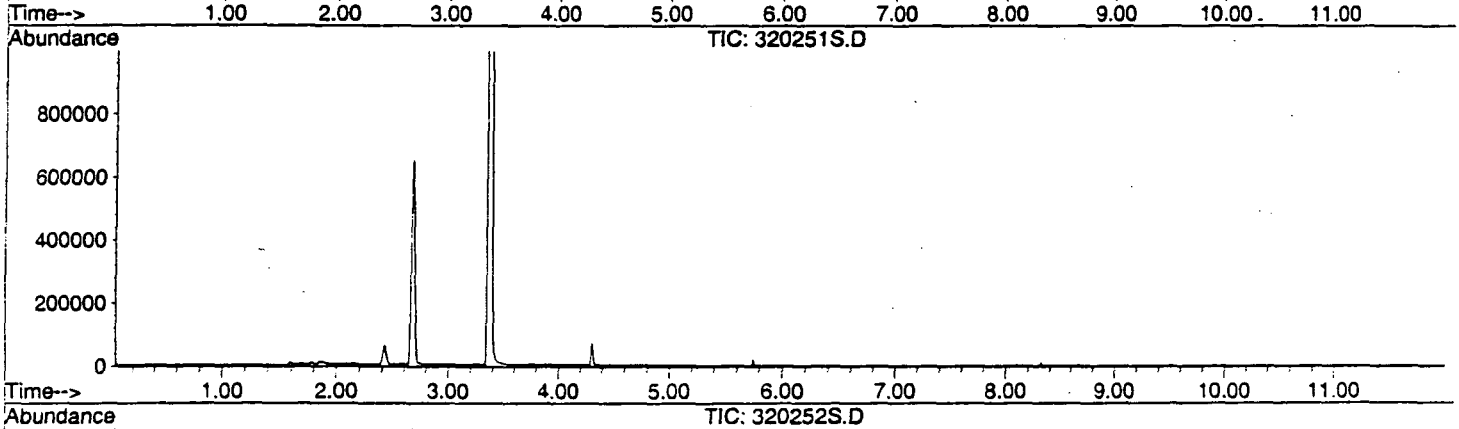

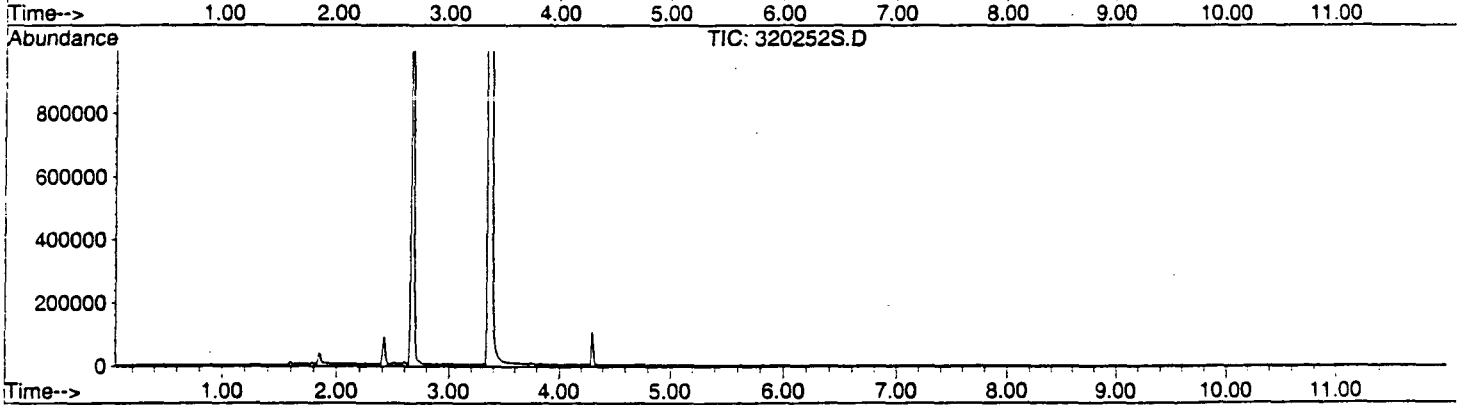

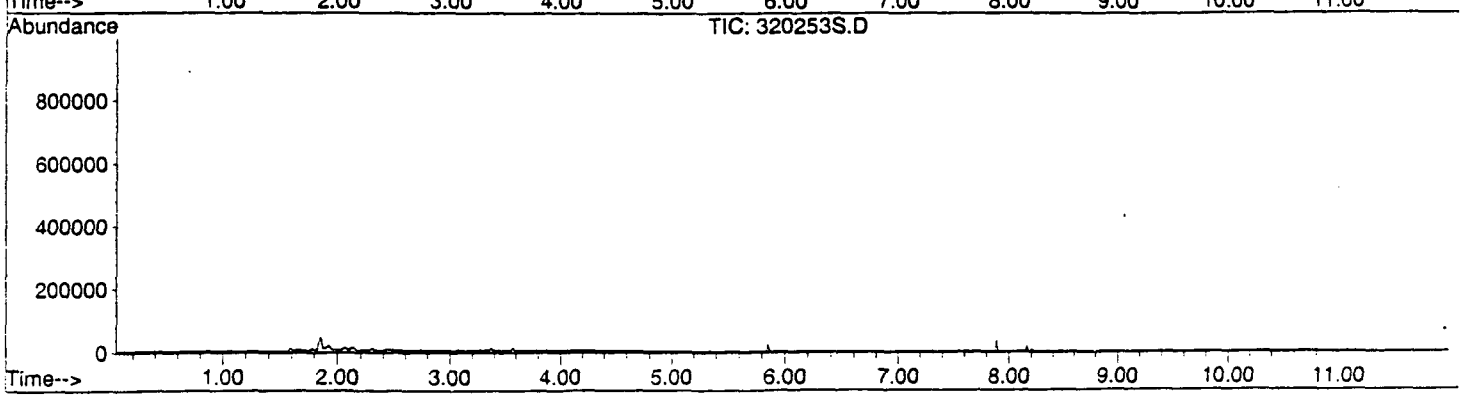

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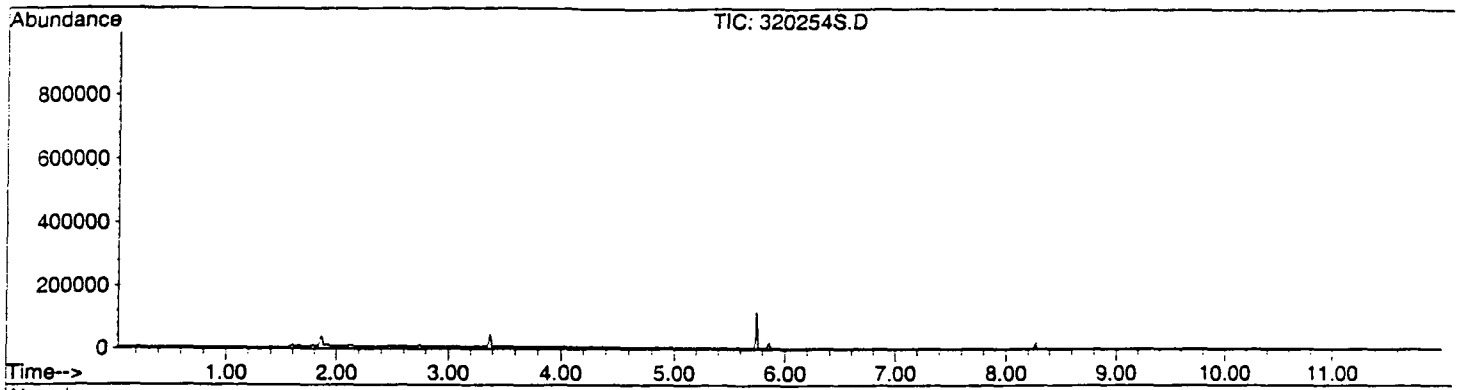

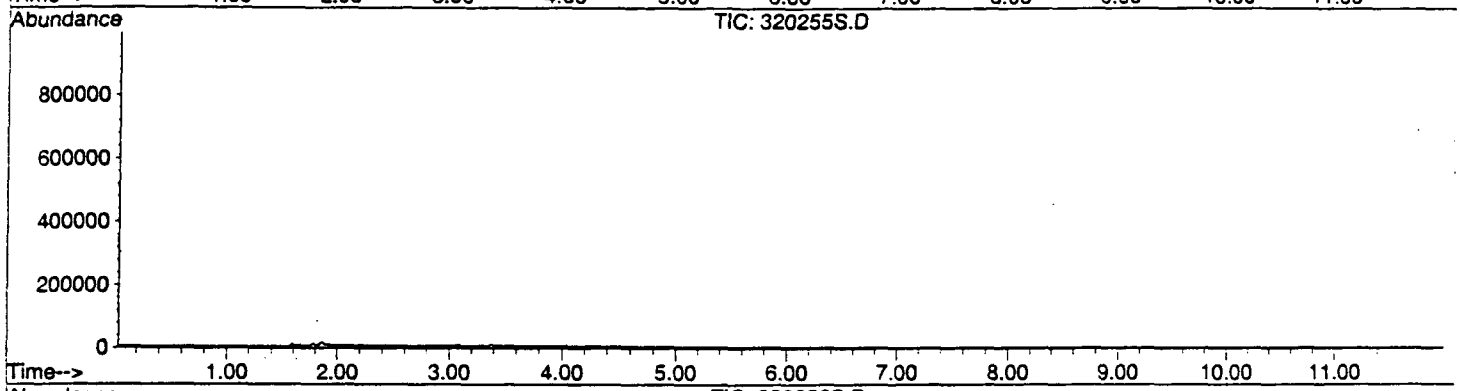

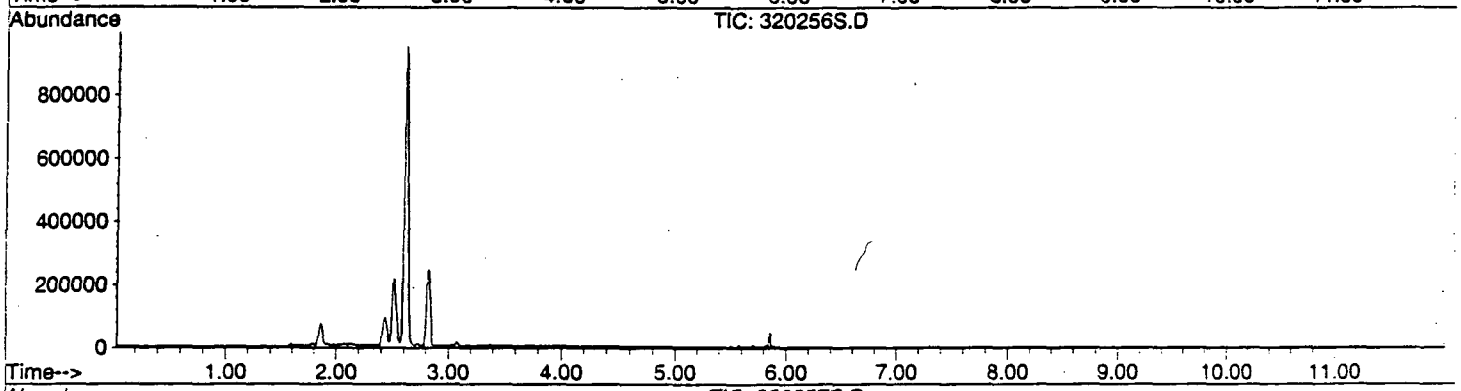

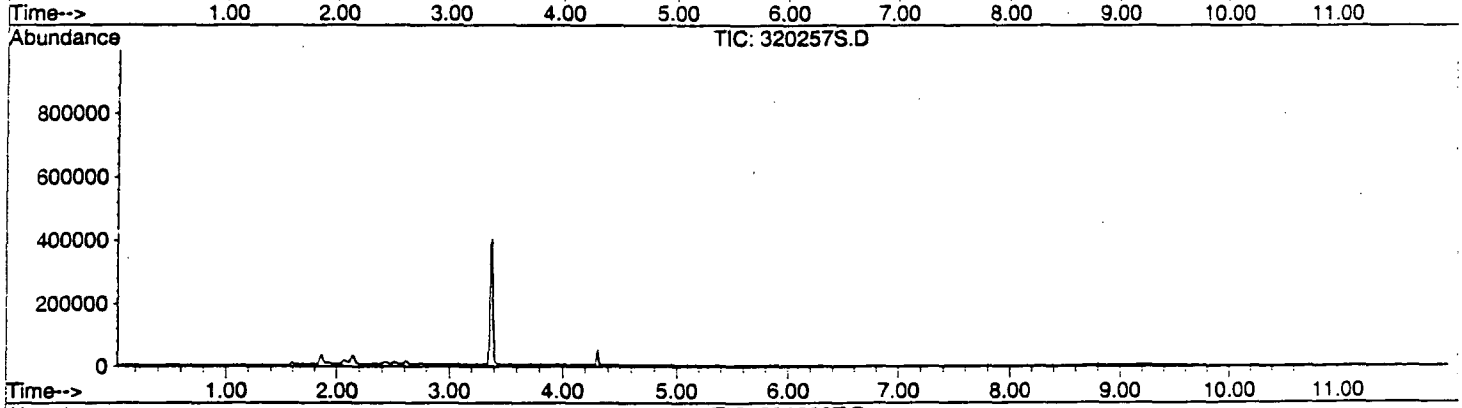

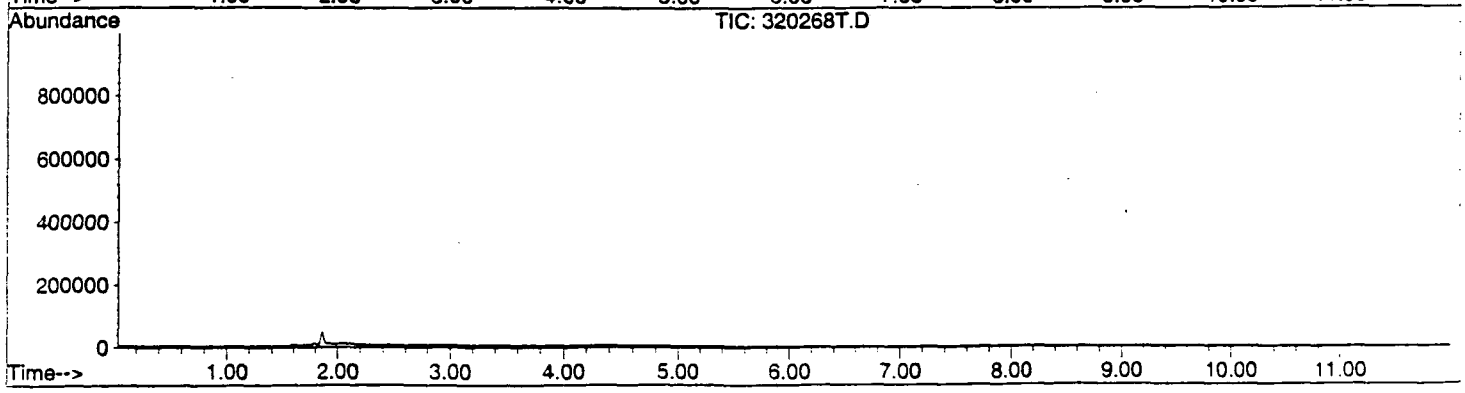

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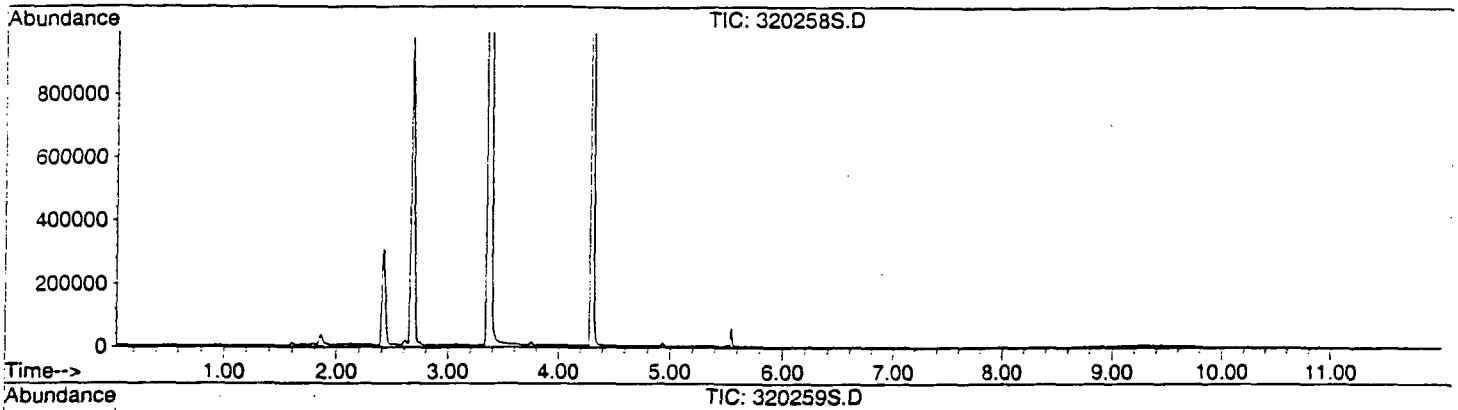

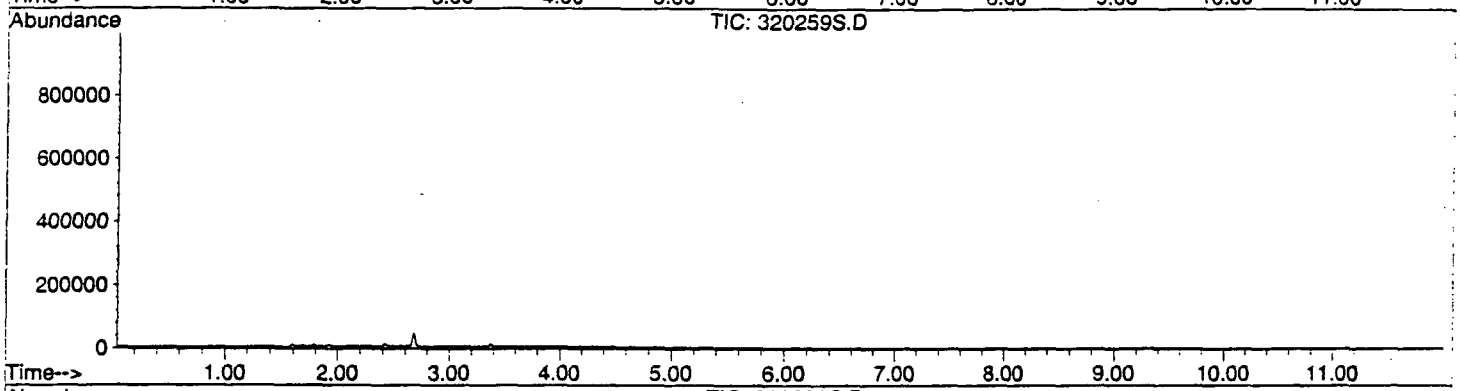

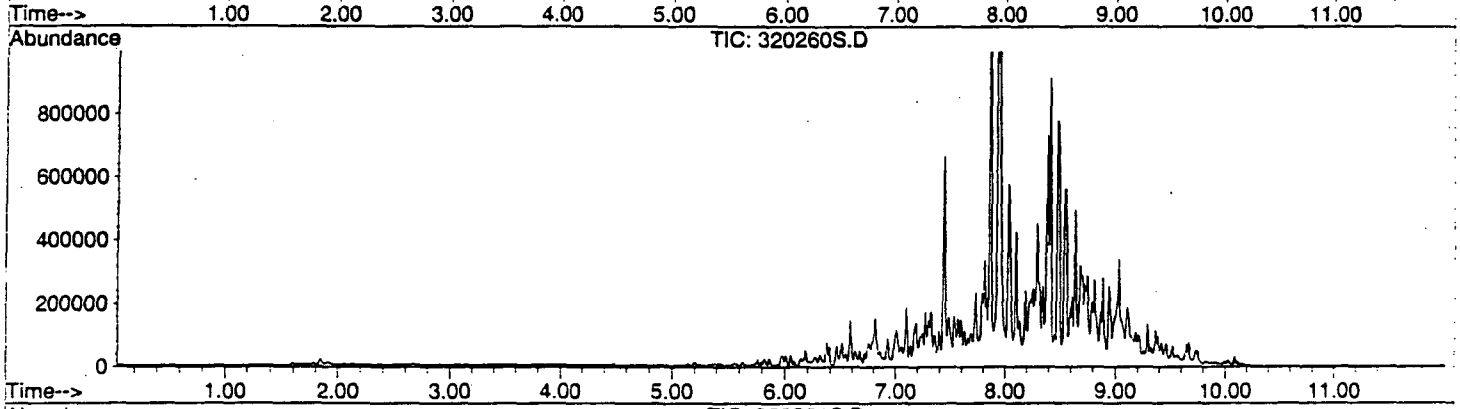

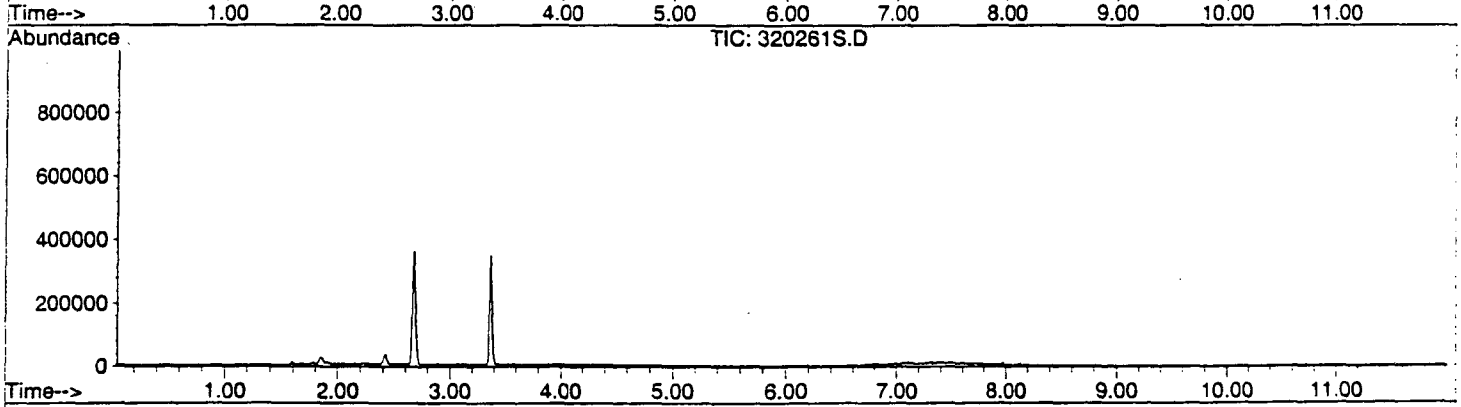

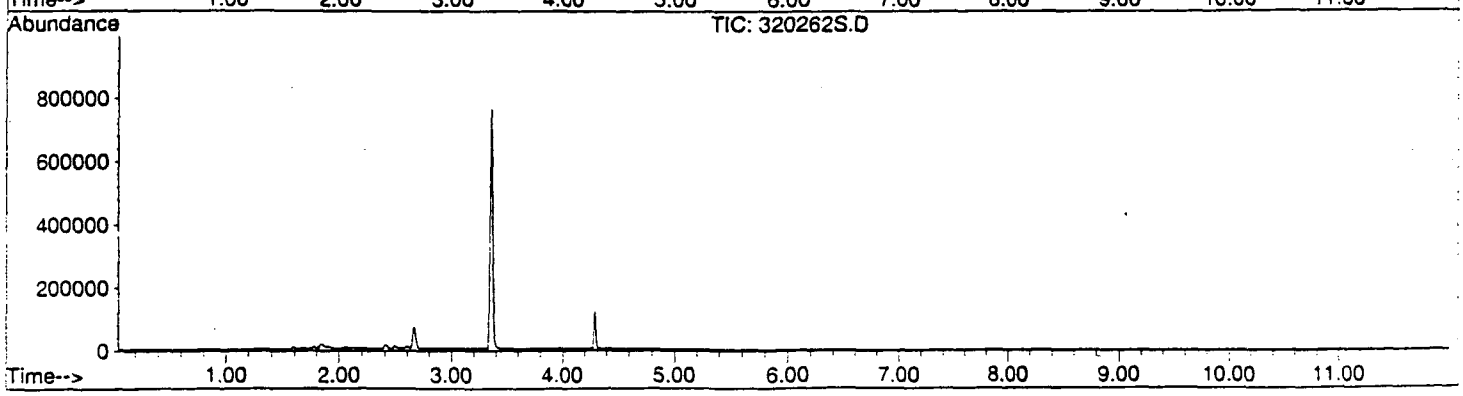

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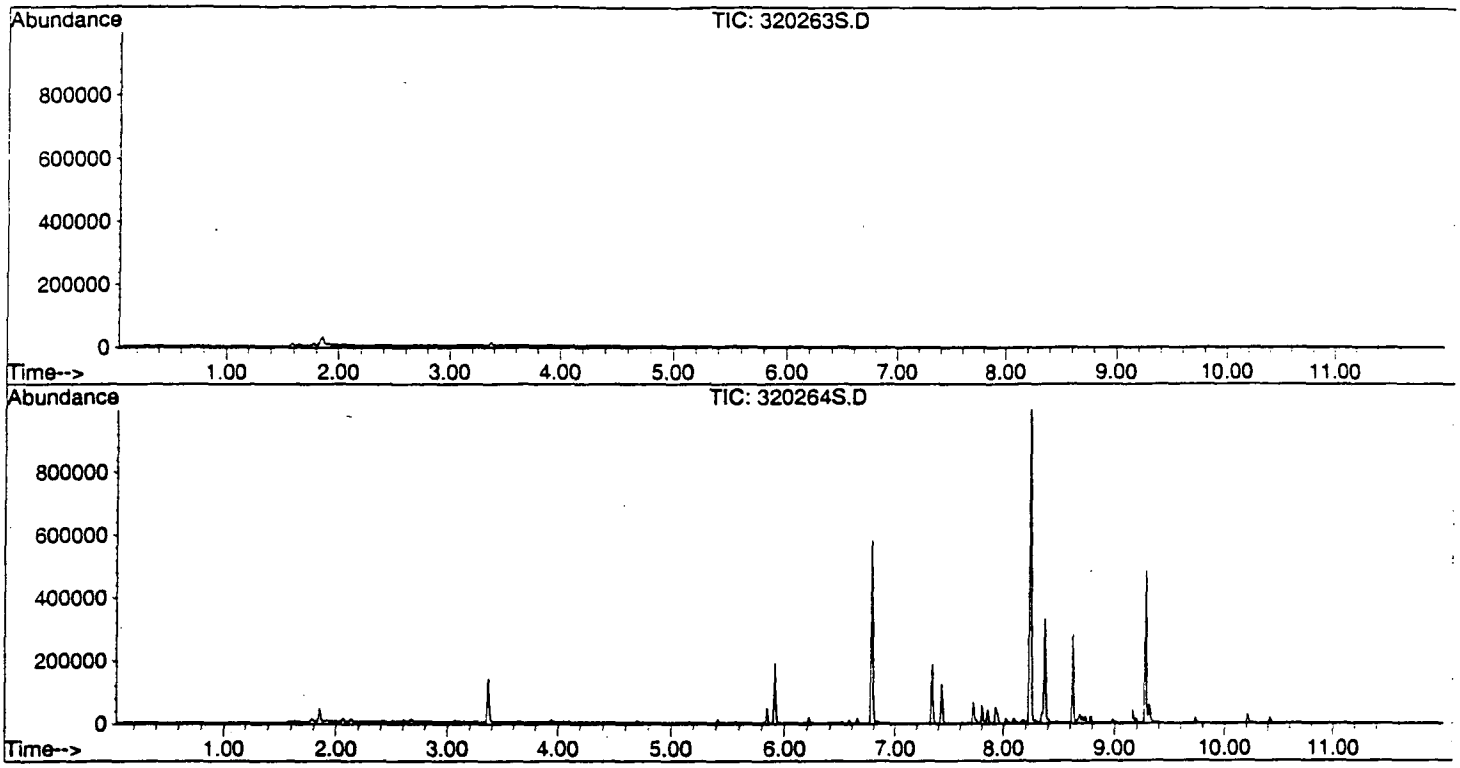

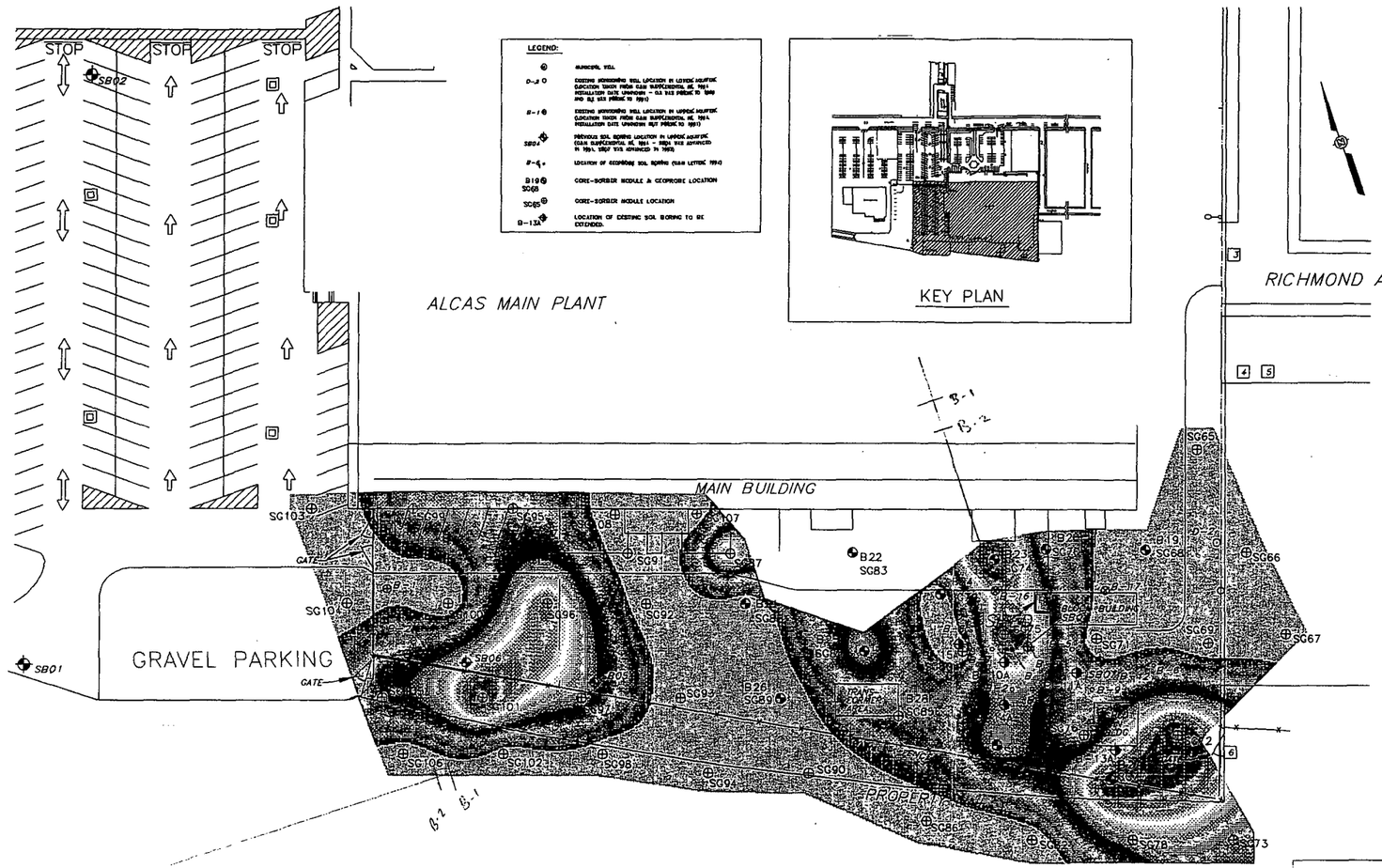

LEGEND:

- SURFACE SOIL
- EXISTING MONITORING WELL LOCATION IN LOWER AQUIFER (LOCATION TAKEN FROM GAIA SUPPLEMENTAL RE, 1994. INSTALLATION DATE UNKNOWN - 0.5 YRS PRIOR TO 1988 AND 0.5 YRS PRIOR TO 1990)
- EXISTING MONITORING WELL LOCATION IN UPPER AQUIFER (LOCATION TAKEN FROM GAIA SUPPLEMENTAL RE, 1994. INSTALLATION DATE UNKNOWN BUT PRIOR TO 1990)
- PREVIOUS SOIL BORING LOCATION IN UPPER AQUIFER (GAIA SUPPLEMENTAL RE, 1994 - BORE WAS ADVANCED IN 1991, GROUP WAS ADVANCED IN 1989)
- LOCATION OF GEOPROBE SOIL BORING (GAIA LETTER 1990)
- CORE-SORBER MODULE & GEOPROBE LOCATION
- CORE-SORBER MODULE LOCATION
- LOCATION OF EXISTING SOIL BORING TO BE EXTENDED.

KEY PLAN

PCE [µg]
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19.999
13.320
8.872
5.909
3.936
2.621
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1.163
0.774
0.516
0.344
0.229
0.152
0.102
0.068
0.045
0.030

Scale 1:840

50 0 50 100 150

foot

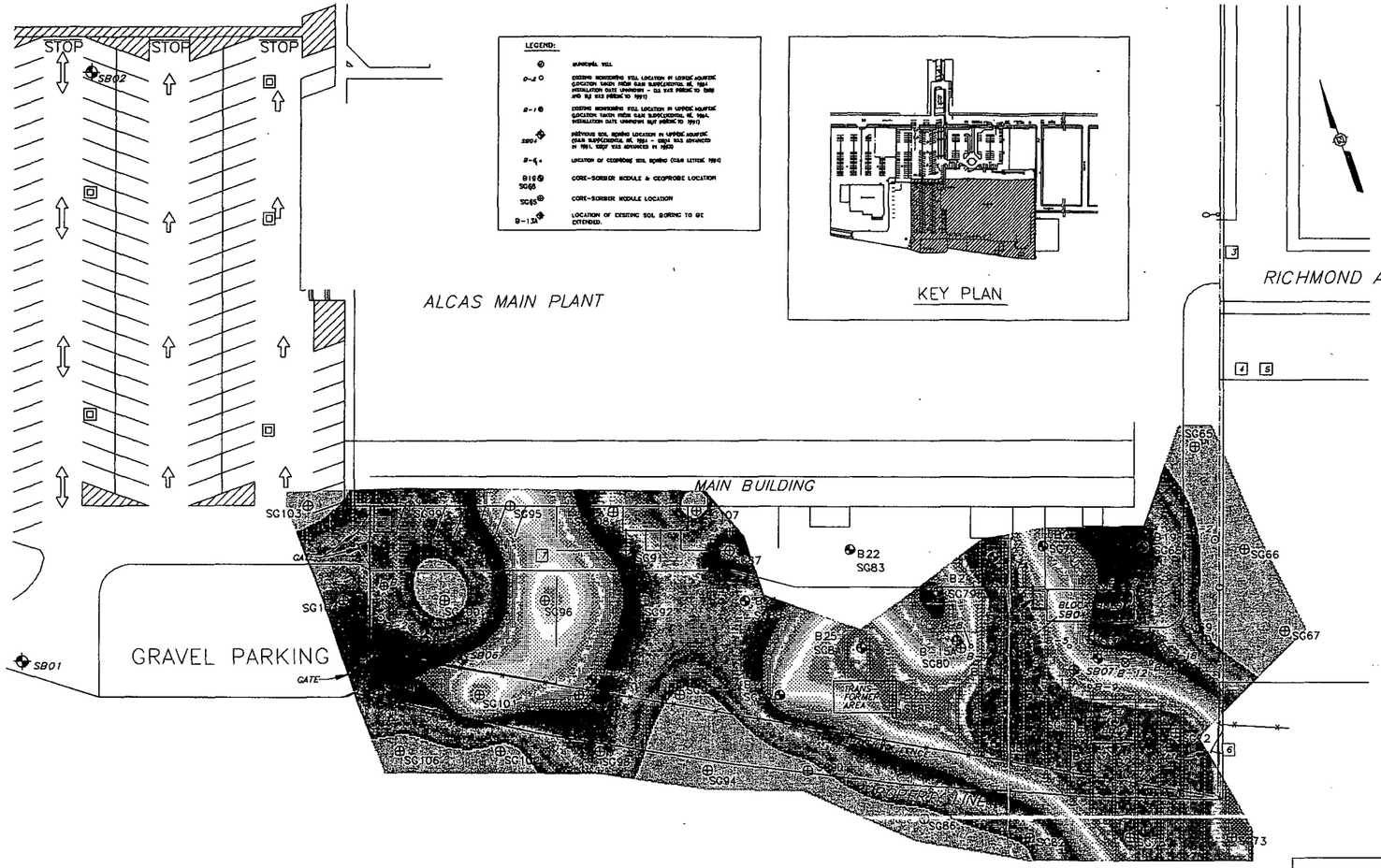
GORE-SORBER® Screening Survey

W.L. GORE & ASSOCIATES, INC.
100 CHESAPEAKE BOULEVARD
ELKTON, MD, USA 21921
USA
(410) 392-7600

Creative Technologies Worldwide

IT Corporation, Monroeville, PA
Alcoa Alcas/Cutco, Olean, New York
Tetrachloroethene

DATE DRAWN: 12 Nov 1999	DRAWN BY: JH	ORIG. CAD: WKSHT2.dwg	SITE CODE: BET
REV. DATE:	REV. #:	PROJECT NUMBER: 10228929	



Scale 1:840

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foot

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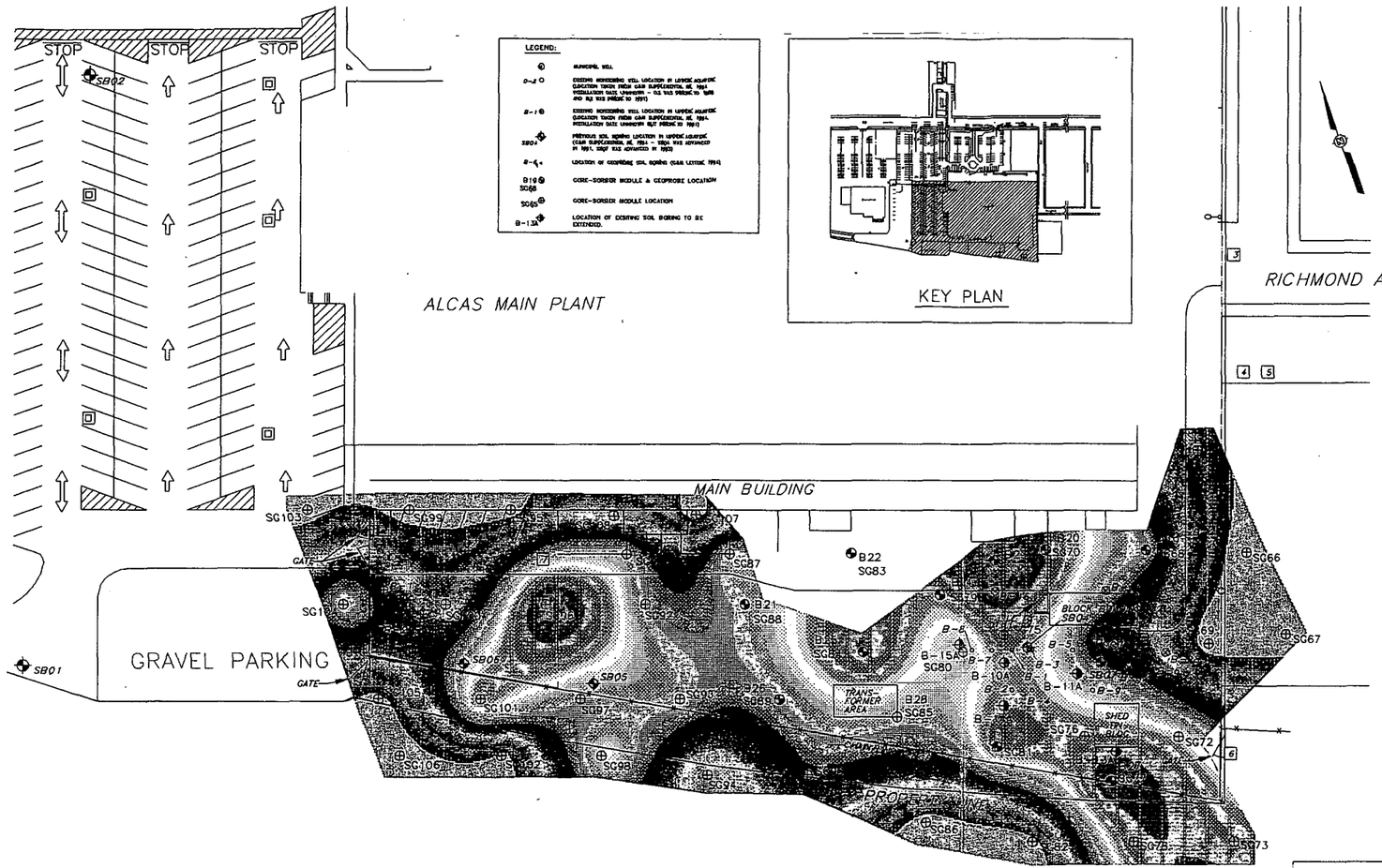

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0.052
0.032
0.020

c,t-1,2-DCE
[µg]

Scale 1:840

50 0 50 100 150

foot

GORE-SORBER IS REG. PAT. & T.M. OFF.
GORE-SORBER Screening Survey IS A REGISTERED SERVICE MARK OF W.L. GORE & ASSOCIATES
GORE-SORBER Module IS A REGISTERED TRADEMARK OF W.L. GORE & ASSOCIATES

GORE-SORBER® Screening Survey

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Creative Technologies Worldwide

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ELKTON, MD, USA 21921
USA
(410) 392-7600

IT Corporation, Monroeville, PA
Alcoa Alcas/Cutco, Olean, New York
cis- & trans-1,2-Dichloroethene

DATE DRAWN: 12 Nov 1999	DRAWN BY: JH	ORIG. CAD: WKSHT2.dwg	SITE CODE: BET
REV. DATE:	REV. #:	PROJECT NUMBER: 10228929	

APPENDIX F

ENSAFE Review of VER Pilot Test

TECHNICAL MEMORANDUM

Review of Vacuum-Enhanced Recovery Pilot Test
Alcas Facility
Olean, New York

Prepared for:

Alcoa Tennessee Operations
2300 North Wright Road
Alcoa, Tennessee 37701

Prepared by:

EnSafe Inc.
Summer Trees Drive
Memphis, Tennessee 38134

April 2002

EXECUTIVE SUMMARY

EnSafe Inc. has been retained by Alcoa Tennessee Operations (Alcoa) to perform a technical review of a vacuum-enhanced recovery (VER) pilot test completed at the Alcas facility in Olean, New York. Geraghty and Miller, Inc. (GMCE) performed the pilot test in September 1994. Following the test, GMCE summarized the findings and recommendations in a May 1995 report, concluding that a VER system would be an effective remedial technology for the Alcas site.

EnSafe has reviewed GMCE's pilot study work plan and report. Based on our review, EnSafe concludes that a vacuum-enhanced recovery system is not an appropriate remedial solution for the site. VER systems are only feasible under specific geological conditions. Pilot systems are generally used to examine their feasibility under site-specific conditions before the technology is recommended for full-scale implementation. Several critical parameters are estimated during a pilot test. These include the radius of influence (ROI), intrinsic soil gas permeability, k, maximum attainable drawdown, and soil heterogeneity. GMCE's pilot test did not evaluate these parameters effectively. Furthermore, estimates of these critical parameters were either improper or exaggerated. As a result, the recommendation for the use of this technology in full-scale remediation does not appear to be valid. The following technical memorandum outlines EnSafe's conclusions on the inappropriateness of vacuum enhanced-recovery for the Alcas site.

INTRODUCTION

The following is a technical review of a vacuum-enhanced recovery (VER) pilot system, designed and installed by Geraghty & Miller, Inc. (GMCE) in 1994. The work was performed for the Olean Cooperating Industries at the Alcas facility in Olean, New York. The original work plan for the pilot test, which was submitted in May 1994, described two separate studies. The first was a traditional soil-vapor extraction (SVE) system and the second was a VER system. However, following additional investigation at the site later that year, a revised work plan was submitted in September 1994. It outlined site-specific hydrogeological reasons for abandoning the SVE system and implementing a single VER test.

Based on the new hydrogeological and geological information in 1994, the subsurface at the Alcas facility was re-stratified. A new cross-section indicated two separate water-bearing units in the top 100 feet of sediments. The lower aquifer was 60 feet thick and consisted of stratified sand and mixtures of gravel. The upper aquifer is 10 feet thick and consists of sand, gravel, and varying amounts of silt. The two aquifers are separated by an upper aquitard, a relatively impermeable layer of silty clay approximately 10 feet thick.

The revised work plan outlined the layout and design of the VER pilot test, which was conducted with a single recovery system (RW-1), surrounded by an array of monitoring wells in the upper water-bearing unit (upper aquifer). The recovery well was connected to a vacuum system with the capability of extracting both liquid and vapor phases from the subsurface. The extraction well and monitoring wells had the mechanical fittings required to measure critical parameters to evaluate the pilot system. These included pressure gauges and flow meters from the extraction well to measure vacuum influence and overall extraction flow rates, devices to measure water and vacuum levels in all wells, and sampling connectors to periodically measure VOC concentrations in the extracted soil and groundwater. The data were to be analyzed to study the effectiveness of the pilot study, the feasibility of a full-scale VER system, and the collection of design parameters for the system.

The VER pilot test was performed in November 1994. It lasted approximately 24 hours. Data collected from the test were summarized in a May 1995 report in which GMCE concluded that

the test had successfully demonstrated the feasibility of VER and endorsed its implementation as an effective remedial technology for the Alcas site.

TECHNICAL REVIEW

The following paragraphs review the test plan, results, and conclusions. After examining several key aspects of the pilot test, EnSafe has concluded that contrary to the conclusions in the report, vacuum extraction actually is unlikely to be a feasible remedy for the site. The key design parameters that were estimated during the pilot test and used to examine feasibility were the radius of influence (ROI), soil gas permeability, k, water table drawdown, and soil heterogeneity. Each of these will be discussed in greater detail to develop a better understanding of EnSafe's review and conclusions.

Soil Gas Permeability, k: Perhaps, the most important design parameter in determining VER feasibility is the soil gas permeability or intrinsic permeability (U.S. EPA, March 1991). Soil gas permeability, k, is defined as the soil's capacity for fluid flow, and varies according to grain size, soil uniformity, porosity, and moisture content. It is expressed in the units of cm^2 or darcy (1 darcy = 1 x 10^{-8} cm^2). Generally, k values less than 10^{-8} cm^2 indicate that the soil may be too fine for a VER system to work efficiently. Soils with a permeability greater than 10^{-7} cm^2 are preferred, while soils with a k value less than 10^{-9} cm^2 are not recommended for this technology. The k value and the methodology to determine it are critical in deciding whether to recommend VER or SVE.

First, the pilot study used a solitary well MW-1 to determine the k value and estimated it to be greater than 10^{-6} cm^2. The other monitoring wells, which showed a much poorer response to vacuum influence, were not used in the estimations. MW-1 showed a gradual increase in vacuum level over time and an attainment of more than 20 inches H_2O vacuum at the end of the test. By comparison, the other two wells (MW-2 and MW-3) show a vacuum build-up of less than 1 inch H_2O. If these wells were used to estimate soil gas permeability, its value would likely have been much less than 10^{-6} cm^2. In all likelihood, a mean determination of k from these three wells would have put it in a critical range that actually indicated that the site is not feasible for remediation via a vacuum extraction system.

Second, the technique used to estimate soil gas permeability was probably inappropriate. A better estimate of soil gas permeability, k, could have been made from steady-state conditions using a different equation than the one used for the dynamic state response scenario. Estimations of k from steady state are preferred for extraction systems from relatively shallow soils (AFCEE, May 1992). In this case, there is less risk of arriving at a false positive, which appears to have occurred at this site, where the k value was estimated from the dynamic response at a single selected well. Therefore, not only does the estimated k value appear highly exaggerated, but the methodology by which it was determined may have been inappropriate.

Radius of Influence (ROI)

The radius of influence, R, or ROI, is the maximum distance from the extraction well where measurable vacuum occurs. The ROI at this site was also estimated based on the vacuum response from a single well (MW-1). The conclusion was that the ROI at this site is at least 35 feet. The response from MW-2 and MW-3 were not considered while making this determination. If all three wells were considered and a mean value determined, a meaningful ROI would probably have been much less than the estimated 35 feet, and probably closer to 15 feet. Smaller ROIs generally indicate that the number of extraction wells required for a full-scale extraction system would be too numerous for feasible implementation of the technology.

A better way to estimate ROI would have been to design a series of monitoring points along a single direction from the extraction well. In this case, a series of vacuum levels during steady state along a straight line could have been plotted on a graph and the ROI estimated. If required to provide an estimate of the area of influence, monitoring points could also have been located radially surrounding the extraction well. Based on these observations, it once again appears that the field-determined ROI was not only exaggerated, the method by which it was determined may not have been appropriate.

Water Table Drawdown: Water table drawdown in the extraction well and the surrounding monitoring wells is a good indicator of how much of the vadose zone can be made available for vapor extraction. The decrease in the water table demonstrated in this study varied tremendously

from well to well. Therefore, while groundwater extraction at isolated locations in the subsurface may actually result in an exposed vadose zone, much of the subsurface may not be amenable to achieving the kind of drawdown that makes a vacuum extraction system feasible. Judging from the vacuum response and the poor influence observed at MW-1 and MW-2, it may not be possible to achieve adequate drawdown to make a VER system feasible.

Soil Heterogeneity: An understanding of subsurface geology and hydrogeology is critical in VER testing and the implementation of this technology at the site. The geological cross-sections in the report do not appear to have considered soil heterogeneity. The variation in vacuum response in different radial directions from the vacuum extraction well strongly indicate that the subsurface is much more heterogeneous than depicted by the geological cross-sections. A description of the upper aquifer as silty sand is probably inappropriate. In all likelihood, there are several portions of the subsurface where finer soils such as silt predominate, making vacuum extraction infeasible, as observed from the highly variable vacuum responses. The presence of silts decreases the soil gas permeability, and limits vacuum removal to a diffusive, rather than the preferred advective process. The diffusion process considerably limits the rate of contaminant removal by the vapor extraction process (U.S. EPA, March 1991). Furthermore, the presence of substantial amounts of fines such as silts also makes the subsurface heterogeneous, a condition that makes vacuum extraction technology even more infeasible.

CONCLUSIONS

Based on EnSafe' s review of significant parameters (radius of influence, ROI, and soil gas permeability, k) which are critical to the success of a vacuum-enhanced recovery system, it appears that this technology is not a viable option for the site. The techniques of determination did not lead to accurate estimates of these parameters. As a result, the radius of influence and soil gas permeability determined from this pilot test are likely to be exaggerated. If these parameters are accurately determined, it is very likely that the site will not be appropriate for vacuum extraction remediation. Finally, when site heterogeneity and the presence of silts are considered, it is unlikely that a VER/SVE system is applicable at this site.

REFERENCES

1. U.S. EPA. Guide for Conducting Treatability Studies Under CERCLA: Soil Vapor Extraction. Washington, DC. March 1991.

2. Air Force Center for Environmental Excellence (AFCEE). Test Plan and Protocol for a Field Treatability Test for Bioventing. Washington, DC. May 1992.

APPENDIX G

Boring Logs and Well Construction Details

DRILLER: BUFFALO DRILLING
GEOLOGIST: J. BYRD
WORK ORDER: 137-09
CLIENT: ALCOA, INC.
DATE COMPLETED: 9-27-00
LOCATION: 1116 E. STATE ST.
METHOD: GEOPROBE
OLEAN, NY

NOTES:

LOCATION

SOIL BORING ENI-1

MONITOR WELL NA

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
						CLAY, DARK W/GRAVEL, GRASS & ROOTS
						SANDY LEAN CLAY, TAN W/ROOTS & GRAVEL
5						
	0					INCREASING CLAY
						OLIVE GRAY W/GRAVEL,
10	0					ROCKS & LITTLE SILT
15	0					
						INCREASING SILT
20	0					
						SHALE LAYER AT 23'
	0					SANDY LEAN CLAY, TAN, SILTY W/GRAVEL, MOIST
	0					SILTY CLAYEY SAND, COARSE W/SILT & LG. GRAVEL ▼
25	0					CLAY LAYER, TAN W/GRAVEL, SAND & SILT
	0					SANDY LEAN CLAY, COARSE W/LARGE GRAVEL & ROCK
30						
	0					SANDY LAYER
35						COARSE SAND & GRAVEL
	0					END OF BORING
40						

E1370907

ENVIRONEERING, INC.

BORING LOG.
ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	1-23-01	137-09

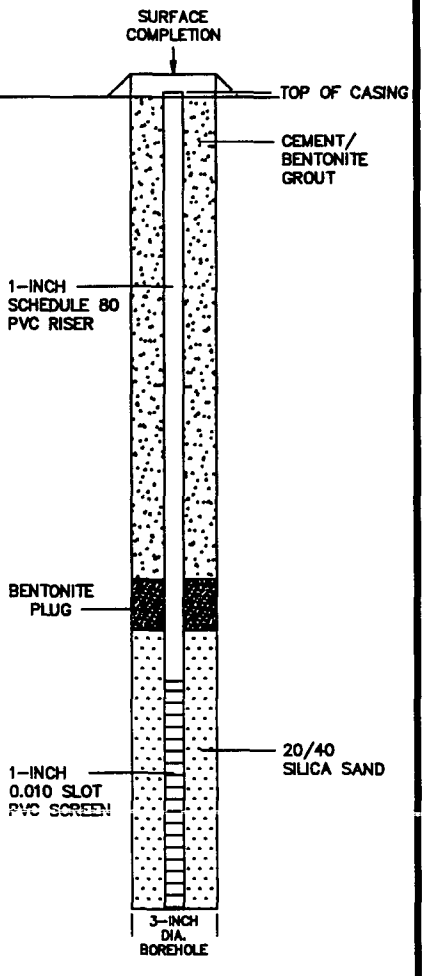
DRILLER: BUFFALO DRILLING
GEOLOGIST: J. BYRD
WORK ORDER: 137-09
CLIENT: ALCOA, INC.
DATE COMPLETED: 9-28-00
LOCATION: 1116 E. STATE ST. OLEAN, NY
METHOD: GEOPROBE
NOTES:

LOCATION

SOIL BORING RU-1

MONITOR WELL RU-1

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
	0					ASPHALT
	0					GRAVEL, TAN
						FIRM, GRAY SANDY LEAN CLAY W/GRAVEL
5	0					IRON STAINING, SILTY, LIGHT
						ROCK, TAN
	0					CLAY, RED, FIRM W/FEW SMALL GRAVEL
	0					GRAY W/GRAVEL & INCREASING SAND
10						
						SILTY CLAYEY SAND, FIRM OLIVE GRAY W/GRAVEL & ROCK, FEW IRON NODULES
15	0					MORE TAN
	0					
20						SILTY CLAYEY GRAVEL, GRAY W/SAND
	0					VERY SILTY, SATURATED ▼
25						CLAY SAND, FIRM W/GRAVEL
	0					FIRM W/DECLINING GRAVEL SIZE
30						SANDY LEAN CLAY W/GRAVEL
						END OF BORING
35						
40						



E1370908

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	1-25-01	137-09

DRILLER: BUFFALO DRILLING
GEOLOGIST: J. BYRD
WORK ORDER: 137-09
CLIENT: ALCOA, INC.
DATE COMPLETED: 9-28-00
LOCATION: 1116 E. STATE ST.
METHOD: GEOPROBE
OLEAN, NY

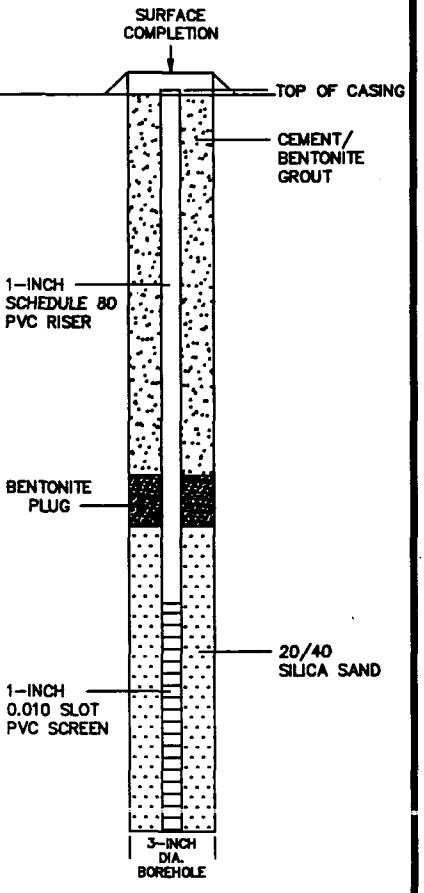
NOTES:

LOCATION

SOIL BORING RU-2

MONITOR WELL RU-2

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
0	0					CLAY, ORGANIC. DK. SILTY, GRASS AT SURFACE W/GRAVEL
	0					POORLY GRADED GRAVEL FILL, TAN, DARK STAINED W/IRON NODULES, HAIR
5	0					POORLY GRADED SAND, TAN W/GRAVEL, CLAY & ROCK
	0					
10	0					SANDY SILTY CLAY, OLIVE GRAY
						SANDY LEAN CLAY, FIRM OLIVE GRAY/TAN W/ROCK & GRAVEL, LITTLE SILT
15	0					
20	0					
						THIN SILT LAYERS
25	0					
	0					GRAVEL, COARSE, BROWN W/SILTY CLAY & SAND
30	0					
0						END OF BORING
35						
40						



E1370909

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	1-25-01	137-09

DRILLER: BUFFALO DRILLING GEOLOGIST: J. BYRD

WORK ORDER: 137-09 CLIENT: ALCOA, INC.

DATE COMPLETED: 9-27-00 LOCATION: 1116 E. STATE ST.

METHOD: GEOPROBE OLEAN, NY

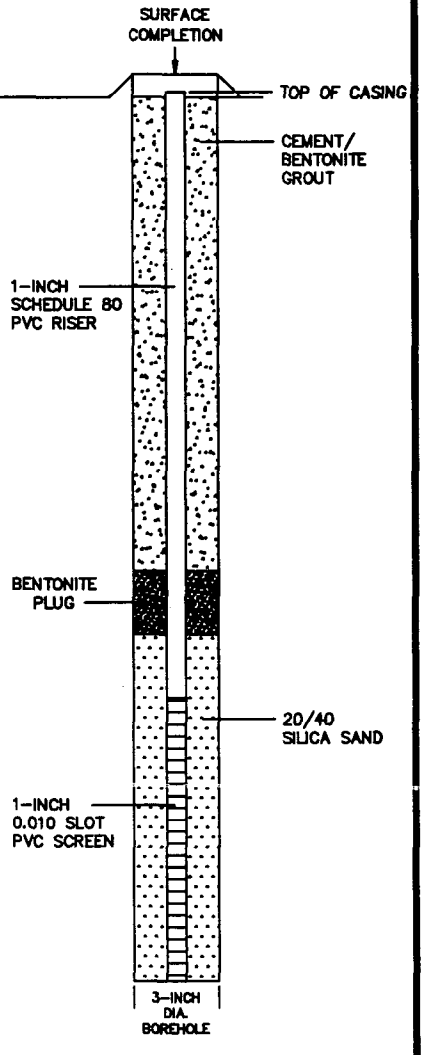
NOTES:

LOCATION

SOIL BORING RU-3

MONITOR WELL RU-3

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
0	0					SANDY SILTY CLAY, FIRM BROWN W/ROOTS & SMALL GRAVEL, BURNT MATERIAL & TAR OR ASPHALT, PIECES OF RED CONGLOMERATE
5	0					CLAYEY SAND, DARK GRAY W/FEW SOFT CALCITE NODULES, FEW ROOTS & BURNT WOOD CHIPS & GRAVEL
10	0					SILT LAYER, LIGHT TAN AT 8.5' LIGHTER COLOR W/SOME LG. GRAVEL
	0					SILTY CLAY, DARK BROWN W/LG. GRAVEL, ORGANIC
15	0					SANDY LEAN CLAY, OLIVE GRAY W/GRAVEL SHALE ROCK AT 15.5'
20	0					SILTY GRAVEL, LOOSE SMALL & LARGE W/POOR MICA & SANDSTONE
25	0					SANDY LEAN CLAY, TAN W/SILT LAYERS & GRAVEL GRAY W/FEW IRON NODULES
30						END OF BORING



E1370912

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	1-25-01	137-09

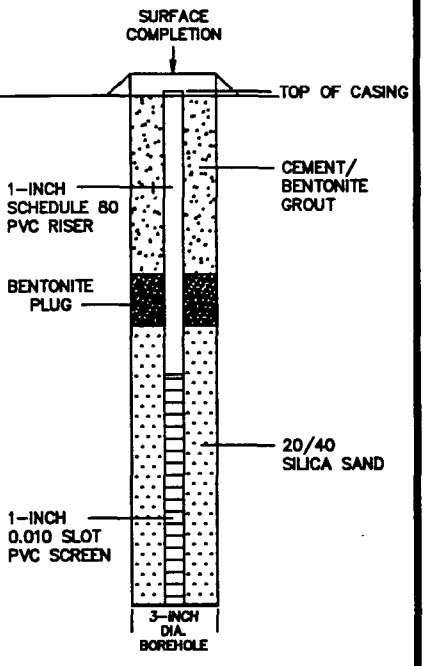
DRILLER: BUFFALO DRILLING
GEOLOGIST: J. BYRD
WORK ORDER: 137-09
CLIENT: ALCOA, INC.
DATE COMPLETED: 9-26-00
LOCATION: 1116 E. STATE ST.
METHOD: GEOPROBE
OLEAN, NY
NOTES:

LOCATION

SOIL BORING RU-4

MONITOR WELL RU-4

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
						CONCRETE
	37					SANDY LEAN CLAY, FIRM GRAY W/SMALL ROCKS & LIGHT IRON STAINING
	92					COARSE ROCK
5	64					ROCK DECREASING IN SIZE, MOSTLY RED ROOT TRACES, MAGNESIUM & IRON NODULES, SMALL GRAVEL
	16					
10						LARGE & SMALL GRAVEL, FOSSILIZED MATERIAL
	7					
	16					SHALE LAYER, GRAY
15						CLAY SAND, TAN, SATURATED W/SM. GRAVEL
						SILTY CLAYEY SAND, FIRM GRAY W/LARGE ROCKS & GRAVEL
	37					
20	234					GRAVELLY LEAN CLAY, SOFT SILTY OLIVE/GRAY W/SMALL ROCKS & SAND
						THIN LAYER DARK GRAY GRAVEL
	16					
25						
30	29.5					GRAVEL, LARGE & SMALL, SAND & SILT
						END OF BORING
35						
40						



E1370910

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	1-25-01	137-09

DRILLER: BUFFALO DRILLING GEOLOGIST: J. BYRD

WORK ORDER: 137-09 CLIENT: ALCOA, INC.

DATE COMPLETED: 10-02-00 LOCATION: 1116 E. STATE ST.

METHOD: GEOPROBE OLEAN, NY

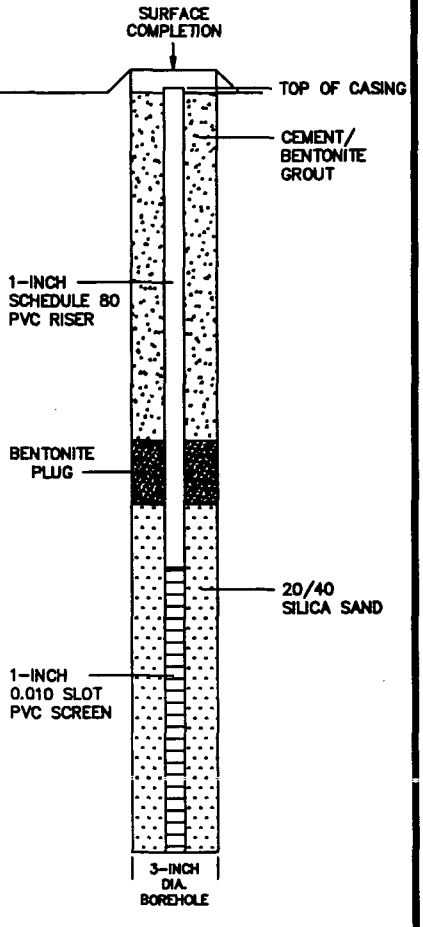
NOTES:

LOCATION

SOIL BORING RU-5

MONITOR WELL RU-5

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
0	0					SANDY SILTY CLAY, RED/BROWN W/LITTLE GRAVEL
5	0					BROWN W/SMALL & LARGE GRAVEL
	0					CLAY SILT, TAN W/GRAVEL
10	0					SANDY LEAN CLAY, GRAY W/GRAVEL ROCK AT 10'
15	2					WELL GRADED GRAVEL, COARSE W/CLAY & SAND
	6					
	0					SANDY LEAN CLAY, FIRM GRAY W/GRAVEL & SILT
20						
	4					VERY SILTY
25						END OF BORING
30						



E1370913

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	1-25-01	137-09

DRILLER: BUFFALO DRILLING GEOLOGIST: J. BYRD

WORK ORDER: 137-09 CLIENT: ALCOA, INC.

DATE COMPLETED: 9-27-00 LOCATION: 1116 E. STATE ST.

METHOD: GEOPROBE OLEAN, NY

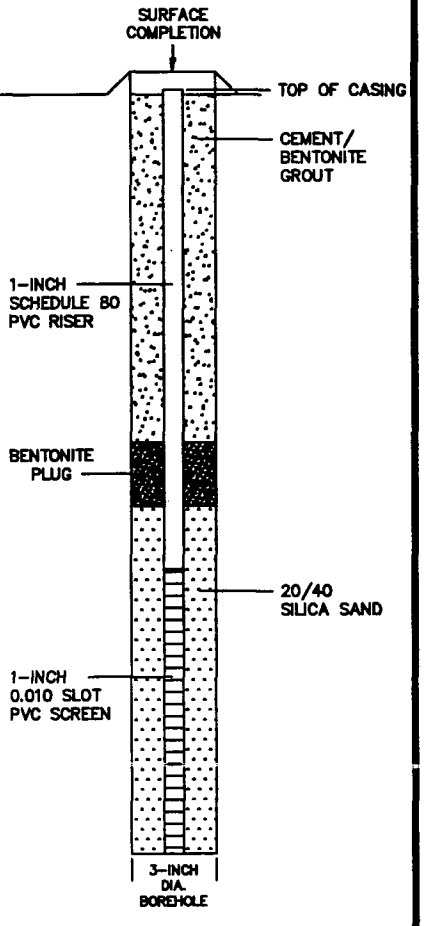
NOTES:

LOCATION

SOIL BORING RU-6

MONITOR WELL RU-6

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
0						CONCRETE
	0					WELL GRADED GRAVEL, LARGE, SAND & LITTLE SILT
5						SANDY SILTY CLAY, SOFT TAN W/FEW LARGE ROCKS
	0					LARGE GRAVEL
	0					MORE CLAY
10						SHALE, GRAY
	0					SANDY LEAN CLAY, GRAY W/LITTLE SMALL GRAVEL & MAGNESIUM NODULES
						SILTY CLAYEY SAND, OLIVE GRAY W/ LARGE GRAVEL
15	0					INCREASING SILT
	1					SHALE
20						SANDY SILTY CLAY, SOFT W/LITTLE SAND
	0					CLAYEY SAND, FIRM W/GRAVEL
	77					
	122					END OF BORING
25						
30						



E1370914

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	1-25-01	137-09

DRILLER: BUFFALO DRILLING
GEOLOGIST: J. BYRD
WORK ORDER: 137-09
CLIENT: ALCOA, INC.
DATE COMPLETED: 9-26-00
LOCATION: 1116 E. STATE ST.
METHOD: GEOPROBE
OLEAN, NY

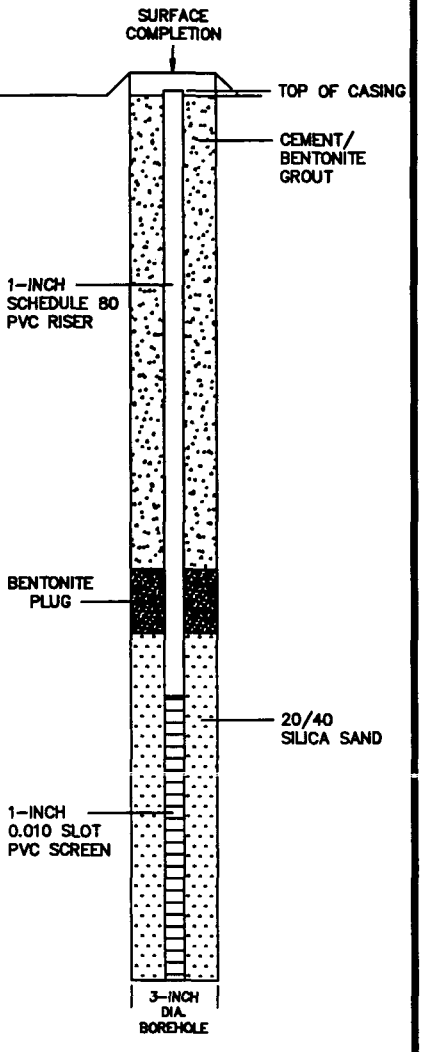
NOTES:

LOCATION

SOIL BORING RU-7

MONITOR WELL RU-7

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
0						SILTY LEAN CLAY, OLIVE TAN W/GRASS & ROOTS AT SURFACE SMALL & LARGE GRAVEL
5	0					INCREASING MOISTURE & FEW ORGANIC NODULES
10	0 0 0					SANDY LEAN CLAY, MOIST W/SMALL & LARGE ROCKS, RED
15	0					SILTY CLAYEY SAND W/GRAVEL, OLIVE GRAY W/BROWN SHALE
	0					SHALE, BROWN W/SANDY SILT
20	0					SANDY LEAN CLAY, OLIVE GRAY W/GRAVEL SILT LAYER ▼
25	0 0 0					CLAY SAND, FIRM TAN W/FEW ROCKS & GRAVEL
30						END OF BORING



E1370916

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	1-25-01	137-09

DRILLER: BUFFALO DRILLING
GEOLOGIST: J. BYRD
WORK ORDER: 137-09
CLIENT: ALCOA, INC.
DATE COMPLETED: 10-01-00
LOCATION: 1116 E. STATE ST.
METHOD: GEOPROBE
OLEAN, NY

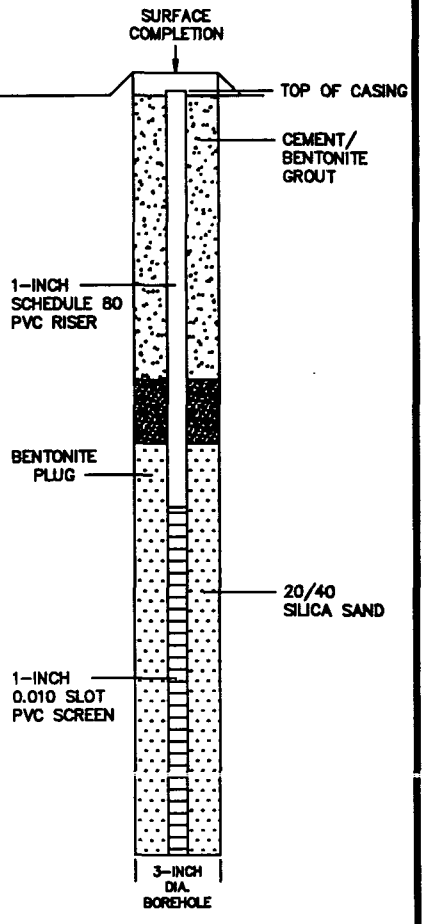
NOTES:

LOCATION

SOIL BORING RU-8

MONITOR WELL RU-8

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
0	0					SANDY LEAN CLAY, BLACK, OIL STAINED W/ROOTS & GRASS
	0					TAN W/LITTLE GRAVEL, LIGHTER NEAR 4'
5						MOIST AT 4-8'
	0					ORGANIC LAYER AT 8.5'
	0					SILTY SAND, TAN W/GRAVEL, MOIST
10	0					SILTY SAND, OLIVE GRAY W/GRAVEL
						LIGHT GRAY
15	0					
						CLAYEY SAND, GRAY W/GRAVEL
	0					SANDY LEAN CLAY, FIRM, GRAY W/GRAVEL
20	0					MOIST
	0					
25						END OF BORING
30						



E1370915

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	1-25-01	137-09

DRILLER: BUFFALO DRILLING
GEOLOGIST: J. BYRD
WORK ORDER: 137-09
CLIENT: ALCOA, INC.
DATE COMPLETED: 9-29-00
LOCATION: 1116 E. STATE ST.
METHOD: GEOPROBE
OLEAN, NY

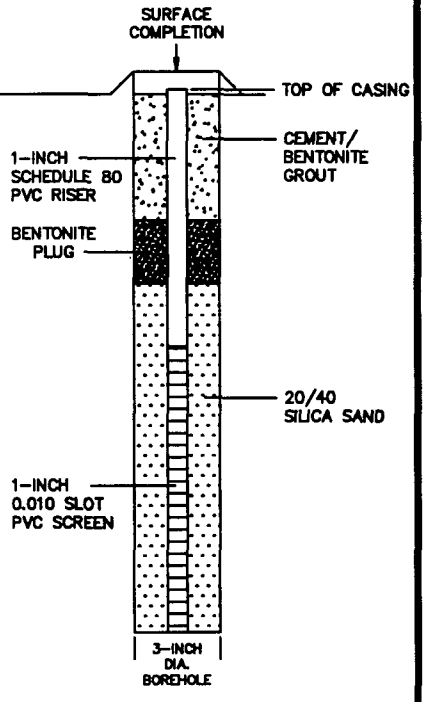
NOTES:

LOCATION

SOIL BORING RU-9

MONITOR WELL RU-9

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
	0					SANDY LEAN CLAY, BROWN W/ROOTS & ORGANIC NODULES & GRAVEL GRASS AT SURFACE
	0					GRAY
5	0					SAND, TAN/RED, LITTLE SILT
	0					SILTY CLAYEY SAND, TAN, MOIST W/IRON NODULES, COARSE W/GRAVEL ▼
10	0					
						COARSE GRAVEL, CLAY
						SANDY LEAN CLAY, BROWN, LAYERED
15	0					
	0					END OF BORING
20						
25						
30						



E1370917

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	1-25-01	137-09

DRILLER: BUFFALO DRILLING
GEOLOGIST: J. BYRD
WORK ORDER: 137-09
CLIENT: ALCOA, INC.
DATE COMPLETED: 9-30-00
LOCATION: 1116 E. STATE ST.
METHOD: GEOPROBE
OLEAN, NY

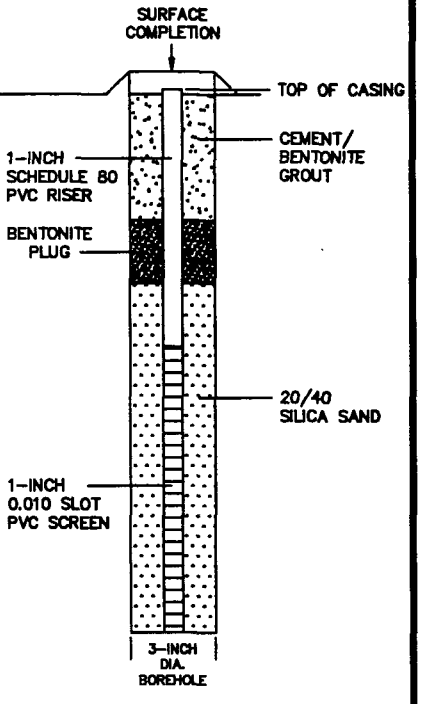
NOTES:

LOCATION

SOIL BORING RU-10

MONITOR WELL RU-10

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
0						
5	0					SANDY LEAN CLAY, BROWN, ROOTS & GRASS LIGHT IRON STAINING
						GRAVEL & INCREASING SAND
	0					SILTY CLAYEY SAND, BROWN/TAN ▼
10	0					
	0					SANDY LEAN CLAY, BROWN DECREASING SAND W/DEPTH, GRAVEL
15	0					SILTY, LITTLE SAND
	0					END OF BORING
20						
25						
30						



E1370918

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	1-25-01	137-09

DRILLER: BUFFALO DRILLING
GEOLOGIST: J. BYRD
WORK ORDER: 137-09
CLIENT: ALCOA, INC.
DATE COMPLETED: 9-30-00
LOCATION: 1116 E. STATE ST.
METHOD: GEOPROBE
OLEAN, NY

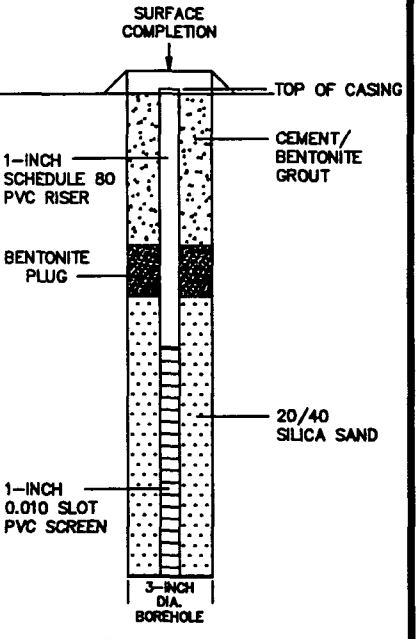
NOTES:

LOCATION

SOIL BORING RU-11

MONITOR WELL RU-11

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
0	0					SANDY LEAN CLAY, GRAY, BURNT WOOD, ROOTS & GRASS AT SURFACE
						GLASS FRAGMENTS AT 2'
						BROWNISH AT 3'
5						SILTY CLAYEY SAND, SOFT W/ROOTS AT 3-3.5', TURNING MOSTLY GRAY AT 4'
						ROCK AT 6.2 & 7.5'
						GRAVEL THROUGH OUT W/LITTLE SAND
10	0					LARGE GRAVEL & ROCK, FIRM AT 9.5' ▼
	0					SANDY LEAN CLAY, SOFT, TAN
						GRAY
15	0					
	0					CLAYEY SAND, OLIVE GRAY W/GRAVEL
20	0					
25	0					SANDY LEAN CLAY, GRAY W/LITTLE GRAVEL & SILT
30	0					
35	0					
40	0					HARD SHALE AT 39.8', REFUSAL
						END OF BORING



E1370911

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	1-25-01	137-09

DRILLER: BUFFALO DRILLING
GEOLOGIST: J. BYRD
WORK ORDER: 137-09
CLIENT: ALCOA, INC.
DATE COMPLETED: 9-29-00
LOCATION: 1116 E. STATE ST.
METHOD: GEOPROBE
OLEAN, NY

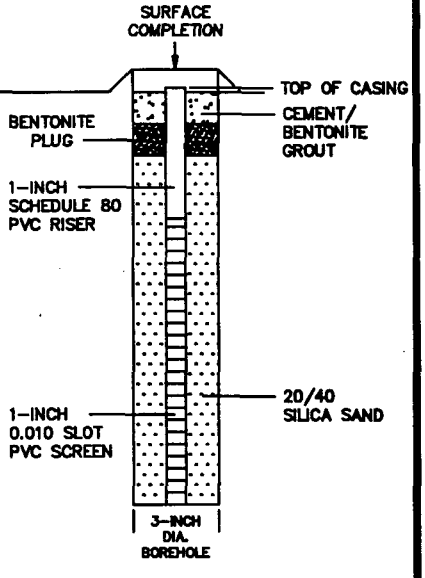
NOTES:

LOCATION

SOIL BORING RU-12

MONITOR WELL RU-12

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
0	0					SANDY LEAN CLAY, SOFT W/ROOTS & SMALL GRAVEL, GRASS AT SURFACE
						TAN W/IRON STAINING & ROOT TRACES
	0					SANDY LEAN CLAY, GRAY
5						INCREASING SILT, GRAY W/SHALE AT 7'
	0					VERY MOIST
						▼
10						CLAY SAND, FIRM OLIVE TAN W/SILT & GRAVEL
	0					INCREASING GRAVEL SIZE W/DEPTH
15	0					
	0					
20						
25	0					
	0					COARSE SAND & GRAVEL, BROWN & TAN
	0					END OF BORING
30						



E1370919

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	1-25-01	137-09

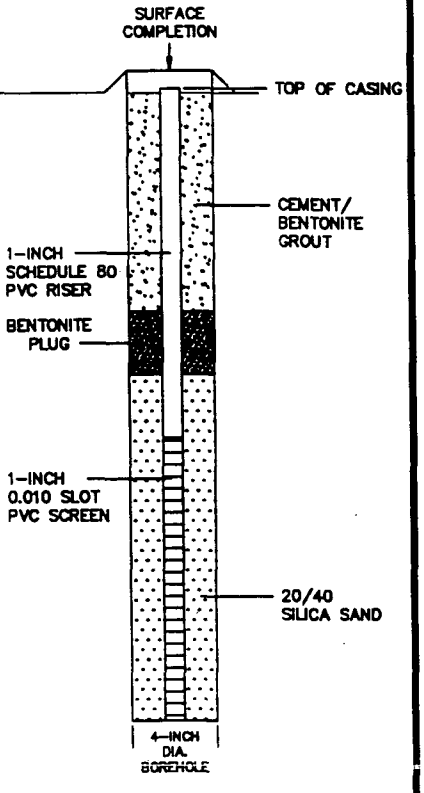
DRILLER: TED BESTOF
GEOLOGIST: J. BYRD
WORK ORDER: 137-15
CLIENT: ALCAS, INC.
DATE COMPLETED: 09-05-01
LOCATION: 1116 E. STATE STREET
METHOD: GEOPROBE
OLEAN, NY

NOTES:

SOIL BORING RU-13

MONITOR WELL RU-13

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
						CLAY, BROWN W/GRAVEL & SAND ROOTS & GRASS NEAR SURFACE
	0					LARGER GRAVEL
	0					
5						MOIST & SILTY
	0					
						TCE-2.0 J ug/Kg (9')
10						VERY MOIST - NO ODOR
	0					
	0					SAND, GRAY W/GRAVEL & SAT. SILT
						CLAY, FIRM W/GRAVEL & SAND FEW IRON NODULES
15	0					SMALL GRAVEL
20	0					END OF BORING
25						
30						



E1371501

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	2-6-02	137-15

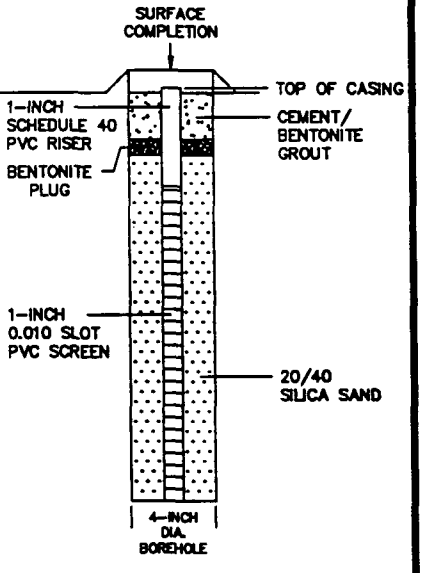
DRILLER: TED BESTOF
GEOLOGIST: J. BYRD
WORK ORDER: 137-15
CLIENT: ALCAS, INC.
DATE COMPLETED: 09-06-01
LOCATION: 1116 E. STATE STREET
METHOD: GEOPROBE
OLEAN, NY

NOTES: _____

SOIL BORING RU-14A

MONITOR WELL RU-14A

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
0	0					CLAY, BROWN W/GRAVEL & SAND
5						BROWN/TAN, SILTY
						MOIST
10						SAND, GRAY W/GRAVEL & SAT. SILT
						END OF BORING
15						
20						
25						
30						



E1371502

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	11-20-01	137-15

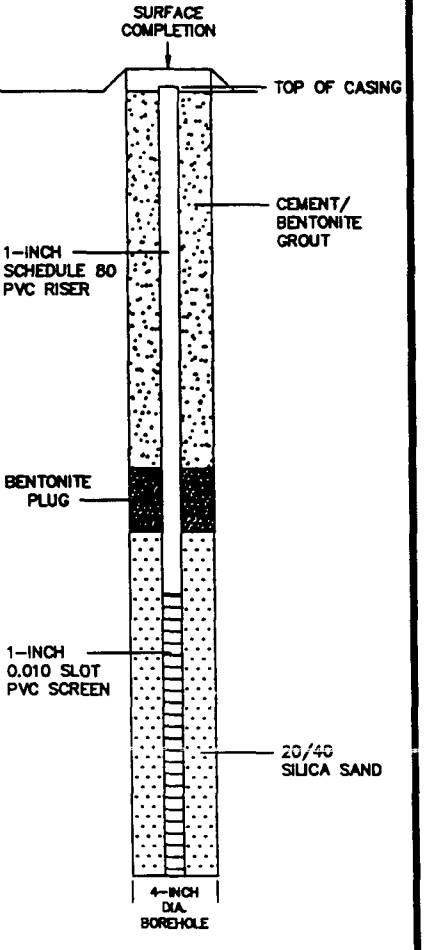
DRILLER: TED BESTOF
GEOLOGIST: J. BYRD
WORK ORDER: 137-15
CLIENT: ALCAS, INC.
DATE COMPLETED: 09-05-01
LOCATION: 1116 E. STATE STREET
METHOD: GEOPROBE
OLEAN, NY

NOTES:

SOIL BORING RU-14B

MONITOR WELL RU-14B

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
0	0					CLAY, BROWN W/GRAVEL & SAND BURNT MATERIAL NEAR SURFACE NO ODOR
5						cis-1,2-DCE-1.0 J ug/Kg (8')
10	0					TCE-9.4 ug/Kg (8') CLAY, BROWN W/GRAVEL SAND & SILT, MOIST, NO ODOR GREENISH
15	0					
	0					LARGE MARBLE SIZE GRAVEL
20	0					CLAYEY SAND, GRAY/BROWN W/GRAVEL & SILT MOIST
	0					cis-1,2-DCE-40 ug/Kg (25')
25	0					TCE-1,600D ug/Kg (25') trans-1,2-DCE-3.2 J ug/Kg (25')
						END OF BORING
30						



E1371503

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	1-26-02	137-15

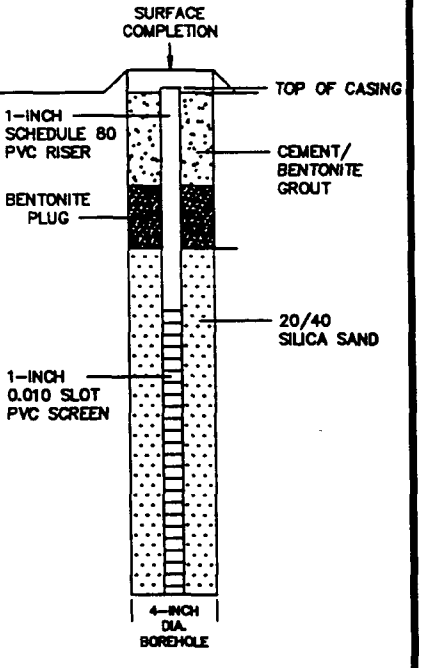
DRILLER: TED BESTOF
GEOLOGIST: J. BYRD
WORK ORDER: 137-15
CLIENT: ALCAS, INC.
DATE COMPLETED: 09-06-01
LOCATION: 1116 E. STATE STREET
METHOD: GEOPROBE
OLEAN, NY

NOTES:

SOIL BORING RU-15

MONITOR WELL RU-15

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
0						CLAY, BROWN W/IRON NODULES & ROOT TRACES
5						RED CLAYEY SAND & SMALL GRAVEL
						COARSE GRAY SAND W/SMALL GRAVEL
10						SATURATED SILT LAYER @ 10 - 10.5' ▼
	0					GRAY CLAY, STIFF W/GRAVEL & SAND
15	0					
						END OF BORING
20						
25						
30						



E1371504

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	11-29-01	137-15

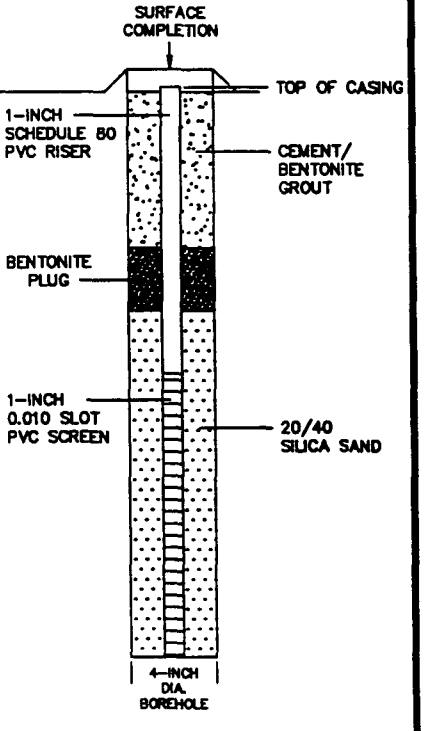
DRILLER: TED BESTOF
GEOLOGIST: J. BYRD
WORK ORDER: 137-15
CLIENT: ALCAS, INC.
DATE COMPLETED: 09-06-01
LOCATION: 1116 E. STATE STREET
METHOD: GEOPROBE
OLEAN, NY

NOTES: _____

SOIL BORING RU-16

MONITOR WELL RU-16

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
0						CLAY, BROWN W/SAND & SILT, FEW GRAVEL
5						CLAYEY SAND, REDDISH BROWN W/FEW GRAVEL
						SILTY CLAY, SOFT
						SAND, BROWN W/FEW GRAVEL & SILT
10						
15						CLAY, FIRM GRAY W/LARGE GRAVEL
						END OF BORING
20						
25						
30						



E1371505

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	2-6-02	137-15

DRILLER: TED BESTOF
WORK ORDER: 137-15
DATE COMPLETED: 09-06-01
METHOD: GEOPROBE

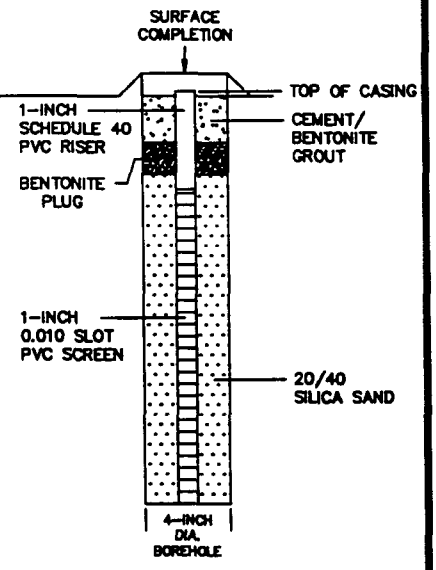
GEOLOGIST: J. BYRD
CLIENT: ALCAS, INC.
LOCATION: 1116 E. STATE STREET
OLEAN, NY

NOTES: _____

SOIL BORING RU-17A

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
0	0					ASPHALT
						SILTY CLAY, TAN W/GRAVEL & SAND IRON & ORGANIC NODULES
5						CLAYEY SAND, GRAY W/GRAVEL & SILT FEW BURNT WOOD NEAR 4'
10						SILTY CLAY, TAN W/SMALL GRAVEL
						GRAVELLY CLAY W/SAND & SILT
15						END OF BORING
20						
25						
30						

MONITOR WELL RU-17A



E1371506

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	2-6-02	137-15

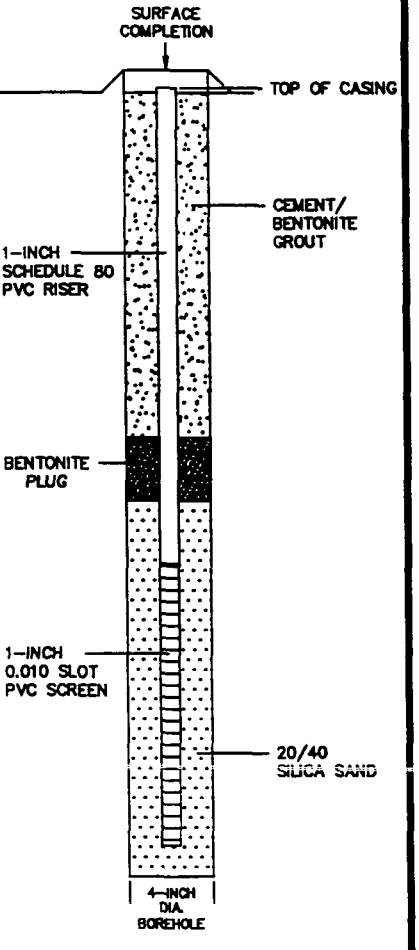
DRILLER: TED BESTOF
GEOLOGIST: J. BYRD
WORK ORDER: 137-15
CLIENT: ALCAS, INC.
DATE COMPLETED: 09-05-01
LOCATION: 1116 E. STATE STREET
METHOD: GEOPROBE
OLEAN, NY

NOTES:

SOIL BORING RU-17B

MONITOR WELL RU-17B

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
						ASPHALT
						SILTY CLAY, TAN W/GRAVEL & SAND FEW IRON & ORGANIC NODULES GRAY NEAR 4' W/BURNT WOOD CHIPS
5	0					CLAYEY SAND, GRAY W/GRAVEL & SILT
	0					MOIST
10						GRAVELLY CLAY W/SAND & SILT SAND LAYER @ 15.2'
15						LARGE MARBLE SIZE GRAVEL GREENISH
						SANDY CLAY, GREEN W/GRAVEL
						GRAVEL W/SILT & SAND
20						GRAVELLY SAND
						CLAY, FIRM GRAY W/LARGE MARBLE SIZED GRAVEL
25						END OF BORING
30						



E1371507

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	2-6-02	137-15

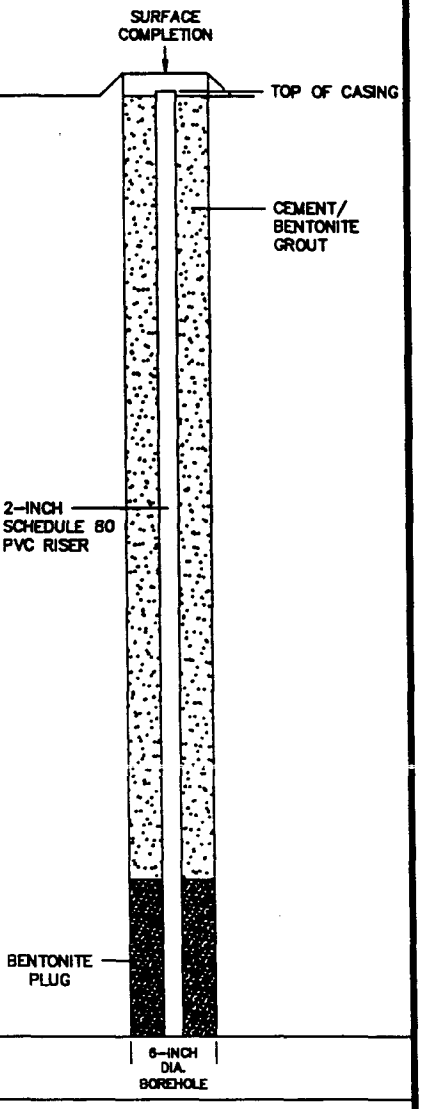
DRILLER: TED BESTOF
GEOLOGIST: J. BYRD
WORK ORDER: 137-15
CLIENT: ALCAS, INC.
DATE COMPLETED: 09-05-01
LOCATION: 1116 E. STATE STREET
METHOD: GEOPROBE
OLEAN, NY

NOTES:

SOIL BORING RU-17C

MONITOR WELL RU-17C

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
						ASPHALT
						SILTY CLAY, TAN W/SAND & GRAVEL FEW IRON NODULES
5	0					CLAYEY SAND, GRAY W/GRAVEL & SILT TCE-3.3 ug/Kg (5')
	0					MOIST
10						SILTY CLAY W/PEA GRAVEL & IRON NODULES
	0					GRAVELLY CLAY W/SILT & SAND
15	0					
						GRAVEL W/SILT & SAND, GREENISH TAN
20	0					CLAY, GRAY FIRM W/PEA-MARBLE SIZE GRAVEL & SAND
	0					
	0					cis-1,2-DCE-0.53 J ug/Kg (25')
25	0					TCE-20 ug/Kg (25') CLAYEY SILT, TAN, SATURATED W/GRAVEL & SAND
	0					CLAY, FIRM GRAY W/LARGE MARBLE SIZED GRAVEL
	0					
30						CONTINUED ON NEXT PAGE



E1371508a

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	2-6-02	137-15

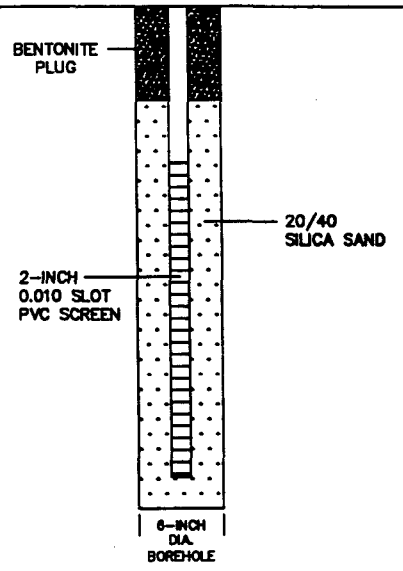
DRILLER: TED BESTOF
GEOLOGIST: J. BYRD
WORK ORDER: 137-15
CLIENT: ALCAS, INC.
DATE COMPLETED: 09-05-01
LOCATION: 1116 E. STATE STREET
METHOD: GEOPROBE
OLEAN, NY

NOTES:

SOIL BORING RU-17C (Continued)

MONITOR WELL RU-17C (Cont.)

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
0						GRAVEL W/SAND, SILT & CLAY
35						
40	0					
	0					
45	0					TCE-2.4 J ug/Kg (46')
						END OF BORING
50						
55						
60						



E1371508b

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	1-26-02	137-15

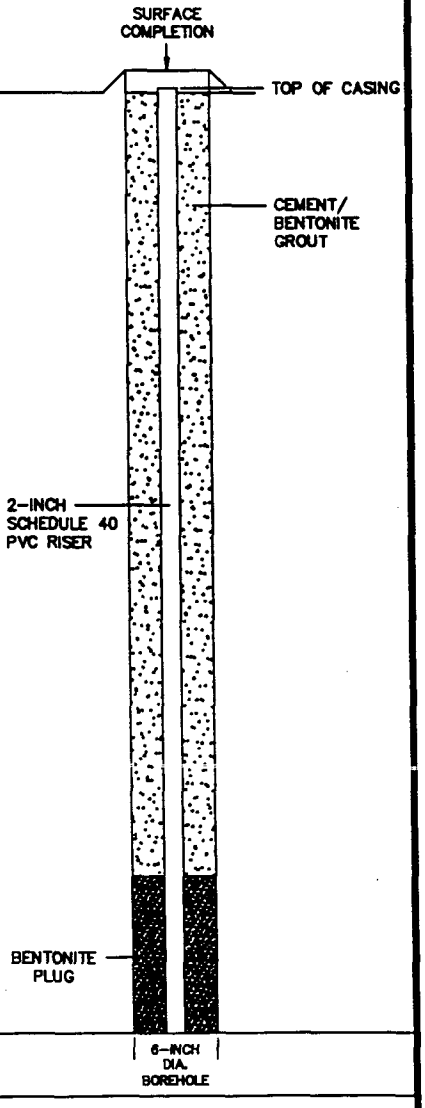
DRILLER: TED BESTOF
GEOLOGIST: J. BYRD
WORK ORDER: 137-15
CLIENT: ALCAS, INC.
DATE COMPLETED: 09-07-01
LOCATION: 1116 E. STATE STREET
METHOD: GEOPROBE
OLEAN, NY

NOTES: _____

SOIL BORING RU-18

MONITOR WELL RU-18

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
	0					SILTY CLAY, BROWN W/FEW GRAVEL GRASS & ROOTS NEAR SURFACE BURNT MATERIAL THROUGHOUT
	0					SOFTER
5	0					TCE-2.9 J ug/Kg (5') cis-1,2-DCE-0.66 J ug/Kg (5') MOIST
	0					FIRMER - FEW ROOTS
10	0					FEW MARBLE SIZE GRAVEL
	0					CLAY, GRAY W/GRAVEL & SILT W/GRAVEL & SAND
15	0					
	0					
	0					
20						INCREASING GRAVEL
	0					
	0					cis-1,2-DCE-9.5 ug/Kg (25')
25						TCE-330 D ug/Kg (25') COARSE SAND & GRAVEL W/SILT & CLAY SATURATED
	0					
	0					SILTY CLAY, SOFT W/PEA GRAVEL
30						CONTINUED ON NEXT PAGE



E1371509a

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	1-26-02	137-15

DRILLER: TED BESTOF
WORK ORDER: 137-15
DATE COMPLETED: 09-07-01
METHOD: GEOPROBE

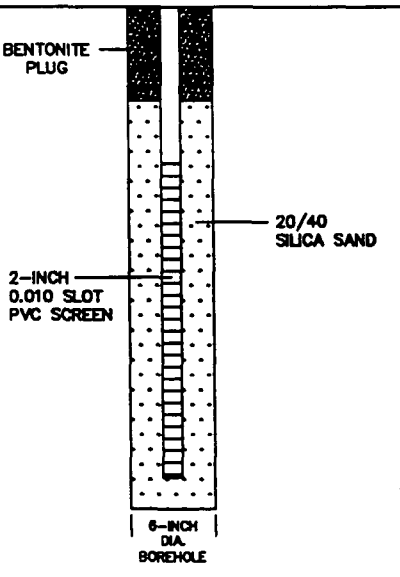
GEOLOGIST: J. BYRD
CLIENT: ALCAS, INC.
LOCATION: 1116 E. STATE STREET
OLEAN, NY

NOTES:

SOIL BORING RU-18 (Continued)

MONITOR WELL RU-18 (Cont.)

DEPTH, FT.	OVA, PPM	SAMPLE	CORE	INTERVAL	MATERIAL	DESCRIPTION
0	0					GRAVEL, COARSE W/SAND & SILT
35	0					
40	0					
45	0					TCE-150 ug/Kg (46') cis-1,2-DCE-4.3 J ug/Kg (46')
	0					END OF BORING
50						
55						
60						



E1371509b

ENVIRONEERING, INC.

BORING LOG

ALCAS CUTLERY FACILITY
OLEAN, NY

DRAWN BY:	DATE:	PROJ. NO.
LMG	1-26-02	137-15

APPENDIX H

EPA Publication 9355.4-07FS
Estimating Potential for Occurrence of DNAPL at Superfund Sites

United States Environmental Protection Agency | R.S. Kerr Environmental Research Laboratory | Office of Solid Waste and Emergency Response | Publication: 9355.4-07FS January 1992

EPA

Estimating Potential for Occurrence of DNAPL at Superfund Sites

Office of Emergency and Remedial Response
Hazardous Site Control Division (OS-220W)

Quick Reference Fact Sheet

GOALS

The presence of Dense Nonaqueous Phase Liquids (DNAPL) in soils and aquifers can control the ultimate success or failure of remediation at a hazardous waste site. Because of the complex nature of DNAPL transport and fate, however, DNAPL may often be undetected by direct methods, leading to incomplete site assessments and inadequate remedial designs. Sites affected by DNAPL may require a different "paradigm," or conceptual framework, to develop effective characterization and remedial actions (2).

To help site personnel determine if DNAPL-based characterization strategies should be employed at a particular site, a guide for estimating the potential for DNAPL occurrence was developed. The approach, described in this fact sheet, requires application of two types of existing site information:

- **Historical Site Use Information**
- **Site Characterization Data**

By using available data, site decision makers can enter a system of two flowcharts and a classification matrix for estimating the potential for DNAPL occurrence at a site. If the potential for DNAPL occurrence is low, then conventional site assessment and remedial actions may be sufficient. If the potential for DNAPL is moderate or high, however, a different conceptual approach may be required to account for problems associated with DNAPL in the subsurface.

BACKGROUND

DNAPLs are separate-phase hydrocarbon liquids that are denser than water, such as chlorinated solvents (either as a single component or as mixtures of solvents), wood preservative wastes, coal tar wastes, and pesticides. Until recently, standard operating practice in a variety of industries resulted in the release of large quantities of DNAPL to the subsurface. Most DNAPLs undergo only limited degradation in the subsurface, and persist for long periods while slowly releasing soluble organic constituents to ground water through dissolution. Even with a moderate DNAPL release, dissolution may continue for hundreds of years or longer under natural conditions before all the DNAPL is dissipated and concentrations of soluble organics in ground water return to background levels.

DNAPL exists in the soil/aquifer matrix as free-phase DNAPL and residual DNAPL. When released at the surface, free-phase DNAPL moves downward through the soil matrix under the force of gravity or laterally along the surface of sloping fine-grained stratigraphic units. As the free-phase DNAPL moves, blobs or ganglia are trapped in pores and/or fractures by capillary forces (7). The amount of the trapped DNAPL, known as residual saturation, is a function of the physical properties of the DNAPL and the hydrogeologic characteristics of the soil/aquifer medium and typically ranges from 5% to 50% of total pore volume. At many sites, however, DNAPL migrates preferentially through small-scale fractures and heterogeneities in the soil, permitting the DNAPL to penetrate much deeper than would be predicted from application of typical residual saturation values (16).

Once in the subsurface, it is difficult or impossible to recover all of the trapped residual DNAPL. The conventional aquifer remediation approach, ground water pump-and-treat, usually removes only a small fraction of trapped residual DNAPL (11, 21, 26). Although many DNAPL removal technologies are currently being tested, to date there have been no field demonstrations where sufficient DNAPL has been successfully recovered from the subsurface to return the aquifer to drinking water quality. The DNAPL that remains trapped in the soil/aquifer matrix acts as a continuing source of dissolved contaminants to ground water, preventing the restoration of DNAPL-affected aquifers for many years.

DNAPL TRANSPORT AND FATE - CONCEPTUAL APPROACHES

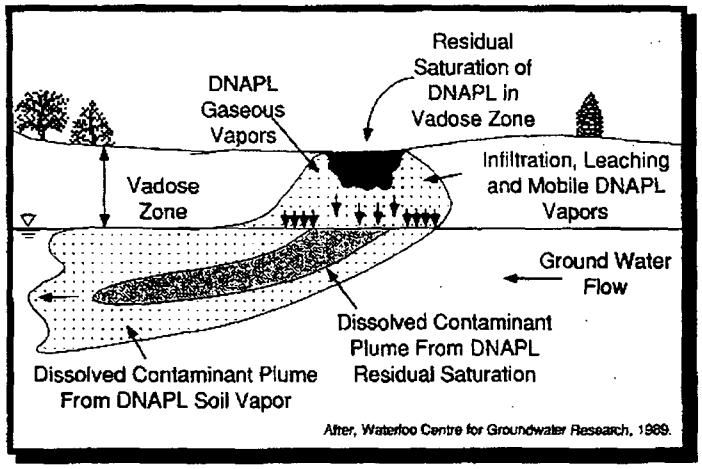
The major factors controlling DNAPL migration in the subsurface include the following (5):

- the volume of DNAPL released;
- the area of infiltration at the DNAPL entry point to the subsurface;
- the duration of release;
- properties of the DNAPL, such as density, viscosity, and interfacial tension;
- properties of the soil/aquifer media, such as pore size and permeability;
- general stratigraphy, such as the location and topography of low-permeability units;
- micro-stratigraphic features, such as root holes, small fractures, and slickensides found in silt/clay layers.

To describe the general transport and fate properties of DNAPL in the subsurface, a series of conceptual models (24) are presented in the following figures:

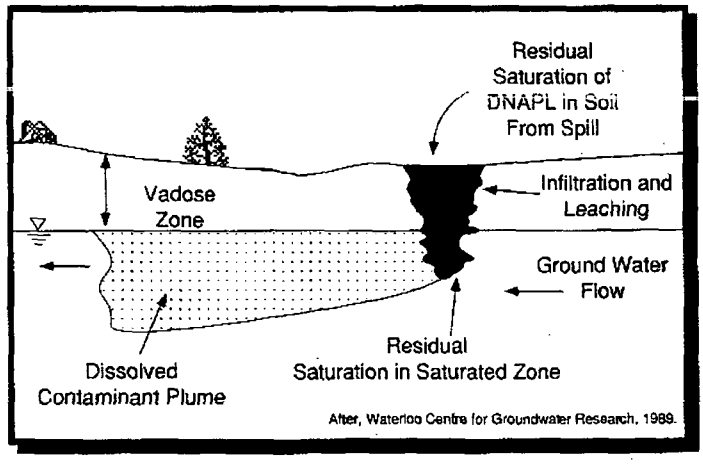
Case 1: DNAPL Release to Vadose Zone Only

After release on the surface, DNAPL moves vertically downward under the force of gravity and soil capillarity. Because only a small amount of DNAPL was released, all of the mobile DNAPL is eventually trapped in pores and fractures in the unsaturated zone. Infiltration through the DNAPL zone dissolves some of the soluble organic constituents in the DNAPL, carrying organics to the water table and forming a dissolved organic plume in the aquifer. Migration of gaseous vapors can also act as a source of dissolved organics to ground water (13).



Case 2: DNAPL Release to Unsaturated and Saturated Zones

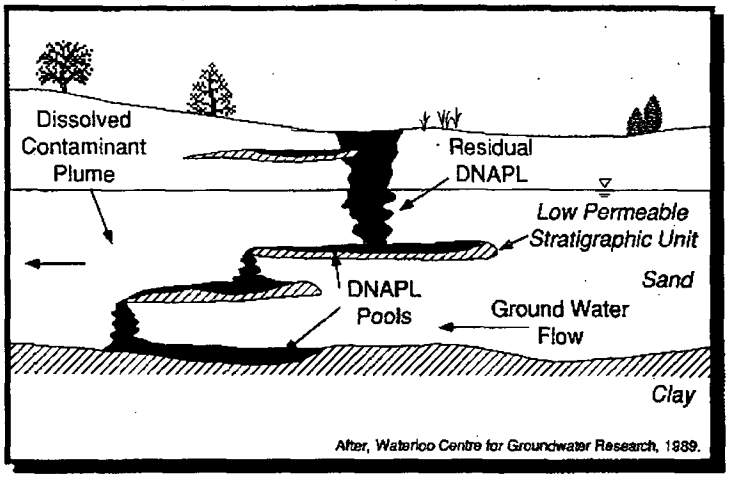
If enough DNAPL is released at the surface, it can migrate all the way through the unsaturated zone and reach a water-bearing unit. Because the specific gravity of DNAPL is greater than water, it continues downward until the mobile DNAPL is exhausted and is trapped as a residual hydrocarbon in the porous media. Ground water flowing past the trapped residual DNAPL dissolves soluble components of the DNAPL, forming a dissolved plume downgradient of the DNAPL zone. As with Case 1, water infiltrating down from the source zone also carries dissolved constituents to the aquifer and contributes further to the dissolved plume.



CONCEPTUAL APPROACHES - Continued

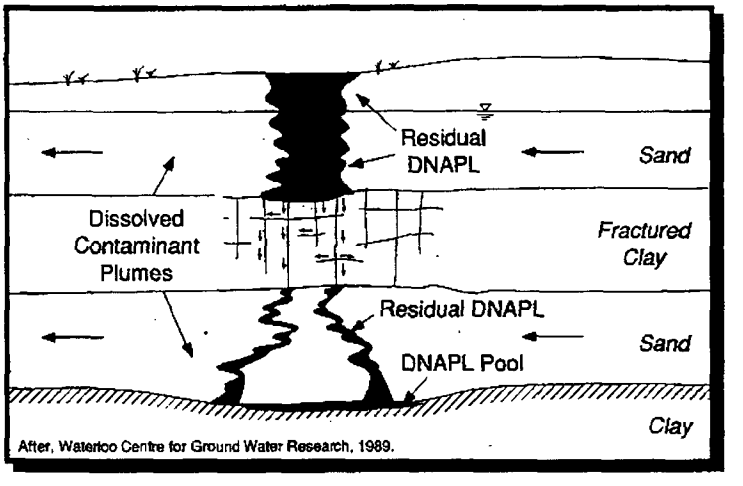
Case 3: DNAPL Pools and Effect of Low-Permeability Units

Mobile DNAPL will continue vertical migration until it is trapped as a residual hydrocarbon (Case 1 and Case 2) or until low-permeability stratigraphic units are encountered which create DNAPL "pools" in the soil/aquifer matrix. In this figure, a perched DNAPL pool fills up and then spills over the lip of the low-permeability stratigraphic unit. The spill-over point (or points) can be some distance away from the original source, greatly complicating the process of tracking the DNAPL migration.



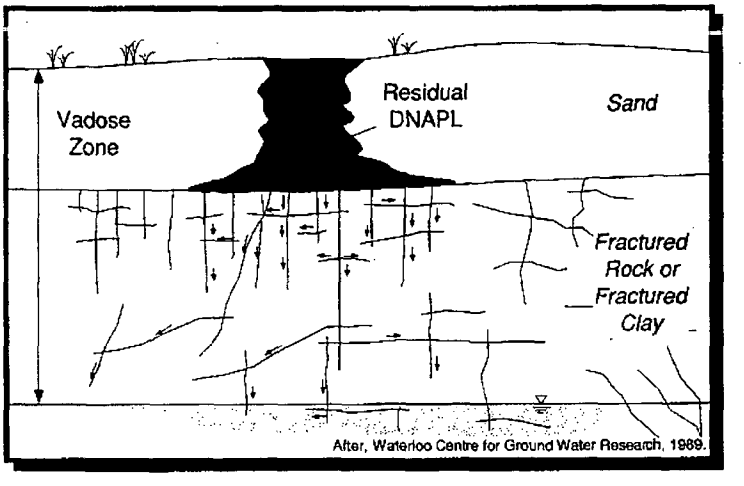
Case 4: Composite Site

In this case, mobile DNAPL migrates vertically downward through the unsaturated zone and the first saturated zone, producing a dissolved constituent plume in the upper aquifer. Although a DNAPL pool is formed on the fractured clay unit, the fractures are large enough to permit vertical migration downward to the deeper aquifer (see Case 5, below). DNAPL pools in a topographic low in the underlying impermeable unit and a second dissolved constituent plume is formed.



Case 5: Fractured Rock or Fractured Clay System

DNAPL introduced into a fractured rock or fractured clay system follows a complex pathway based on the distribution of fractures in the original matrix. The number, density, size, and direction of the fractures usually cannot be determined due to the extreme heterogeneity of a fractured system and the lack of economical aquifer characterization technologies. Relatively small volumes of DNAPL can penetrate deeply into fractured systems due to the low retention capacity of the fractures and the ability of some DNAPLs to migrate through very small (<20 microns) fractures. Many clay units, once considered to be relatively impermeable to DNAPL migration, often act as fractured media with preferential pathways for vertical and horizontal DNAPL migration.



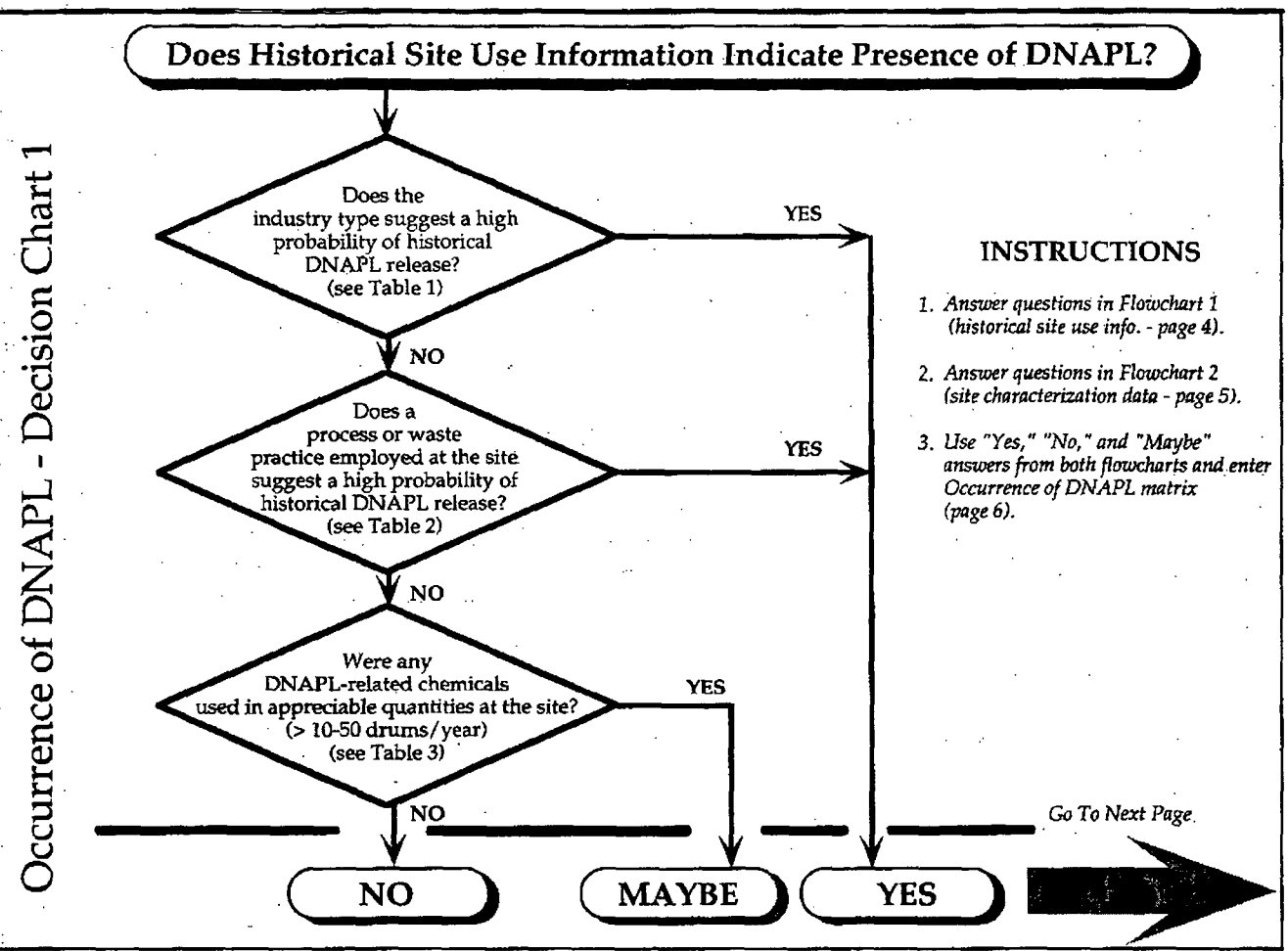


TABLE 1

Industries with high probability of historical DNAPL release:

- Wood preservation (creosote)
- Old coal gas plants (mid-1800s to mid-1900s)
- Electronics manufacturing
- Solvent production
- Pesticide manufacturing
- Herbicide manufacturing
- Airplane maintenance
- Commercial dry cleaning
- Instrument manufacturing
- Transformer oil production
- Transformer reprocessing
- Steel industry coking operations (coal tar)
- Pipeline compressor stations

TABLE 2

Industrial processes or waste disposal practices with high probability of historical DNAPL release:

- Metal cleaning/degreasing
- Metal machining
- Tool-and-die operations
- Paint removing/stripping
- Storage of solvents in underground storage tanks
- Storage of drummed solvents in uncontained storage areas
- Solvent loading and unloading
- Disposal of mixed chemical wastes in landfills
- Treatment of mixed chemical wastes in lagoons or ponds

Note:
The potential for DNAPL release increases with the size and active period of operation for a facility, industrial process, or waste disposal practice.

TABLE 3 DNAPL-Related Chemicals (20):

Halogenated Volatiles

Chlorobenzene
1,2-Dichloropropane
1,1-Dichloroethane
1,1-Dichloroethylene
1,2-Dichloroethane
Trans-1,2-Dichloroethylene
Cis-1,2-Dichloroethylene
1,1,1-Trichloroethane
Methylene Chloride
1,1,2-Trichloroethane
Trichloroethylene
Chloroform
Carbon Tetrachloride
1,1,2,2-Tetrachloroethane
Tetrachloroethylene
Ethylene Dibromide

Halogenated Semi-Volatiles

1,4-Dichlorobenzene
1,2-Dichlorobenzene
Aroclor 1242, 1254, 1260
Chlordane
Dieldrin
2,3,4,6-Tetrachlorophenol
Pentachlorophenol

Non-Halogenated Semi-Volatiles

2-Methyl Napthalene
o-Cresol
p-Cresol
2,4-Dimethylphenol
m-Cresol
Phenol
Naphthalene
Benzo(a)Anthracene
Fluorene
Acenaphthene
Anthracene
Dibenzo(a,h)Anthracene
Fluoranthene
Pyrene
Chrysene
2,4-Dinitrophenol

Miscellaneous

Coal Tar
Creosote

Note: Many of these chemicals are found mixed with other chemicals or carrier oils.

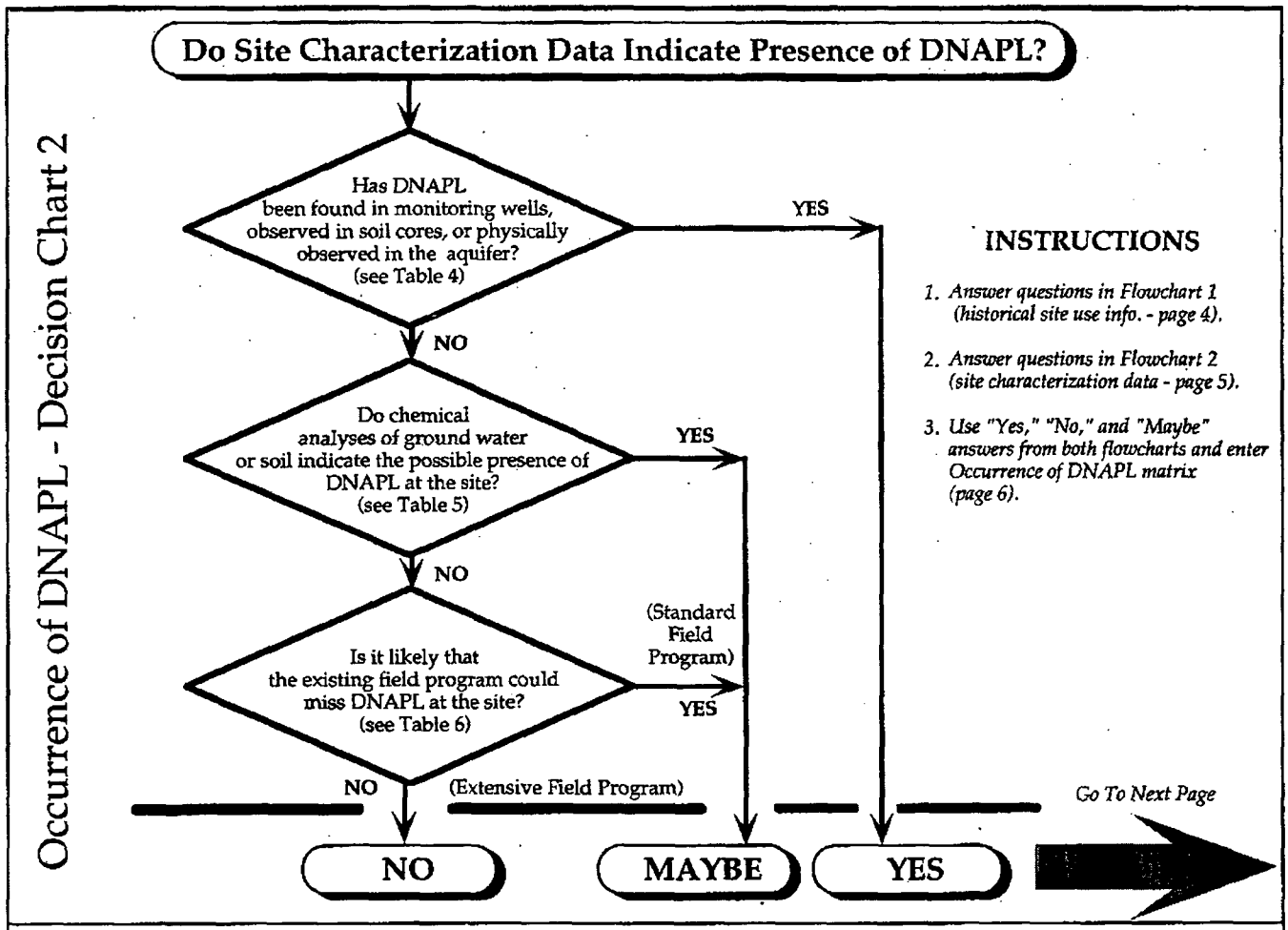


TABLE 4

Methods to confirm DNAPL in wells:

- NAPL/water interface probes that signal a change in conductivity of the borehole fluid
- Weighted cotton string lowered down well
- Pumping and inspecting recovered fluid
- Transparent bottom-loading bailers
- Mechanical discrete-depth samplers.

In general, the depth of DNAPL accumulation does not provide quantitative information regarding the amount of DNAPL present (24).

Methods to confirm DNAPL in soil samples:

Visual examination of cores or cuttings may not be effective for confirming the presence of DNAPL except in cases of gross DNAPL contamination. Methods for enhancing visual inspection of soil samples for DNAPL include:

- Shaking soil samples in a jar with water to separate the DNAPL from the soil (14).
- Performing a paint filter test, in which soil is placed in a filter funnel, water is added, and the filter is examined for separate phases (20).

TABLE 5

Conditions that indicate potential for DNAPL at site based on laboratory data:

Condition 1:
Concentrations of DNAPL-related chemicals (see pg. 3) in ground water are > 1% of pure phase solubility or effective solubility, (defined in Worksheet 1, pg. 7) (25).

Condition 2:
Concentrations of DNAPL-related chemicals on soils are > 10,000 mg/kg (equal to 1% of soil mass) (6).

Condition 3:
Concentrations of DNAPL-related chemicals in ground water calculated from water/soil partitioning relationships and soil samples are > pure phase solubility or effective solubility(see Worksheet 2, pg. 7).

Condition 4:
Concentrations of DNAPL-related chemicals in ground water increase with depth or appear in anomalous upgradient/across gradient locations (25).

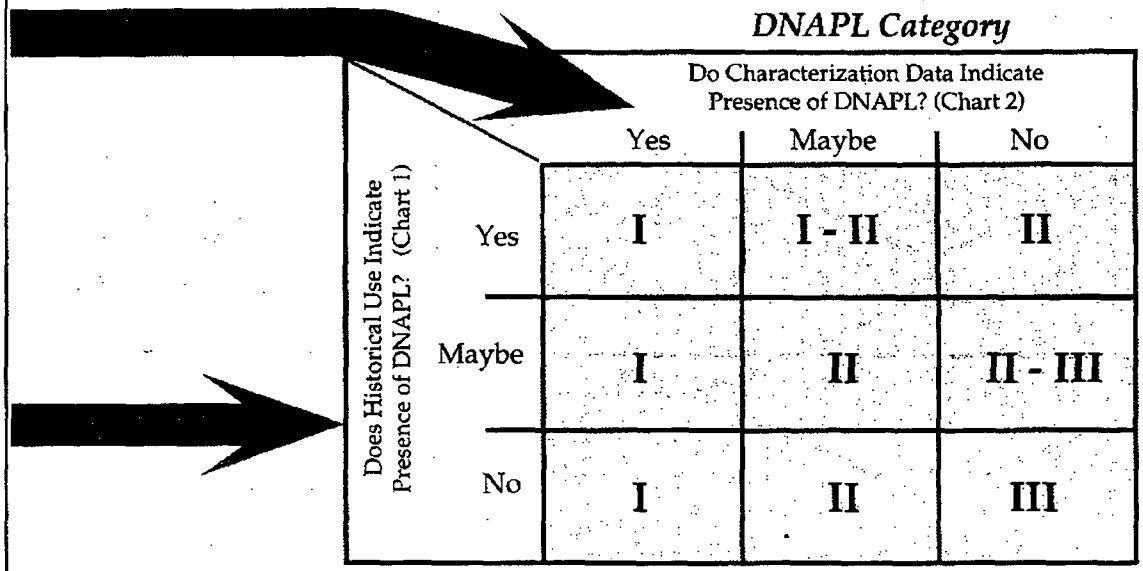
TABLE 6

Characteristics of extensive field programs that can help indicate the presence or absence of DNAPL (if several are present, select "NO"):

- Numerous monitoring wells, with wells screened in topographic lows on the surface of fine-grained, relatively impermeable units.
- Multi-level sampling capability.
- Numerous organic chemical analyses of soil samples at different depths using GC or GC/MS methods.
- Well-defined site stratigraphy, using numerous soil borings, a cone penetrometer survey, or geophysics.
- Data from pilot tests or "early action" projects that indicate the site responds as predicted by conventional solute transport relationships, rather than responding as if additional sources of dissolved contaminants are present in the aquifer (11, 25).

Note: This procedure is designed primarily for hydrogeologic settings comprised of gravel, sand, silt, or clay and may not be be applicable to karst or fractured rock settings.

Potential for Occurrence of DNAPL at Superfund Sites



Category	Implications for Site Assessment
I **Confirmed or high potential for DNAPL at site.**	• The risk of spreading contaminants increases with the proximity to a potential DNAPL zone. Special precautions should be taken to ensure that drilling does not create pathways for continued vertical migration of free-phase DNAPLs. In DNAPL zones, drilling should be suspended when a low-permeability unit or DNAPL is first encountered. Wells should be installed with short screens (≤ 10 feet). If required, deeper drilling through known DNAPL zones should be conducted only by using double or triple-cased wells to prevent downward migration of DNAPL. As some DNAPLs can penetrate fractures as narrow as 10 microns, special care must be taken during all grouting, cementing, and well sealing activities conducted in DNAPL zones. • In some hydrogeologic settings, such as fractured crystalline rock, it is impossible to drill through DNAPL with existing technology without causing vertical migration of the DNAPL down the borehole, even when double or triple casing is employed (2). • The subsurface DNAPL distribution is difficult to delineate accurately at some sites. DNAPL migrates preferentially through selected pathways (fractures, sand layers, etc.) and is affected by small-scale changes in the stratigraphy of an aquifer. Therefore, the ultimate path taken by DNAPL can be very difficult to characterize and predict. • In most cases, fine-grained aquitards (such as clay or silt units) should be assumed to permit downward migration of DNAPL through fractures unless proven otherwise in the field. At some sites it can be exceptionally difficult to prove otherwise even with intensive site investigations (2). • Drilling in areas known to be DNAPL-free should be performed before drilling in DNAPL zones in order to form a reliable conceptual model of site hydrogeology, stratigraphy, and potential DNAPL pathways. In areas where it is difficult to form a reliable conceptual model, an "outside-in" strategy may be appropriate: drilling in DNAPL zones is avoided or minimized in favor of delineating the outside dissolved-phase plume (2). Many fractured rock settings may require this approach to avoid opening further pathways for DNAPL migration during site assessment.
II **Moderate potential for DNAPL at site.**	• Due to the potential risk for exacerbating ground-water contamination problems during drilling through DNAPL zones, the precautions described for Category I should be considered during site assessment. Further work should focus on determining if the site is a "DNAPL site."
III **Low potential for DNAPL at site.**	• DNAPL is not likely to be a problem during site characterization, and special DNAPL precautions are probably not needed. Floating free-phase organics (LNAPLs), sorption, and other factors can complicate site assessment and remediation activities, however.

Worksheet 1: Calculation of Effective Solubility (from Shiu, 1988; Feenstra, Mackay, & Cherry, 1991)

For a single-component DNAPL, the pure-phase solubility of the organic constituent can be used to estimate the theoretical upper-level concentration of organics in aquifers or for performing dissolution calculations. For DNAPLs comprised of a mixture of chemicals, however, the **effective solubility** concept should be employed::

$$S_i^e = X_i S_i$$

Where

S_i^e = the effective solubility (the theoretical upper-level dissolved-phase concentration of a constituent in ground water in equilibrium with a mixed DNAPL; in mg/l)

X_i = the mole fraction of component i in the DNAPL mixture (obtained from a lab analysis of a DNAPL sample or estimated from waste characterization data)

S_i = the pure-phase solubility of compound i in mg/l (usually obtained from literature sources)

For example, if a laboratory analysis indicates that the mole fraction of trichloroethylene (TCE) in DNAPL is 0.10, then the effective solubility would be 110 mg/l [pure phase solubility of TCE times mole fraction TCE: (1100 mg/l) * (0.10) = 110 mg/l]. Effective solubilities can be calculated for all components in a DNAPL mixture. Insoluble organics in the mixture (such as long-chained alkanes) will reduce the mole fraction and effective solubility of more soluble organics but will not contribute dissolved-phase organics to ground water. *Please note that this relationship is approximate and does not account for non-ideal behavior of mixtures, such as co-solvency, etc.*

Worksheet 2: Method for Assessing Residual NAPL Based on Organic Chemical Concentrations in Soil Samples (From Feenstra, Mackay, and Cherry, 1991)

To estimate if NAPLs are present, a partitioning calculation based on chemical and physical analyses of **soil samples from the saturated zone** (from cores, excavations, etc.) can be applied. This method tests the assumption that all of the organics in the subsurface are either dissolved in ground water or adsorbed to soil (assuming dissolved-phase sorption, **not** the presence of NAPL). By using the concentration of organics on the soil and the partitioning calculation, a theoretical pore-water concentration of organics in ground water is determined. If the theoretical pore-water concentration is greater than the estimated solubility of the organic constituent of interest, then NAPL may be present at the site. A worksheet for performing this calculation is presented below; see Feenstra, Mackay, and Cherry (1991) for the complete methodology.

Step 1: Calculate S_i^e, the effective solubility of organic constituent of interest. See Worksheet 1, above.

Step 2: Determine **Koc**, the organic carbon-water partition coefficient from one of the following:
A) Literature sources (such as 22) or
B) From empirical relationships based on **Kow**, the octanol-water partition coefficient, which is also found in the literature (22). For example, **Koc** can be estimated from **Kow** using the following expression developed for polyaromatic hydrocarbons (8):

$$\text{Log Koc} = 1.0 * \text{Log Kow} - 0.21$$

Other empirical relationships between Koc and Kow are presented in refs. 4 and 15.

Step 3: Determine **foc**, the fraction of organic carbon on the soil, from a laboratory analysis of clean soils from the site. Values for **foc** typically range from 0.03 to 0.00017 mg/mg (4). Convert values reported in percent to mg/mg.

Step 4: Determine or estimate **ρb**, the dry bulk density of the soil, from a soils analysis. Typical values range from 1.8 to 2.1 g/ml (kg/l). Determine or estimate **φw**, the water-filled porosity.

Step 5: Determine **Kd**, the partition (or distribution) coefficient between the pore water (ground water) and the soil solids:

$$Kd = Koc * foc$$

Step 6: Using **Ct**, the measured conc. of the organic compound in saturated soil in mg/kg, calculate the theoretical pore water conc. assuming no DNAPL (i.e., Cw in mg/l):

$$Cw = \frac{(Ct * \rho b)}{(Kd * \rho b + \varphi w)}$$

Step 7: Compare **Cw** and S_i^e (from Step 1):

$Cw > S_i^e$ suggests possible **presence** of DNAPL

$Cw < S_i^e$ suggests possible **absence** of DNAPL

GLOSSARY (adapted from Cherry, 1991):

DNAPL: A Dense Nonaqueous Phase Liquid. A DNAPL can be either a single-component DNAPL (comprised of only one chemical) or a mixed DNAPL (comprised of several chemicals). DNAPL exists in the subsurface as free-phase DNAPL or as residual DNAPL (see following definitions). DNAPL does not refer to chemicals that are dissolved in groundwater.

DNAPL ENTRY LOCATION: The area where DNAPL has entered the subsurface, such as a spill location or waste pond.

DNAPL SITE: A site where DNAPL has been released and is now present in the subsurface as an immiscible phase.

DNAPL ZONE: The portion of a site affected by free-phase or residual DNAPL in the subsurface (either the unsaturated zone or saturated zone). The DNAPL zone has organics in the vapor phase (unsaturated zone), dissolved phase (both unsaturated and saturated zone), and DNAPL phase (both unsaturated and saturated zone).

DISSOLUTION: The process by which soluble organic components from DNAPL dissolve in ground water or dissolve in infiltration water and form a ground-water contaminant plume. The duration of remediation measures (either clean-up or long-term containment) is determined by 1) the rate of dissolution that can be achieved in the field, and 2) the mass of soluble components in the residual DNAPL trapped in the aquifer.

EFFECTIVE SOLUBILITY: The theoretical aqueous solubility of an organic constituent in ground water that is in chemical equilibrium with a mixed DNAPL (a DNAPL containing several organic chemicals). The effective solubility of a particular organic chemical can be estimated by multiplying its mole fraction in the DNAPL mixture by its pure phase solubility (see Worksheet 1, page 7).

FREE-PHASE DNAPL: Immiscible liquid existing in the subsurface with a positive pressure such that it can flow into a well. If not trapped in a pool, free-phase DNAPL will flow vertically through an aquifer or laterally down sloping fine-grained stratigraphic units. Also called mobile DNAPL or continuous-phase DNAPL.

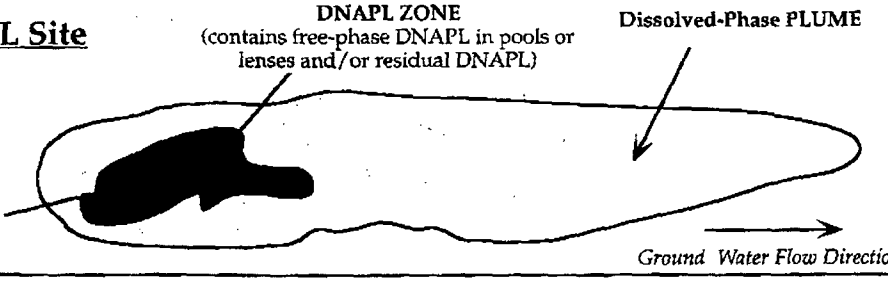
PLUME: The zone of contamination containing organics in the dissolved phase. The plume usually will originate from the DNAPL zone and extend downgradient for some distance depending on site hydrogeologic and chemical conditions. To avoid confusion, the term "DNAPL plume" should not be used to describe a DNAPL pool; "plume" should be used only to refer to dissolved-phase organics.

POOL and LENS: A pool is a zone of free-phase DNAPL at the bottom of an aquifer. A lens is a pool that rests on a fine-grained stratigraphic unit of limited areal extent. DNAPL can be recovered from a pool or lens if a well is placed in the right location.

RESIDUAL DNAPL: DNAPL held in soil pore spaces or fractures by capillary forces (negative pressure on DNAPL). Residual will remain trapped within the pores of the porous media unless the viscous forces (caused by the dynamic force of water against the DNAPL) are greater than the capillary forces holding the DNAPL in the pore. At most sites the hydraulic gradient required to mobilize all of the residual trapped in an aquifer is usually many times greater than the gradient that can be produced by wells or trenches (26).

RESIDUAL SATURATION: The saturation (the fraction of total pore space containing DNAPL) at which DNAPL becomes discontinuous and is immobilized by capillary forces (14). In unsaturated soils, residual saturation typically ranges from 5% to 20% of total pore volume, while in the saturated zone the residual saturation is higher, with typical values ranging from 15% to 50% of total pore volume (14,17). At many sites, however, DNAPL migrates preferentially through small-scale fractures and heterogeneities in the soil, permitting the DNAPL to penetrate much deeper than would be predicted from application of typical residual saturation values (16).

Defined Areas at a DNAPL Site



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